Car Builders' Dictionary

and

Cyclopedia

Ninth Edition
1919

(*SECOND EDITION*)

Definitions and Illustrations of American
Railway Cars, Their Parts and Equipment

Compiled and Edited
for the
Master Car Builders' Association

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Published by Simmons-Boardman Publishing Company
Woolworth Bldg. New York, N. Y.

Home Life Bldg.
Washington, D. C.

First National Bank Bldg.
Cincinnati, O.

Transportation Bldg.
Chicago, Ill.

Citizens Bldg.
Cleveland, O.

London, England

The Car Builders' Dictionary

At the Fifth Annual Convention of the Master Car Builders' Association, held in Richmond, Virginia, in 1872, it was

"Resolved, That a committee be appointed with power to publish an illustrated book, defining the proper terms or names of each and every part used in the construction of railway cars, and a description of the use of the same."

This committee consisted of F. D. Adams, M. C. Andrews, Leander Garey, A. Stienbach, C. A. Smith, Joseph Jones and I. W. Van Houten, the actual compilation of the dictionary being done by Matthias N. Forney, assisted by Messrs. Garey and Smith of the committee.

At the Fourteenth Annual Convention, held in Detroit in 1880,

"The committee to which was assigned the duty of preparing a dictionary of terms used in the construction of cars submitted a copy of the book and reported that it had finished its work, and it was discharged."

Revised editions were compiled in 1884 and 1888 by A. M. Wellington, assisted by members of the executive committee of the Master Car Builders' Association.

This dictionary was revised in 1895 and 1898 by Professor John C. Wait, assisted by R. H. Soule, superintendent of motive power, Norfolk & Western; A. E. Mitchell, superintendent of motive power, New York, Lake Erie & Western, and C. A. Smith, master car builder, Union Tank Line.

Revised in 1903 by Rodney Hitt, assisted by A. M. Waitt, superintendent of motive power, New York Central & Hudson River; J. S. Lentz, master car builder, Lehigh Valley; W. P. Appleyard, master car builder, New York, New Haven & Hartford.

Revised in 1906 by Rodney Hitt, and in 1909 by Francis E. Lister, under the supervision of C. A. Seley, mechanical engineer, Chicago, Rock Island & Pacific; H. F. Ball, superintendent of motive power, Lake Shore & Michigan Southern; J. E. Muhfeld, general superintendent of motive power, Baltimore & Ohio.

Revised in 1912 by Roy V. Wright, managing editor of the Railway Age Gazette and editor of the American Engineer, assisted by Andrew C. Loudon, under the supervision of a committee composed of R. B. Kendig, chief mechanical engineer, Chicago, Burlington & Quincy; C. B. Young, mechanical engineer, Chicago, Burlington & Quincy, and R. L. Ettinger, consulting mechanical engineer, Southern Railway.

Revised in 1916 by Roy V. Wright, managing editor of the Railway Age Gazette and editor of the Railway Mechanical Engineer; and Andrew C. Loudon, associate editor of the above publications; assisted by George Mitchell, under the supervision of H. C. Manchester, superintendent of motive power and equipment, Delaware, Lackawanna & Western; William Schlafge, general mechanical superintendent, Erie Railroad, and G. W. Wildin, mechanical superintendent, New York, New Haven & Hartford.

Preface

This, the ninth edition of the Car Builders' Dictionary, is a thorough revision of the eighth (1916) edition.

The definition section has been carefully revised and enlarged by the addition of definitions of new devices. It includes the latest revisions of the Master Car Builders' Association specifications, and numerous references have also been made to discussions and papers on various phases of car construction, operation and repair, which are recorded in the M. C. B. Proceedings.

The entire illustrated section has been reconstructed, eliminating illustrations of obsolete practices. Photographic views and drawings have been grouped to give complete information of a specific car on consecutive pages, and illustrations of a large number of new cars and devices have been added.

Subdivisions of the illustrated section include:

> American built cars and parts for use in foreign lands by traffic lines and industrial enterprises, such as sugar plantations and mines;
>
> Transport cars, railway gun carriages and hospital cars used by the American Expeditionary Forces in the recent world war;
>
> Standard cars designed and built under the direction of the United States Railroad Administration and details and floor plans required by United States Government postal car specifications;
>
> Master Car Builders' Association standards and recommended practice, and methods of loading materials.

Of special interest also is the enlarged Catalog Section, which was introduced for the first time in the 1916 edition. References to these detail descriptions of special devices have been made in the definition section, this section thus forming an index for the entire book.

To the Users of this Dictionary

It has been pointed out by the users of this work that if some way could be found to amplify the information given in the Illustrated Section respecting the various cars, devices, and other products, it would be extremely helpful. The very nature of the book, covering as it does every known and available device used in car construction makes an unusually large volume. It is, therefore, necessary to restrict the type matter in the Illustrated Section to captions.

Many of the devices are described in greater detail in the Catalog Section which begins on page 1117. This Section describes briefly the construction, utility, advantages, and savings to be derived from the use of certain articles.

A general list of contents is given on the next page and a complete index is embodied in the definition section. (Pages 1-248.)

As a quick reference to any group of cars or parts refer to the list of contents and for reference to a specific part refer to the figure and page numbers given with the definition.

The Alphabetical Index, to the Catalog Section, giving the names of the companies so listed (page 1334) ; the Directory of Products (pages 1320-1330) ; and the Trade Name Index, giving the name by which a product is usually distinguished (pages 1331-1333), will all be found of practical help by those who make full use of this work.

General Contents

NOTE.—*Complete index is given with the definitions, pages 1 to 248.*

A DICTIONARY OF AMERICAN
RAILWAY CAR PRACTICE

A

"A" Car Roof. A car roof with straight carlines, meeting at a point like rafters in the center of the upper deck. See CAR ROOF.

"A" Frame. A strut in the form of the sides of the letter A, to which the boom guys of a steam shovel are fastened.

"A" Frame Step. The supports of the bottom ends of the "A" frame of a steam shovel.

Accelerator. Fig. 2084. A special fitting used in connection with the hot water circulation heating system to quicken the circulation of hot water.

Accordion Hood. A term sometimes applied to the top transverse portion of a vestibule diaphragm. See DIAPHRAGM.

Acetone. A colorless liquid, obtained from the destructive distillation of wood, which resembles alcohol and which has the property of absorbing acetylene gas under pressure in a high degree.

Acetylene Gas. A colorless gas, C_2H_2, produced when water is brought in contact with calcium carbide. It has a distinctive odor and burns with a bright, luminous flame. It is used in car lighting with success. It may be generated in the car, under the car, or carried in tanks filled with acetone and asbestos under pressure.

Acetylene Gas Lamps and Fixtures. Figs. 2314, etc.

Acetylene Gas Lighting Systems. Figs. 2312-2314. This system uses acetylene gas stored in tanks filled with asbestos and charged with 4/10 of a volume of acetone, a colorless liquid obtained from the dry distillation of wood which absorbs large quantities of acetylene under pressure. When the pressure is relieved the acetylene is given off and the acetone remains in the tank and may be used over again on recharging; 2,000 cubic feet of acetylene may be stored under a pressure of 150 lbs. in a tank 114 in. by 20 in. and may not be exploded by any known means when in the tanks filled with asbestos bricks. Such a supply is sufficient for more than one month's lighting of an ordinary car. The gas is generated in stations at terminals, and the tanks, when empty, are replaced by full tanks supplied from the charging stations or charged from yard lines. The lamps and piping for the car are similar to those used with the Pintsch gas system.

Figs. 2316-2340. In this system the gas is generated in the apparatus shown in Figs. 2321, 2322, which is enclosed in one end of a car. The carbide is contained in cartridges, pockets or baskets. The water flowing down and coming into contact with the carbide generates acetylene gas, which is stored in the receiving tank under the car as shown in Fig. 2329. The piping and arrangements through the car are similar to those of the Pintsch system. The form of the lamp is shown in Fig. 2327.

Figs. 2341-2346. This system employs a gas generator mounted under the car. The carbide is put in a cartridge which is put in or removed from the generator as shown in Figs. 2345, 2346. See TRAIN LIGHTING.

Adjustable Foot Rest. A sliding foot rest, supported by various mechanical devices—as by a ratchet arc or on rabbet pieces. A foot rest or rail under a seat, which can be adjusted to suit the passenger using it. See FOOT REST.

Admission Valve. (Car Heating.) Used in connection with steam heat system.

Advertising Rack Rail. (Street Cars.) A strip of wood to which the frames for advertising cards are screwed or otherwise fastened.

Agasote. Page 1238. A substitute for wood; used extensively in place of wood for headlinings, side panels, floors and outside roofs. Its composition is secret, but it does not contain rosin or any acid compound injurious to paint or steel. Panels made from this material can be scraped, planed, molded or sawed on any wood-working machine and will not split under various changes of temperature and humidity. Used extensively for interior finish of steel cars, owing to its insulating and sound-deadening properties. The material used in steel cars is fire resisting.

Air Brake. Figs. 1365-1495; Pages 1306-1313. Any brake operated by air pressure, but usually restricted to systems of continuous brakes operated by compressed air, in distinction from vacuum brakes, which are operated by creating a vacuum. The air is compressed by some form of pump on the locomotive, or a motor compressor on electric cars, and is conveyed by pipes and flexible hose between the cars to cylinders and pistons under each car, by which the pressure is transmitted to the brake levers, and thence to the brake shoes. This system is what is now termed the straight-air brake. It is now obsolete in steam road practice, having been replaced by the AUTOMATIC AIR BRAKE. See also ELECTRO-PNEUMATIC BRAKE, TRACTION AIR BRAKE, VACUUM BRAKE, EMPTY and LOAD BRAKE EQUIPMENT, HIGH SPEED BRAKE, QUICK ACTION AUTOMATIC AIR BRAKE.

Air Brake (General Arrangement and Details), (M. C. B Recommended Practice).

In 1913 the braking power for freight equipment at 60 per cent of the light weight of the car, based on 50 pounds per square inch cylinder pressure, was adopted as Recommended Practice.

Air Brake. (General arrangement and details.) Figs. 1365-1495. (M. C. B. Standard.) Figs. 2956-2960.

Sheet M. C. B. 18

The general arrangement and details of brake gear for air-brake cars, as shown on this sheet, are standard. See letter ballot 1889, and other action 1890, 1891 and 1898. At the same time the following standards were adopted in this connection:

1. Maximum train-pipe pressure, 70 pounds per square inch.

2. Maximum brake power in freight cars, 70 per cent of the light weight of car.

3. All levers 1 inch in thickness; all pins to be 1 3/32 inch in diameter; all jaws or clevises made of ¾-inch by 2½-inch iron; all rods ¾ inch diameter.

4. Angle of brake beam lever, 40 degrees with vertical.

Drawing revised in 1896 and 1898.

The revision made in 1896 consisted in the omission of such detail dimensions as could not be used in all cases, such as the length and proportions of main levers, and the omission of some of the smaller parts from the drawing, such as the pipe clamps, staples, etc. The dimensions of the cross-section of the malleable iron truck lever connection were increased, and the letters W. I., M. I., C. I., etc., indicating the material of which the parts were to be made, were omitted from the drawing.

In 1898 the following changes were made:

Diameter of truck lever connection for outside hung brakes changed from ¾ inch to ⅞ inch, and a note to this effect was added under title on this sheet.

Diameter of hole for cotter in air-brake pin was first indicated as 7/16 inch.

Addition was made to note under drawing of truck lever connection for inside hung brakes as follows: "If made of round iron or steel, must not be less than 1⅝ inch diameter."

Dummy coupling was omitted from drawing and air hose was shown as hanging down.

The words "33 inches or" were omitted from height shown for air-brake pipe above rail.

Diameter of release-valve rod was changed from ¼ inch to ⅜ inch.

In 1900 a standard brake pipe nipple, 10 inches long, was ordered shown located directly back of the angle cock.

See Sheet M. C. B.—Q for Recommended Practice for location of air-brake parts.

In 1904 the location of the main air pipe and angle cock was changed from Recommended Practice to Standard. See letter ballot, Proceedings, 1904.

In 1911 the following specifications were adopted:

Brake chain shall be of not less than ⅜-inch, preferably 7/16-inch, wrought iron or steel, with a link on the brake-rod end of not less than 7/16-inch, preferably ½-inch, wrought iron or steel, and shall be secured to brake-shaft drum by not less than ½-inch hexagon or square head bolt. Nut on said bolt shall be secured by riveting end of bolt over nut.

In 1908 the diameter of the holes in the different levers, guides, brackets and connections were omitted, and a note added to drawing reading as follows: "All holes for brake pins not less than 1 3/32 inch diameter nor more than 1⅛ inch diameter."

In 1909, in order to suit the different types of air-brake equipment and particularly to provide for the 10-inch brake cylinder, a note was added to Sheet M. C. B. 18:

For brake cylinders larger than 8 inches or for brake-cylinder pressures above 50 pounds per square inch, the size of brake rods and levers should be increased, if necessary, so that the fiber stress shall not exceed 15,000 pounds per square inch for rods and 23,000 pounds per square inch for levers. See Sheet M. C. B. 18.

In 1909 the use of malleable-iron construction was discontinued, and providing that the truck connections be made of round iron or steel not less than 1⅝ inch diameter.

In 1911 the use of cast steel for truck-lever connections was permitted.

In 1911 a standard bottom rod for use with all steel or steel-tired wheels with inside hung brakes was adopted as shown on Sheet M. C. B. 18.

In 1912 Sheet M. C. B. 18 was revised to show an additional lever, in order that the hand brake and air brake will work in harmony on double hand-brake cars.

In 1916 the bottom rod connection was changed to show two holes (1¾-inch center) in jaw at one end for use with cast-iron wheels.

In 1916 the tunnel brake shown on Sheet M. C. B. 18 was eliminated.

In 1916 the location of main air pipe on freight cars was revised.

In 1917 dimensions were added showing the spacing of holes 1¾ in. in jaws of truck lever connections on trucks equipped with steel wheels.

Air Brake and Train Air Signal Instructions. Recommended Practice. In 1898 the Air Brake and Signal Instructions which had been in use since 1892 were slightly revised and adopted as a Recommended Practice of the Association. Revised in 1904. These instructions were also approved by the American Railway Master Mechanics' Association as originally adopted in 1892 and as revised in 1898 and 1904. For instructions in detail, also see separate pamphlet.

In 1911 Rule 121 was modified and some slight changes made in text and illustrations and the rules ordered printed in the Proceedings.

In 1914 the Air Brake and Train Air Signal Instructions were revised.

In 1914 the general questions regarding the use of the air brake and train air signal instructions were omitted in accordance with the result of letter ballot.

AIR BRAKE AND TRAIN SIGNAL INSTRUCTIONS.

"A"—GENERAL INSTRUCTIONS.

1. The following rules and instructions are issued for the government of all employees of this railroad whose duties bring them in contact with the maintenance and operation of the air brake and train air signal apparatus. They must be obeyed in all respects, as employees will be held strictly responsible for the observance of same.

Every employee whose duties are connected in any way with the maintenance and operation of the air brake will be examined from time to time as to his qualifications for such duties by the Inspector of Air Brakes or other person appointed by the proper authority, and a record will be kept of such examination.

Any employee whose work indicates an apparent lack of the requisite brake knowledge will be required to pass an examination at any time following such indications.

"B"—INSTRUCTIONS TO ENGINEMEN.

2. Enginemen when taking charge of locomotives must see that the air brake and train air signal apparatus on engine and tender is in good working order and that the air compressor and lubricator work properly; that the devices used for regulating all pressures are adjusted at the authorized amount; that

brake valves work properly in all positions of the handle, and that, when brakes are fully applied, with cam type of driver brake, the pistons do not travel less than 2 in., nor more than 3½ in., and with other forms of driver brakes from 4 to 6 in.; that the engine truck and trailer brake piston travel be not less than 4, nor more than 6 in.; that the tender brake piston does not travel less than 6 nor more than 8 in.

Enginemen must report to roundhouse foremen, in writing, at the end of the run, any defects in the air brake or train air signal apparatus.

3. *Making Up Trains. Testing Brakes at Terminal Points and Before Starting Down Such Grades As May Be Designated by Special Instructions.*—The brake pipe on the engine and under the tender must always be blown out and maximum pressure obtained in main reservoir before coupling engine to train.

After the train has been coupled, stretched and fully charged, the engineman shall, at the request of the inspector or trainmen, apply the brakes with full service application and leave them so applied until all brakes operated from the engine have been inspected and the signal given to release. The engineman must then release the brakes and he must not leave the station until it has been ascertained that all brakes are released and he has been informed by the inspector, or the trainmen, of the number of brakes in service and of their condition. If any defect is discovered during this test same must be corrected and the brakes again tested, and the operation repeated until the brakes are known to be in good condition.

In testing passenger train brakes, signal for releasing must be given from the air signal discharge valve on rear car.

Following the separation of couplings for local switching, or when engine is parted from train, or train has been parted for any purpose, the above test need not be complied with further than to ascertain, by test, that the rear brakes are responsive to brake valve on engine and that all brakes have properly released. However, when cars are added to train, the brakes on such cars must be inspected as in terminal test. When a back-up hose is to be used to control the train, the brakes must be applied for test with the back-up hose, and released from the brake valve on the engine.

4. *Service Application.*—Passenger Trains.—In making service stops from high speed, two applications should be used. The first application should be derived from two or more brake-pipe reductions, and when the speed has reduced to about fifteen miles per hour, release all brakes, and complete the stop with a moderate service application.

In making service stops with trains of less than seven cars, the brakes should be released about the time the drivers make the last revolution, except on heavy grades. Even on moderate grades and when stopping at water stations, coaling chutes, short platforms, etc., this should be done, and after releasing re-apply the brakes, either automatic or independent, as required, to prevent the train from starting. To avoid shocks and train parting the brakes must not be released on trains of seven or more cars while moving at a speed of less than ten miles per hour.

If *undesired quick action* has taken place during a service application on trains of more than five cars, the brakes must not be released until the train comes to a stop.

5. *Service Application.*—Freight Trains.—In applying the brakes to steady the train on descending grades, or for reducing speed for any purpose, an initial brake-pipe reduction of not less than 7 lb. must be made. Releasing brakes at low speeds must not be attempted unless local conditions are favorable for same.

Ample time should always be allowed for making the stop, first permitting the slack of train to become adjusted before commencing to use the brake. After this the first brake-pipe reduction should be made and it should be sufficiently heavy to make the stop, being not less than 7 or more than 12 lb., according to the length of the train. Then when not more than a car length (40 ft.) short of the completion of the stop, a second reduction sufficiently heavy should be made to cause the brake valve to be blowing when stop is completed. After a reduction to apply brakes, no attempt must be made to release, until air ceases to discharge from the brake-valve pipe exhaust.

When backing freight trains and it is desired to stop, apply the brake in service, and when conditions permit, keep the engine brake from applying and the throttle open until stop is complete, the idea of keeping the engine brake released and using steam while train brake is applying being to keep the slack of train bunched and thus prevent train parting.

6. *Emergency Applications.*—The emergency application of the brakes must be used only in actual emergencies. Under such conditions the brake valve handle must be left in emergency position until train has come to a stop.

ENGINEMEN'S STRAIGHT AIR OR INDEPENDENT BRAKE VALVES

(A) Always keep both brakes cut in and ready for operation, unless failure of some part requires cutting out.

(B) Always carry an excess pressure of 20 lb., or more, in the main reservoir, as this is necessary to insure a uniformly satisfactory operation.

(C) The straight air or the independent brake valve should not be used for bunching the slack of the train previous to an automatic application; neither should it be used alone for making ordinary stops with a train.

(D) The reducing valves for the straight air and the independent brake and the safety valves for the locomotive brakes should be kept adjusted at the authorized pressures.

When a full application of the straight air or of the independent brake causes any of the safety valves to operate, it indicates that same is out of order, or too high adjustment of the reducing valve or too low adjustment of the safety valve, or leakage of same. Have the reducing and safety valves tested and adjusted.

7. *Brakes Applied from an Unknown Cause.*—If it is found that the train is dragging as though the brakes were applied without rapid falling of the pointer on the brake pipe air gage, the engineman must make an effort to release the brakes, which may be done as follows: First, if brake-pipe pressure is less than authorized amount and the required excess pressure is carried in the main reservoir, move the handle of the brake valve to release position for an instant and then return it to running position; second, should the brake pipe be fully charged, apply the brakes with

a heavy service reduction, and release them in the usual way. In case the brakes can not be released in this manner, the train must be stopped and the trainmen notified.

If, however, the brakes go on suddenly with a rapid fall of brake-pipe pressure, it is evidence that (A) a conductor's valve has been opened, (B) a hose has burst or other serious leak has occurred, or (C) the train has parted. In such an event the engine throttle should be closed and the brake-valve handle immediately placed on lap or in emergency position, to prevent the escape of air from the main reservoir, and left there until the train has stopped and the signal to release has been given.

8. *Braking by Hand.*—Hand brakes must not be used, except in emergency.

9. *Cutting Out Brakes.*—The engine and tender brakes must always be used automatically at every application of the train brake, unless defective, except upon such grades as shall be designated by special instructions.

When necessary to cut out either the engine or the tender brake, it shall be done by closing the cut-out cock, located between the brake pipe and triple valve, and opening the drain cock in the auxiliary reservoir, on locomotives so equipped. On locomotives having the ET or the LT equipment close the cut-out cock in the pipe leading to the respective brake cylinder.

10. *Double Headers.*—When two or more engines are coupled in the same train, the brakes must be connected through to and operated from the leading engine. Engineman of each engine, except the leading one, must close the double-heading cock below the automatic brake valve and carry the handle of brake valve in running position. He will run the compressor for the purpose of maintaining pressure on his engine, and of enabling him to assume charge of the train brakes should occasion require.

11. *Dead Engine Feature.*—Its purpose is to supply air to the main reservoir for operating brakes and other devices on engines where pump has failed, or on dead engines en route. In both cases the cut-out cock in this device must be kept open and handle of both brake valves on such engines left in running position, and the double heading cock below automatic brake valve kept closed.

The dead engine cut-out cock must be kept closed on all engines whose compressors are running.

"C"—INSTRUCTIONS TO TRAINMEN.

12. *Making Up Trains and Testing Air Brakes.*—After the locomotive has been coupled to the train, or after two or more sections have been coupled together, the brake and signal couplings must be united, the cocks in the brake and signal pipes must all be open, except those at the rear end of the last car, which must be closed, and the rear hose hung up in the dummy couplings, when cars are so equipped.

After the train has been coupled, stretched, and fully charged, the engineman must be requested to apply the brakes. When he has done so, the brakes of each car must be examined to see if they are properly applied. When it has been ascertained that each brake has so applied, the engineman should be signalled to release.

In testing passenger-train brakes the train air signal whistle code for releasing must be used, and the signals to release must be given from the air signal apparatus on the rear car. The brakes of each car must then be examined to see that each is released, and the engineman informed as to the number of brakes in service and of their condition.

If any defect is discovered it must be remedied and the brakes tested again—the operation being repeated until it is ascertained that everything is right. The conductor and engineman must then be notified that the brakes are all right. Following the separation of couplings for local switching or when engine or train has been parted for any purpose, the above test need not be complied with other than to ascertain, by test, that the rear brakes are responsive to brake valve on engine, and that all brakes have properly released.

No passenger train must be started out from its terminal with the brakes upon any car cut out or in a defective condition. The air brakes must be relied upon to control all trains.

13. *Detaching Locomotive or Cars.*—First close the cocks in the brake and signal pipes at the point of separation, and then part the couplings by hand.

Couplings Frozen.—If the couplings are found to be frozen together or covered with ice, the ice must first be removed and then the couplings thawed to prevent injury to the gaskets.

14. *Brakes Sticking.*—If brakes are found sticking and can not be released from the engine, or if the brakes are applied to detached cars, the release may be effected by opening the release valve in the auxiliary reservoir until the air begins to release through the triple valve, when the valve must be closed.

15. *Train Breaking In Two or More Parts.*—First close the cock in the brake pipe at the rear of the first section, and then signal the engineman to release the brakes. Having coupled to the second section, observe the rules for making up trains—first being sure that the cock in the brake pipe at the rear of second section has been closed, if the train has broken in more than two sections. When the engineman has released the brakes on the second section, the same method must be employed with reference to the third section, and so on. When the train has been once more entirely united the brakes must be inspected on each car to see that all are released before proceeding.

16. *Cutting Out the Brakes on a Car.*—When necessary to cut out the brake upon any car, close the cut-out cock in the cross-over pipe near the triple valve, and open the drain cock in the auxiliary recervoir, leaving it open on passenger cars.

On freight cars the release valve must be held open until all of the air has escaped from the reservoir, when an air-brake defect card must be applied. The conductor must notify the engineman of brake cut-out.

17. *Conductor's Valve.*—Should it become necessary to apply the brakes from the train, it may be done by opening the conductor's valve in any car so equipped. *The valve must be held open until the train comes to a stop, and then must be closed.*

This method of stopping the train must not be used except in case of emergency.

18. *Burst Hose.*—In the event of the bursting of a brake hose, it must be replaced and the brakes tested before proceeding, so as to ascertain that the rear brakes are responsive to the brake valve on engine. At least one extra air-brake hose complete should be carried by all crews, and in addition one extra signal hose complete carried by passenger crews.

19. *Brakes Not In Use.*—When the air brakes are not in use, hose should be kept coupled between the cars or hung to the dummy couplings when cars are so equipped.

20. *Pressure Retaining Valve.*—When this valve is to be used, the trainmen must, at the top of the grade, at the point authorized, test the brakes upon the whole train, and must then pass over the train and turn the handles of the pressure retaining valves upon all or upon a part of the cars, as may be directed, to proper position for retaining pressure. At the foot of the grade, the handles must be turned downward (lengthwise with pipe) again. Special instructions will be issued as to the grades upon which these valves are to be used.

21. *Train Air Signal.*—In making up trains, all couplings and car discharge valves on the cars must be examined to see if they are tight. Should the car discharge valve upon any car be found defective, it may be cut out by closing the cock in the branch pipe leading to it. The conductor must be notified when the signal has been cut out upon any car, and he must report the same for repairs.

In using the signal, pull down upon the cord during one full second for each intended blast of the signal whistle, and allow three seconds to elapse between the pulls.

22. *Reporting Defects to Inspectors.*—Any defect in either the air brake or the train air signal apparatus must be reported to the inspector on arrival at terminal; or, if the defect be a serious one in passenger service, it must be reported to the nearest inspector, and such defect must be remedied before the car proceeds.

"D"—INSTRUCTIONS TO ENGINE-HOUSE FOREMEN

23. *General.*—It is the duty of the engine-house foreman to know that the air brake and train air signal equipment is properly inspected upon each locomotive after each run, and that necessary repairs are made before leaving the engine house. Air gages must be tested at least once every thirty days, and date of testing shown.

24. *Air Compressors.*—The air compressors must be tested for efficiency by orifice test, and their condition determined.

Compressors must be started slowly with drain cocks open, these cocks to be left open until compressor is free from all condensation. They must also be left open while compressor is not working.

25. *Compressor Governor.*—The compressor governor should cut off the steam supply when the air pressure for which it is adjusted has been obtained, and promptly admit steam to the compressor when air pressure falls slightly below the authorized amount.

26. *Brake Valves.*—These valves must be kept clean and be known to be in working order in all positions of the handle before the engine leaves the engine house.

27. *Adjustment of Brakes.*—Engine brake piston travel should not be less than 4 nor more than 6 in.; for tender brake not less than 6 nor more than 8 in. When cam driver brake is in use piston travel should be not less than 2 in. nor more than 3½ in., and care must be taken to adjust both cams alike, so that the point of contact of the cams will be in line with the piston rod; the brake shoes should be correctly adjusted at equal distances from the wheel at the top and bottom of the shoe and in line with the tires.

28. *Brake Cylinders and Triple Valves.*—Engine and tender brake cylinders, plain triple valves and high-speed reducing valves should be cleaned, lubricated and tested, at least once in six months; when locomotive is equipped with distributing valve or control valve, or the tender has a quick action triple valve, these parts should be cleaned and tested at least once in three months. Time and place of cleaning to be stenciled according to standard drawings.

29. *Draining.*—The main reservoir, and also the drain cup and dirt collector in the brake pipe under the tender, must be drained of any accumulation after each trip. The auxiliary reservoirs and triple valves must also be drained frequently, and daily in cold weather, and the brake pipe under the engine and tender blown out.

30. *Train Air Signal.*—The train air signal apparatus must be examined and tested, both at front of engine and rear of tender, before every trip by means of a suitable appliance to which is attached an air gage for testing the pressure carried. It must be known that the whistle responds properly, also that the pressure-reducing valve maintains the authorized pressure.

"E"—INSTRUCTIONS TO INSPECTORS

31. *General.*—It is the duty of all inspectors to see that the couplings, the pipe joints, the triple valves, the high-speed reducing valves, the conductor's valves, the air-signal valves, and all other parts of the brake and signal apparatus are in good order, of standard size for the car, and free from leaks. For this reason they must be tested under the full air pressure as used in service. No passenger train must be allowed to leave a terminal station with the brake upon any car cut out, or in a defective condition.

If a defect is discovered in the brake apparatus of a freight car, which can not be held long enough to give time to correct such defect, the brake must be cut out and the car properly carded, to call the attention of the next inspector to the repairs required.

Special rules will specify the smallest proportion of the total number of freight cars, with the air brakes in good condition, which may be used in operating the train as an air-brake train.

32. *Making Up Trains and Testing Brakes.*—In making up trains, the couplings must be united and the cocks at the ends of the cars all opened, except at the rear end of the last car, where the cocks must be closed; the inspector must know that the air is passing through the pipes to the rear end, and the hose couplings at the rear are properly attached to the dummy couplings on cars so equipped.

After the train is stretched and fully charged, the engineman must be requested to apply the brakes. After the brakes are applied they must be examined upon each car to see that they have the proper piston travel. This having been ascertained, the inspector must signal the engineman to release the brakes.

In testing passenger-train brakes, the signal to release must be given from the discharge valve on the rear car. He must then again examine the brakes upon each car to note that all have released. If any defect is discovered, it must be corrected and the testing of the brakes repeated, until they are found to work properly. The inspector must then inform

both the engineman and conductor of the number of cars with brakes in good order.

The examination must be repeated if any change is made in the make-up of the train before starting.

33. *Cleaning Cylinders, Triple Valves and Slack Adjusters.*—The brake cylinders and triple valves on freight equipment cars must be cleaned, lubricated and tested, at least once in twelve months, and the method of marking brake apparatus which has been cleaned, lubricated and tested, should be as shown in Rule No. 60, of M. C. B. Rules of Interchange.

On passenger cars, the cylinders and slack adjusters must be cleaned and oiled at least once in twelve months. Triple valves, control valves and high-speed valves must be cleaned and oiled at least once in every six months, and date and place of last cleaning stenciled on these parts with white paint.

The triple valves and auxiliary reservoirs must be frequently drained, especially in cold weather, by removing the plug in the bottom of the triple valve and opening the drain cock in the bottom of reservoir.

34. *Adjustment of Brakes.*—The slack of the brake shoes must be taken up by means of the truck dead levers on cars having four-wheeled truck and at the turnbuckle nearest the center of the car on cars having six-wheeled trucks. In taking up such slack it must first be ascertained that the hand brakes are released, and the slack is all taken out of the upper connections, so that the truck levers do not go within one inch of the truck timber or other stop, when the piston of the brake cylinder is fully back at release position.

When under a full application the brake piston travel is found to exceed 9 in. upon passenger or freight cars, the brake shoe slack must be taken up and adjustment so made that the piston shall travel not less than 6 in. In taking up the brake shoe slack it must never be taken up by means of the hand brakes.

Where automatic slack adjusters are applied to a car, such adjuster must be fully released before the slack is taken up elsewhere, and where cars are equipped with P. C. control apparatus it must be seen that both slack adjusters are evenly adjusted.

35. *Braking Force.*—Where the cylinder lever has more than one hole at the outer end and different holes are for use upon cars of different weights, it must be carefully ascertained that the rods are connected to the proper holes, so that the correct braking force shall be exerted upon each car.

36. *Repair Parts.*—Inspectors must keep constantly on hand for repairs supply of all parts of the brake and signal equipment that are likely to get out of order.

37. *Hanging Up Hose.*—Inspectors must see that, when cars are being switched or while standing in the yard, the hose is coupled between the cars or properly secured in the dummy couplings, where cars are so equipped.

38. *Responsibility of Inspectors.*—Inspectors will be held strictly responsible for the good condition of all the brake and signal apparatus upon cars placed in trains at their stations; they will also make examinations of the brakes, and such repairs as may be required.

Air-Brake and Train Air-Signal Hose, Specifications for (M. C. B. Standard). In 1901 specifications and tests for air-brake hose were adopted as Recommended Practice. Advanced to Standard in 1903. Revised 1905. Revised 1913.

In 1911 detailed specifications of label were placed under the heading "Label for Air-Brake Hose." Modified and changed as to form in 1914. Modified in 1915. Specifications for duck modified in 1916.

In 1901 a committee report to the M. C. B. Association on this subject was made up largely of replies to a circular of inquiry and comments on these replies. A proposed specification was submitted which was adopted as recommended practice. In 1903, these specifications were advanced to standard. The committee proposed certain changes in 1904, but these were rejected by letter ballot. At the 1905 convention the committee reported on tests made at Purdue University of 500 air brake hoses taken from actual service. The specifications were revised in this year. At the 1906 convention the committee report included the results of tests of 713 samples of air brake hose. As the result of a report made at the 1913 convention, the specifications were again revised.

In 1911 detailed specifications of a label were placed under the heading "Label For Air Brake Hose." These were modified and changed as to form in 1914, and were again modified in 1915.

I. MANUFACTURE

1. *Scope.*—These specifications supersede all previous specifications for air-brake and signal hose, including that for "Woven and combination woven and wrapped air-brake hose." Air-brake hose of the woven and combination woven and wrapped type shall meet all tests of these specifications except that of friction, Section 4, on those constructions where friction cannot be made.

2. *Physical Properties.*—All hose shall be soft and pliable and not less than four-ply. They shall be made of rubber and cotton fabric, each the best of its kind for the purpose.

II. TESTS

3. *Tests.*—Hose shall be subjected to the following tests, which shall be made with the temperature of the air not lower than 65 or higher than 90° F., and the samples shall be kept at a temperature within these limits for at least one-half hour previous to the time of test.

4. *Friction Test.*—The quality of friction shall be determined by suspending a 20-lb. weight from the separated end of the duck of one of the 1-in. test specimens described in Section 9, the force being applied radially. The separation shall be uniform and regular, and the average speed shall not exceed 8 in. in 10 min., the distance being measured while the weight is still in place.

5. *Stretching Test.*—Test specimens from tube and cover will be quickly stretched until the 2-in. marks are 10 in. apart and immediately released. They will then be re-marked as at first within 10 sec. after starting to release and again stretched to 10 in. between the new marks, remaining so stretched for 10 min. The specimens shall then be completely released, and within 30 sec. after starting to release the distance between the marks last applied will be measured, and the initial set must not be more than ¼ in. At the end of 10 min. the distance between the marks will again be measured, and the final set must not be more than ⅛ in. These test specimens may be cut from the

tube and cover of the friction-test specimen, but shall not be used for tensile test.

6. *Tensile Strength.*—Test specimens from tube and cover shall be pulled in a tensile machine with a test speed of 20 in. per minute. The inner tube must have a tensile strength of not less than 800 lb. or more than 1,200 lb. per sq. in., and the cover not less than 700 lb. or more than 1,100 lb. per sq. in. The elongation shall be such that the marks, originally 2 in. apart, stretch to at least 10 in. before specimen breaks. If the tensile strength in lb. per sq. in. is greater than that required, the sample may be accepted, providing the per cent increase in elongation is equal to or greater than the per cent increase in tensile strength in lb. per sq. in. above the maximum figure.

7. *Porosity Test.*—The remaining 17 in. shall be mounted and placed in a test rack, the circumference will be measured and the hose filled with air at 140 lb. pressure per sq. in., the rubber cover shall be cut from clamp to clamp (taking care not to injure the duck) and this pressure maintained for 5 min. At the end of this time the hose will be submerged in water to determine whether the inner tube is porous. The escape of air through the tube shall be distinct enough so that the porosity will not be confused with the escape of air which is confined in the structure of the hose. In the event the hose fails on bursting test at the point at which cut was made for porosity test and a satisfactory hydraulic test is not obtained, the porosity and hydraulic test will be repeated on another piece of hose.

8. *Bursting Tests.*—The section of hose, which was used for porosity test, shall then be subjected to a hydraulic pressure of 200 lb. per sq. in., under which pressure it shall not expand in circumference more than ¾ in. for air-brake hose and 11/16 in. for air-signal hose, nor develop any small leaks or defects. After the above test, this section shall then stand a hydraulic pressure of 500 lb. per sq. in. for 10 min., without bursting or developing any small leaks or defects, after which the hydraulic pressure shall be increased to a minimum of 700 lb. per sq. in. without bursting, at the rate of not less than 100 or more than 200 lb. per five seconds.

9. *Test Specimen.*—(a) A hose shall be selected at random and a section 5 in. cut from one end. Two sections, each 1 in. long, shall be cut from the 5-in. section for making friction, stretching and tensile tests, the remaining 3-in. section shall be used for making additional tests, which may be desired on the tube and cover. Stretching and tensile test specimens shall be cut from the tube and cover with a die having the dimensions shown in Fig. 1.

(b) In measuring the thickness of the test specimen shown in Fig. 1 to determine the strength per square inch, a micrometer graduated to 0.001 in. having a shoe 0.24 to 0.26 in. in diameter, exerting a pressure of from 8 to 10 oz. on the test specimen, shall be used.

10. *Number of Tests.*—For each lot of 200 pieces of hose one extra hose shall be furnished free of costs for test purposes.

III. PERMISSIBLE VARIATIONS.

	Length, In.	Outside Diameter, In.	Inside Diameter, In.	Thickness of Cap Vulcanized on In.
AIR-BRAKE HOSE.				
Maximum	22½	2⅛	1 7/16	3/32
Minimum	22	2 1/16	1⅜	1/32
AIR-SIGNAL HOSE.				
Maximum	22½	1⅞	1 3/16	3/32
Minimum	22	1 13/16	1⅛	1/32

IV. WORKMANSHIP AND FINISH

11. *Workmanship.*—(a) Tube. The tube shall be made either by hand or machine. It shall be free from holes and imperfections, and in joining must be so firmly united to the cotton fabric that it will meet the friction tests prescribed in Section 3. The tube shall be of such a composition and so cured as to successfully meet the requirements of tests given in Sections 4 and 5, the tubes to be not less than 3/32 in. thick.

(b) Cover. The cover shall be of the same quality of rubber as the tube and shall not be less than 1/16 in. thick, and shall meet the requirements of tests given in Sections 4 and 5.

12. *Duck.*—Construction. The canvas or duck used as a wrapping for the hose shall be made from long-fiber cotton, and shall weigh not less than 22 oz. per lineal yard, 40 in. wide. It shall have five threads per strand and not less than 16 nor more than 22 strands per inch of width, for both warp and filler. The duck shall be cut and applied on a bias of from 42 to 46 degrees, with edges lapped at least 0.5 in. and both sides well frictioned.

13. *Finish.*—The hose shall be smooth and regular in size throughout its entire length.

V. MARKING

14. *Serial Number.*—Each lot of 200 or less shall bear the manufacturer's serial number, commencing at 1 on the first of the year and continuing consecutively until the end of the year.

15. *Label.*—Each length of hose shall have vulcanized on it the label for air-brake hose of red rubber, as shown under the specifications for "Label for Air-Brake Hose." This label shall be applied around the hose at a point 6 in. from the end (a variation of ½ in. either way will be permitted) and with the top of the lettering toward the center of the hose.

VI. INSPECTION AND REJECTION

16. *Inspection.*—(a) The manufacturer shall afford the inspector, free of cost, all reasonable facilities to satisfy him that the material is being furnished in accordance with these specifications.

(b) The purchaser may make the tests and inspection to govern the acceptance or rejection of the material in his own laboratory or elsewhere. Such tests and inspection shall be made at the expense of the purchaser.

(c) All tests and inspection shall be so conducted as not to interfere unnecessarily with the operation of the works.

17. *Rejection.*—Material which, subsequently to above tests at the mills or elsewhere, and its acceptance, or prior to being placed in service, develops weak spots or imperfections, or fails to pass any one of the tests herein required, within 60 days from date of shipment, will be rejected and shall be replaced by the manufacturer at his own expense.

18. *Rehearing.*—Samples tested in accordance with this specification, which represent rejected material, shall be preserved for 14 days from date of test report to the manufacturer. In case of dissatisfaction with results of the tests, the manufacturer may make claim for a rehearing within that time.

Air-Brake Appliances. Recommended Practice. Sheet M. C. B.—Q.

In 1899 a Recommended Practice for the location

of air brake parts on different classes of cars was adopted, as follows:

1. Location of air-brake cylinders and triple valves on box cars and other clear bottom cars.

2. Location of air-brake cylinders and triple valves on hopper gondola cars and drop bottom gondola cars.

3. Arrangement of piping for clear bottom cars, or cars of the box car type.

4. Location of main air pipe at ends of cars.

5. As to the manner of fastening air cylinder reservoirs, retaining valves, etc., to the framework of cars, the bolts fastening the cylinders and reservoirs should be either double-nutted or cottered, so as to prevent the same from working loose. The air pipes should be fastened to the framework of the car with a liberal number of clamps.

One elbow should be applied to the retaining valve pipe, it being located at the end sill of the car where pipe turns upward.

One union should be applied as close to the triple valve as practicable to permit the easy removal of same; the pipe to be carried along under side of the intermediate sill when practicable, from the triple valve to end of car, and be supported by either staples or clamps, not to exceed six feet apart.

6. In 1902 label for air-brake hose to show dates of application and removal, manufacturer's name and name of railroad company was advanced to Standard.

In 1904 the location of main air pipe and angle cock shown on Sheet G was changed to Standard, and is now shown on Sheet M. C. B. 18.

In 1918, by letter ballot, it was decided that the air supply for water-raising systems of passenger equipment should be taken from the following points in the brake system, with the different types of brakes as follows:

(a) Schedule PM—From auxiliary reservoir.
(b) Schedule PC—From emergency reservoir.
(c) Schedule UC—From emergency reservoir.
(d) Schedule LN—From supplementary reservoir.

Where a cut-out cock is used in the brake system for cutting out the supplementary or emergency reservoir, the air connection for the water-lift system should be made between the reservoir cut-out cock and the triple valve or control valve.

Air-Brake Appliances. Standard. Sheet M. C. B. 18, Fig. 2957.

In 1913 10-inch air-brake cylinders for freight cars weighing between 37,000 pounds and 58,000 pounds light weight were adopted as Recommended Practice. In 1914 advanced to Standard for cars built after January 1, 1915, weighing between 37,000 lb. and 58,000 lb. Note made on Sheet M. C. B. 18.

In 1914 advanced to Standard and note made on Sheet M. C. B. 18.

In 1913 the K^1, for 8-inch, and the K^2, for 10-inch equipment, were adopted as Recommended Practice. Advanced to Standard in 1917.

In 1916 a proper installation of centrifugal dust collector for freight cars was adopted, also revised dimensions covering the location of angle cocks at end of freight cars.

Air Brake, Cleaning and Testing (M. C. B. Standard). In 1902 the following method for cleainng air brakes was adopted as Recommended Practice. Revised and advanced to standard in 1911.

In 1917 the adjustment of piston travel was changed to not less than 6 in. nor more than 8 in.

A topical discussion on repairing and cleaning air brakes on such cars as do not get to the repair yards for repairs, will be found in the 1902 M. C. B. Proceedings, page 310.

Annual Repairs to Freight-car Air Brakes
inspection

Cleaning and Lubricating Triple Valves

The triple valve should be removed from the car for cleaning in the shop, and should be replaced by a triple in good condition. It should be dismantled and all the internal parts, except those with rubber seats and gaskets, cleaned with gasoline, then blown off with compressed air and wiped dry with a cloth.

The slide valve and graduating valve must be removed from the triple piston and retarded-release parts from the body in order that the service ports in the slide valve and other parts may be properly cleaned.

No hard metals should be used to remove gum or dirt or to loosen the piston-packing ring in its groove.

The feed groove should be cleaned with a piece of wood, pointed similar to a lead-pencil. Bags or cloth should be used for cleaning purposes rather than waste, as waste invariably leaves lint on the parts on which it is used.

In removing the emergency-valve seat, care must be exercised not to bruise or distort it.

Particular attention should be given the triple-piston packing ring. It should have a neat fit in its groove in the piston, and also in the triple-piston bushing; once removed from the piston, or distorted in any manner, it should be scraped. The fit of the packing ring in its groove and bushing and the condition of the bushing should be such as to pass the prescribed tests.

The graduating stem should work freely in the guide nut. The graduating spring and the retarded-release spring in retarded-release triple valves must conform to standard dimensions and be free from corrosion. The thread portion of the graduating-stem guide should be coated with oil and graphite before reapplying it to the triple cap.

The triple-valve piston and the emergency valve must be tested on centers provided for the purpose to insure same being straight. The emergency-valve rubber seat should invariably be renewed unless it can plainly be seen to be in first-class condition, which is seldom the case. A check-valve case having cast-iron seat should be replaced with a case having a brass seat.

The cylinder-cap gasket and check-valve case gasket to be carefully examined and cleaned with a cloth; but should not be scraped. All hard or cracked gaskets to be replaced with new ones.

Standard gaskets as furnished by the air-brake manufacturers should be used. The use of home-made gaskets should be avoided, as the irregular thickness results in leakage and causes triple-piston stem to bend or break.

The tension of the slide-valve spring should be regulated so that the contour of same be such as will bring the outer end ⅛ inch higher than the bore of the bushing when the outside end of the spring touches bushing when entering.

Before assembling the parts after cleaning, the castings and ports in the body of the triple valve should

be thoroughly blown out with compressed air, and all parts of the triple not elsewhere provided for known to be in good condition.

Lubricate the seat and face of the slide valve and slide-valve graduating valve with high-grade very fine dry graphite, rubbing it onto the surface and the upper portion of the bushing where the slide-valve spring bears, so as to make as much as possible adhere to and fill up the pores of the brass, leaving a very thin coating of free graphite. The parts to be lubricated with graphite must be free from oil or grease.

Rub in the graphite with a flat-pointed stick, over the end of which a piece of chamois skin has been glued. At completion of the rubbing operation, a few light blows on the slide valve will leave the desired light coating of loose graphite.

The triple-valve piston-packing ring and its cylinder should be lubricated with either a light anti-friction oil or a suitable graphite grease as follows:

Apply a light coating to the packing ring and insert the piston and its valves in the body, leaving them in release position, then lubricate the piston cylinder and move the piston back and forth several times, after which remove the surplus from the outer edge of the cylinder to avoid leaving sufficient lubricant to run on the slide valve or seat while the valve is being handled or stored ready for use.

No lubrication to be applied to the emergency piston, emergency valve or check valve.

All triple valves, after being cleaned or repaired, must be tested, preferably on a rack conforming to the attached print, and pass the test prescribed under the subject of "Triple Valve Tests" before being placed in service.

Should any of the triple-valve bushings require renewing, such work should be done by the air-brake manufacturers.

Triples in which packing rings are to be renewed, slide valve or graduating valves renewed or faced, if the latter are of slide type, should be sent to a central point or general repair station for repairs.

When applying the triple valve to the auxiliary reservoir, the gasket should be placed on the triple valve, not the reservoir.

CLEANING

Lubricating and Inspection of the Brake Cylinders

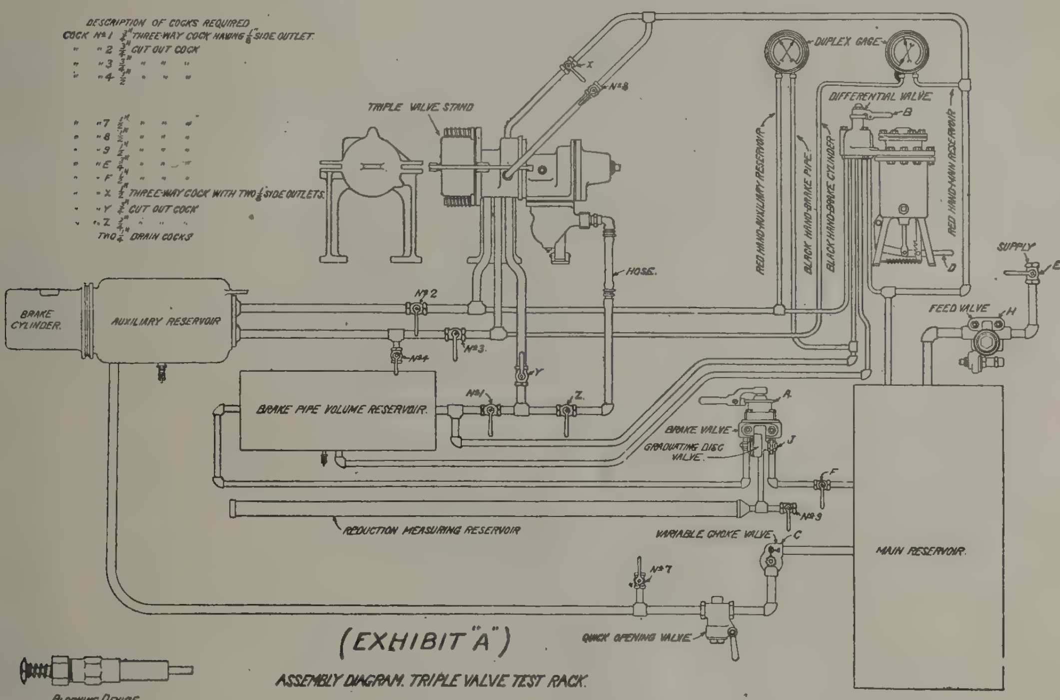
First, secure the piston rod firmly to the cylinder head; then, after removing the non-pressure head, piston rod, piston head and release spring, scrape off all deposits of gum and dirt with a putty knife or its equivalent, and thoroughly clean the removed parts and the interior of the cylinder with waste saturated with kerosene.

Packing leathers must not be soaked in kerosene oil, as same destroys the oil filler placed in the leather by the manufacturers, opening the pores of the leather and causing the same to become hard.

Particular attention to be paid to cleaning the leakage groove and the auxiliary tube. Triple valve must be removed when the auxiliary tube is being cleaned.

The expanding ring when applied in the packing leather should be a true circle and fit the entire circumference, and have an opening of from 3/16 to ¼ inch; when removed from the cylinder the ring opening should be 1½ to 1 9/16 inches, and with this opening, of course, will not be a true circle.

A packing leather which is worn more on one side than the other should be replaced with a new one of uniform thickness, or turned so as to bring the thin side away from the bottom of the cylinder. The piston should be turned each time the cylinder is cleaned. In putting a packing leather on piston, it should be so placed as to bring the flesh side of the leather next to the cylinder walls.



(EXHIBIT "A")

ASSEMBLY DIAGRAM. TRIPLE VALVE TEST RACK.

FIGURE 3 Revised 1918

Follower studs to be firmly screwed into the piston heads, and nuts on same to be drawn up tight before replacing the piston.

The inside of the cylinder and packing leather to be lightly coated with a suitable lubricant, using not more than 4 ounces nor less than 3 ounces per cylinder.

Part of the lubricant should be placed on the expander ring and the adjacent side of the packing leather, thus permitting the air pressure to force the lubricant into the leather at each application of the brake.

No sharp tools should be used in placing the packing leather into the cylinder.

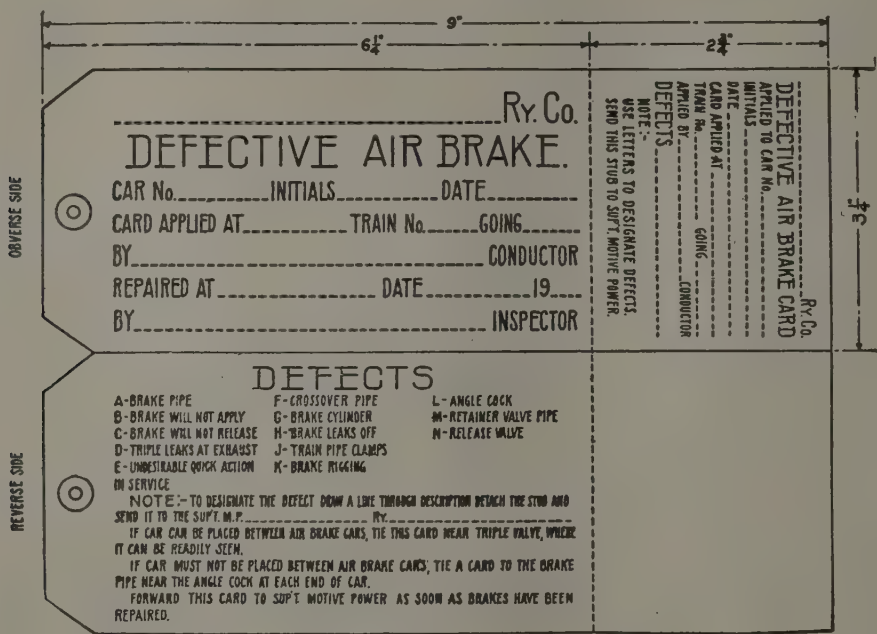
After the piston is entered, and before the cylinder head is replaced, the piston rod should be slightly rotated in all directions, about 3 inches from the center line of the cylinder, in order to be certain that the expanding ring is not out of place.

In either case, the gage will indicate cylinder leakage on releasing the triple valve after making an application, and when attached to the retainer valve it will also test the retainer and retaining-valve pipe.

Brake-cylinder leakage should not exceed five pounds per minute, from an initial pressure of fifty pounds.

Each time the triple valve and the brake cylinder are cleaned, the brake-pipe, brake-pipe strainer and branch pipe should be thoroughly blown out and the triple-valve strainer cleaned before recoupling the branch pipe to the triple valve. If a dirt collector is used, the plug should be removed, the accumulation blown out and the threaded portion of the plug coated with oil and graphite before replacing.

All union gaskets should be made of oil-tanned leather. The use of rubber in unions should not be permitted.



In forcing the piston to its proper position in the cylinder, the packing leather will skim from the inner walls of the cylinder any surplus lubricant that may have been applied. It has been found good practice to again extract the piston and remove the surplus lubricant.

All stencil marks to be scraped off or painted over with black paint. The place of cleaning, day, month and year to be stenciled with white paint, preferably on both sides of the cylinder or auxiliary reservoir, or if same is not readily visible, in a convenient location near the handle of the release rod.

The bolts and nuts holding the cylinder and reservoir to their respective plates and the latter to the car, to be securely tightened.

The brake cylinder to be tested for leakage after cleaning, preferably with an air gage, which can be done by attaching the gage to the exhaust port of the triple valve before connecting the retainer pipe, or where the latest type retainers are used the gauge can be connected to the exhaust port of the retaining valve.

Piston travel should be adjusted to not less than 6 nor more than 8 inches.

ADDITIONAL INSPECTION AND REPAIRS TO CARS

When the brake cylinder and triple valve are cleaned, the following additional work should be done to the car:

Retaining valve cleaned by removing the cap, wiping or blowing out all dirt and seeing that the valve and its seat are in good condition, the retaining position exhaust port open and the valve proper is well secured to the car in a vertical position, pipe clamps applied where missing and tightened where loose, hose and angle cocks turned to their proper position. Pipe joints, air hose, release valves, angle and stop cocks should be tested by painting the parts with soapsuds while under an air pressure of not less than 70 pounds, preferably 80 pounds, and defective parts repaired or removed.

See that there are no broken or missing brake shoes, brake beams or foundation brake gear, and if the car belongs to a foreign road, a repair card should be

made out covering all work that has been done and attached to the car, as per M. C. B. Rules.

The inspection and repairs which have been mentioned should be made to all cars at least once in twelve months.

TRIPLE-VALVE TESTS AND INSTRUCTIONS FOR OPERATING TRIPLE-VALVE TEST RACK.

Mounting Triple Valves for Testing.

With the triple-valve gasket applied to the face of the triple-valve flange, place the latter against the face of the stand in a vertical position and open cock "X" as shown on attached piping diagram, Fig. 3. Connect the brake pipe to the triple, then open cock "Z."

Before attaching triple valves suitable for use with 8-inch brake cylinders, insert in the auxiliary reservoir end of the valve the friction-increaser extension piece, suitable for the valve under test.

Two triple-valve stand face plates are required for each test rack to permit the testing of all types of freight triple valves.

Plate No. 1 is for use when testing triple valves for 8-inch cylinders.

Plate No. 2 is for triple valves used on 10-inch cylinders.

If it is found necessary to repeat any test which has necessitated a reduction of auxiliary reservoir pressure, valve "B" may be moved to position No. 2, which provides a by-pass around the triple valve from the brake pipe to the auxiliary reservoir, thereby permitting a quick recharge.

Test No. 1—Charging Test for Triple Valves

Commencing the tests with cocks 2, 3, 7 and 9 open, all other numbered cocks closed, valve "B" in position No. 3 (lap), valve "A" in position No. 1, auxiliary reservoir empty and main reservoir pressure 80 pounds pressure, proceed as follows:

Close cock No. 7 and open No. 1, and with 80 pounds pressure in the brake pipe note the time required to charge the auxiliary reservoir to specified pressure, as given in the following table:

NOTE.—If, during this test or Test No. 2 (Leakage Test), any considerable leakage is discovered, the charging test must be repeated.

With brake-pipe pressure maintained at 80 pounds, the triple valves should charge the auxiliary reservoir as follows:

Charging Auxiliary Reservoir

Westinghouse Triple Valve	From 0 to 30 Lbs. Seconds, Min.	Max.	From 0 to 70 Lbs. Seconds. Min.	Max.
8-inch non-quick service......	21	28	34	78
10-inch non-quick service......	13	17	58	44
8-inch quick service..........	32	42	100	120
10-inch quick service..........	19	24	60	72
New York Triple Valve.	**From 0 to 30 Lbs. Seconds. Min.**	**Max.**	**From 0 to 70 Lbs. Seconds Min.**	**Max.**
18-inch non-quick service.......	..	..	61	82
80-inch non-quick service.......	..	..	46	61
1 -inch quick service...........	..	..	100	120
0 -inch quick service...........	..	..	65	80

These tests give practically the same results, and the time of charging from 0 to 30 pounds is given simply to save time in making the test.

Test No. 2—Leakage Test

Commencing each of the sections of Test No. 2, with cocks 1, 2, 3 and 9 open, all other numbered cocks closed, valve "B" in position No. 3 (lap), valve "A" in position No. 1 and auxiliary reservoir charged to 80 pounds, proceed as follows:

Sec. "A," Test No. 2—Westinghouse Triple Valves and New York Quick-service Triple Valves. Leakage at Exhaust in Emergency. Check Valve and Cylinder-cap Gasket Leakage

Operate the triple valve two or three times in quick action by closing and opening cock No. 1; finally leaving it closed.

Coat the exhaust port of triple valve with soapsuds to ascertain if leakage exists past the slide valve or bushing to the exhaust with the piston and slide valve in emergency position.

Close cocks 2 and 3 and note the rate of fall of pressure indicated by the brake-cylinder gage hand, which is now connected only with the small volume between cocks 2 and 3 and the triple valve. A leakage greater than 5 pounds in 10 seconds indicates either excessive check-valve leakage or that the piston does not seal against the cylinder-cap gasket.

At the completion of this test, open cocks 2 and 3 in the order given.

Sec. "B," Test No. 2—Leakage at Exhaust in Release Slide Valve of Emergency-valve Leaking

Open cock 1, and after the brake-cylinder pressure is exhausted close cock 3 and again coat the exhaust port with soapsuds to determine if there is any leakage from the auxiliary reservoir to the brake cylinder past the slide valve when the triple valve is in release position, or from the brake pipe to the brake cylinder past the emergency valve or its seat, when the differential on the emergency valve is high. Open cock 3, then paint the body of the triple valve with soapsuds to determine if leakage exists direct to the atmosphere through castings or gaskets.

If leakage is discovered at the triple exhaust in release position, determine if it is from the auxiliary reservoir or brake pipe in the following manner:

Move valve "A" to position No. 8 and open cock 7 until the brake pipe and auxiliary reservoir are empty; then with the valve "J" in position No. 3, place a soap bubble on the exhaust port and place valve "A" in position No. 2. If no leakage is found at the exhaust, advance valve "J" by stages from position to position until a brake-pipe pressure of 10 pounds is obtained. Any leakage from the exhaust while the auxiliary reservoir is without pressure must be from brake pipe, past the emergency valve. Therefore, if no exhaust leakage is found and leakage did exist while the auxiliary reservoir was charged, it indicates defective slide valve. At the completion of this test, close cock No. 7 and move valve "A" to position No. 1, recharging auxiliary reservoir.

Sec. "C," Test No. 2—Graduating-valve Leakage

Move valve "A" to position No. 7 until a brake-cylinder pressure of from 20 to 30 pounds is obtained. Then return valve "A" to position No. 3 and close cock 3. If the brake-cylinder pressure then increases without leakage at the exhaust port, it is proper to assume that the graduating valve is leaking, providing it has been determined by the preceding tests that the emergency valve is tight. If leakage at the exhaust occurs during this test, which will be determined by placing a soap bubble on the exhaust, the leakage may be either from slide valve or graduating valve. The rate of rise of pressure on the brake-cylinder gage, resulting from graduating-valve leakage, must not exceed 5 pounds in 20 seconds. This comparatively rapid rate

of rise is permissible owing to the extremely small volume of the section of brake-cylinder pipe into which the leakage is occurring.

At the completion of test, open cock 3 and move valve "A" to position No. 1.

Sec. "A," Test No. 2—Non-quick Service. New York Triple Valve. Leakage at Exhaust in Emergency. Check-valve, Quick-action Valve and Cylinder-cap Gasket Leakage

Operate the triple valve two or three times in quick action by closing and opening cock 1, finally leaving it closed.

Coat the exhaust port of triple valve with soapsuds to ascertain if leakage exists past the exhaust valve or bushing, with the piston and slide valve in emergency position. Close cocks 2 and 3. If the brake-cylinder gage now indicates leakage greater than 5 pounds in 10 seconds the leakage is excessive, and is usually due to imperfect seating of the check valve or quick-action valve, or to the main piston not making a tight joint on the main cylinder gasket. To locate the defect, place soap bubbles on the vent ports. No leakage at these points indicates that the leakage is past the main cylinder gasket. If leakage is found at the vent ports, open cocks 1, 2 and 3 and recharge the auxiliary reservoir to 80 pounds, then move valve "A" to position No. 7 until the brake-pipe pressure is reduced 10 pounds and return valve "A" to position No. 3. Close cock 2, and if the quick-action valve is leaking the brake will immediately release. If it does not, the leakage is past the check valve.

At the completion of this test, if no leakage were found, open cocks 1, 2 and 3, and if leakage were discovered open cock 2 and move valve "A" to position No. 1.

Sec. "B," Test No. 2—Exhaust-valve Leakage in Release; also Vent-valve and Quick-action Valve Leakage

Close cock 3 and coat the exhaust port with soapsuds to determine if there is any leakage from the auxiliary reservoir past the exhaust valve, or graduating valve or triples having this valve tandem with the exhaust valve, when the triple is in release position. If exhaust leakage is found, the triple under test has tandem exhaust and graduating valves, determine which valve is leaking by making graduating-valve leakage test.

Sec. "C," Test No. 2—Graduating-valve Leakage

Move valve "A" to position No. 7 until a brake-cylinder pressure of from 20 to 30 pounds is obtained. Then return valve "A" to position No. 3 and close cock 3. If the brake-cylinder pressure then increases without leakage at the exhaust port, it is proper to assume that the graduating valve is leaking. The rate of rise of pressure on the brake-cylinder gage, resulting from graduating-valve leakage, must not exceed 5 pounds in 20 seconds. This comparatively rapid rise is permissible owing to the extremely small volume of the section of brake-cylinder pipe into which the leakage is occurring.

If leakage at the exhaust occurs during this test, which will be determined by placing a soap bubble on the exhaust, the leakage is by the exhaust valve instead of the graduating valve.

At the completion of the test open cock 3 and move valve "A" to position No. 1.

Test No. 3.—Test of Type "K" Triple Valves for Retarded-release Feature; for Both Westinghouse and New York Triple Valves.

Commencing the test with cocks 1, 2, 3 and 9 open, all other numbered cocks closed, auxiliary reservoir changed to 80 pounds, valve "B" in position No. 3 (lap), lever "D" in position No. 2 and valve "A" in position No. 3 (lap), proceed as follows:

Move valve "A" to position No. 7 until brake-pipe pressure is reduced 20 pounds, then return it to position No. 3; place valve "J" in position No. 4; valve "B" in position No. 1 and valve "A" in position No. 2. This should move the triple-valve parts to normal (full release) position.

If the triple valve moves to retarded-release position, which is indicated by a contracted exhaust and slow release of brake-cylinder pressure, it indicates a weak or broken retarded-release spring, or undue friction in the retarding device.

Following this test, recharge the system to 80 pounds by moving valve "A" to position No. 1 and valve "B" to position No. 2.

When the brake pipe and auxiliary reservoir are charged to 80 pounds move valve "A" to position No. 7 until brake-pipe pressure is reduced 20 pounds, then return it to position No. 3. Place valve "J" in notch No. 8, lever "D" in notch No. 4, valve "B" in position No. 1 and valve "A" in position No. 2.

Under these conditions the triple-valve piston and slide valve should be forced to retarded-release position. If this does not occur it indicates that the retarded-release spring is not standard, or the retarding devices have excessive friction. Completing test, place valve "B" in position 3 and valve "A" in position 1.

Sec. "A," Test No. 4.—Application Test for Both Westinghouse and New York Triple Valves.

If for any reason it is desired to make this test following an application and release produced by closing and opening cock 1, or the auxiliary reservoir has just been charged by opening cock 1, this test should be preceded by an application and release with valve "A," for the purpose of insuring the slide valve being in its normal position.

Commencing the test with cocks 1, 2, 3 and 9 open, all other numbered cocks closed, valve "A" in position No. 1, valve "B" in position No. 2 and lever "D" in notch 3, then with the auxiliary reservoir charged to 80 pounds, proceed as follows:

To test triple valves for 8-inch cylinders, place valve "B" in position No. 4 and valve "A" in position No. 5.

To test triple valves for 10-inch cylinder, place valve "B" in position No. 4 and valve "A" in position No. 6.

In all of these tests the triple valve should move to application position without causing a discharge of air from the vent port of valve "B."

A failure to apply under the conditions specified indicates either excessive friction, which will be shown by an exhaust from the vent port or valve "B"; a leaky packing ring, which will be discovered later by the packing-ring leakage test; too large a feed groove in the cylinder, or a combination of two or more of these defects. Should the triple valve fail to apply and no exhaust occur from valve "B," the indications are that the back flow of air from the

auxiliary reservoir to the brake pipe is too rapid to permit the required differential.

At the completion of this test move valve "B" to position No. 3 and valve "A" to position No. 1.

Sec. "B."—Quick-service Test (for Quick-service Triple Valves Only) for Both Westinghouse and New York Triple Valves.

Commencing the test with cocks 1, 2, 3 and 9 open, all other numbered cocks closed, valve "A" in position No. 1, valve "B" in position No. 3 and auxiliary reservoir charged to 80 pounds, proceed as follows:

Close cock 9 and move valve "A" to position No. 7 for all 8-inch and 10-inch triple valves. The brake-cylinder pressure obtained should not be less than 5 pounds greater than that which will be obtained by subjecting to the same test triple valves which do not contain the quick-service features.

At the completion of this test move valve "A" to position No. 1 and open cock 9.

Test No. 5.—Packing-ring Leakage Test for Both Westinghouse and New York Triples.

Release Test, Sec. 1.—Commencing with cocks 1, 2, 3 and 9 open, all other numbered cocks closed, valve "A" in position No. 1, valve "B" in position No. 3 and the auxiliary reservoir charged to 80 pounds, proceed as follows:

Place the valve "A" in position No. 7 until the brake-pipe pressure is reduced 15 pounds, then return to position No. 3 (lap). Place valve "J" in position No. 2, lever "D" in notch No. 1 and valve "B" in position No. 1; close cocks 2 and 3 and move valve "A" to position No. 2. If the discharge does not occur promptly from the vent port of valve "B," advance valve "J" from position to position until the discharge begins, then note the rate of increase of pressure on the auxiliary reservoir gauge, which must not exceed 5 pounds in 30 seconds.

During this test there must be a steady exhaust of air from the vent port of valve "B" to insure the proper differential being maintained on the triple valve piston. If, in making this test, the triple valve for the 8-in. cylinder releases or indicates excessive ring leakage, make another test after blocking the triple valve piston in service lap position.

Should it occur that the friction of the triple valves for the 10-inch brake cylinder is so low as to continue to permit the triple to release, the reduction for the application may be changed from 15 to 10 pounds. When this is done, special attention should be given to determine if the graduating valve is right, as it must be, to permit an accurate test.

At the completion of this test place valve "B" in position No. 3, open cocks 2 and 3 and place valve "A" in position No. 1.

Test No. 6, Sec. 2.—Friction Test. Release Test for Both Westinghouse and New York Valves.

Commencing the test with cocks 1, 2, 3 and 9 open and all other numbered cocks closed, valve "A" in position No. 1, valve "B" in position No. 3, auxiliary reservoir charged to 80 pounds.

Place lever "D" in notch 3 for all triple valves undergoing the test; proceed as follows:

Place valve "A" in position No. 7 until the brake-pipe pressure is reduced 10 pounds, then return it to position No. 3. Place valve "J" in position No. 1, valve "B" in position No. 1, and move valve "A" to position No. 2. Under these conditions the triple valve should release. A failure to release should be accompanied by a discharge at the vent port of valve "B," which indicates that the frictional resistance to the movement of the packing ring and slide valve is excessive.

If the triple valve does not release and valve "B" fails to open its exhaust, leakage is occurring from the brake pipe, which will necessitate advancing valve "J" from position to position, remaining in each position 30 seconds, until the triple valve releases or the exhaust in valve "B" opens.

At the completion of the test place valve "B" in position No. 3 and valve "A" in position No. 1.

Test No. 7, Sec. "A."—Service-port Capacity Test for Westinghouse Triple Valves and Quick-service New York Triple Valves.

Commencing with cocks 1, 2, 3, 4 and 9 open, valve "A" in position No. 1, valve "B" in position No. 3, place valve "C" in position required for the triple valve under test, as indicated:

Notch No. 1.—For 8-inch triple valves.

Notch No. 2.—For 10-inch triple valves.

During this test the brake-pipe pressure should not drop, except that in the case of the quick-service triple valves there will, of necessity, be a slight drop, which must not exceed 2 pounds.

Place valve "B" in position No. 2 and move valve "A" to position No. 3, open cock 7 until brake-pipe and auxiliary-reservoir pressures are reduced to 50 pounds, then close cock 7. Move valve "B" to position No. 3 and open combination cock 6 and quick-opening valve, leaving it open 3 seconds. This test should not produce quick action. If it does, it indicates a restriction in the service port, or a weak or graduating spring.

Sec. B.—Duplicate the tests specified under Sec. A, placing the wheel of valve "C" in the position as indicated.

Notch No. 3.—For 8-inch triple valves.

Notch No. 5.—For 10-inch triple valves, excepting Westinghouse non-quick service, with which use notch 7.

This should result in the triple valve moving to emergency position. Failure to do so indicates too close a fit of the emergency piston.

At the completion of the test close cock 4 and combination cock 6 and quick-opening valve, move valve "A" to position No. 1.

Test No. 7, Sec. "A"—Service-port Capacity Test for New York Non-quick Service Triple Valves.

Commencing with cocks 1, 2, 3, 4 and 9 open, valve "A" in position No. 1, valve "B" in position No. 3, place valve "C" in position required for the triple valve under test, as indicated.

Notch No. 1.—For 8-inch triple valves.

Notch No. 2.—For 10-inch triple valves.

Place valve "B" in position No. 2 and move valve "A" to position No. 3. Open cock 7 until brake pipe and auxiliary reservoir pressure are reduced to 50 pounds, then move valve "B" to position No. 3 and open cock 6 quickly.

Sec. B.—Duplicate the test specified under Sec. A,

Note.—During this test the triple valve should move to service position, the brake-pipe pressure must not drop, and there must be no discharge of air from the vent ports.

Should the triple valve move to emergency position, it indicates a restriction in the service ports or a weak vent-valve spring.

placing the wheel of valve "C" in the position as indicated for the triple valve under test.

Notch No. 3.—For 8-inch triple valves.

Notch No. 5.—For 10-inch triple valves.

This should result in the triple valve moving to emergency position, causing a strong blast of air from the vent ports and a brake-pipe reduction of at least 3 pounds. Failure to do so indicates a too loose fit of the vent-valve piston packing.

The committee on triple valve tests made a progress report recommending that no changes be made in the recommended practice of the association; Master Car Builders' Proceedings, 1900, page 82.

The report of the committee in the 1901 Proceedings, page 71, includes a description of the Hibbard air valve, together with a description of the electric recording apparatus on the airbrake rack and results of the tests of the Hibbard valve.

A progress report of the committee will be found on page 55 of the 1905 M. C. B. Proceedings.

The report of the committee in the 1906 Proceedings, page 104, presents a detailed report of tests of the Westinghouse type "K" triple valve.

The committee report in the 1910 M. C. B. Proceedings, page 171, contains results of tests of the K-2 Westinghouse and the K-4 New York triple valves.

See also M. C. B. Proceedings, 1911, page 261.

Air Brake Defect Card. Standard.—In 1894 a Recommended Practice was adopted to use an air-brake repair card to report to division terminals such defects as are found by trainmen which require brake to be cut out. This was revised in 1898, and is to be attached as near to the car number as possible.

In 1902 this was made a Standard of the Association.

In 1903 letters were substituted for figures to indicate the various defects.

In 1911 a revised defective air-brake card was adopted and the use of the card defined as follows:

If car can be placed between air-brake cars, wire this card near triple valve where it can be readily seen.

If car must not be placed between air-brake cars, wire card to brake pipe near angle cock at each end of car.

The color of defective air-brake card to be red.

The size of defective air-brake card to be 3¼ by 9 inches, including the stub, which is 3¼ by 2¾ inches.

Card to be fitted with eyelet, and each card supplied with suitable wire for attaching to car.

Air Brake Hose. Figs. 1366, 1367, 1386, 1504, 1508; Page 1308. Laminated rubber and canvas tubing which is attached to a nipple that screws in the angle cock at the end of the brake pipe. The other end of the hose is fitted with a coupling which engages with a similar coupling on the adjoining car and thus forms a flexible connection between the brake pipes of the two cars through which the compressed air for operating the brakes is conducted. See ARMORED BRAKE HOSE.

Air Brake Hose Clamp. See HOSE CLAMP.

Air Brake Hose Coupling. Figs. 1366, 1367, 1415-1420. A contrivance for coupling or connecting the ends of a pair of brake hose together, so that the air by which the brakes are operated can pass from one vehicle in a train to another. The couplings for train air signal apparatus are similar to brake hose couplings, but are arranged so that they will not couple to the latter.

Air Brake Hose Coupling Case. A hollow casting which joins the main part of a coupling to which the hose is attached.

Air-Brake Hose Couplings, Gage for. Recommended Practice. Sheet M. C. B.—Q.

In 1917 a gage for air-brake hose couplings was adopted as Recommended Practice.

Air Brake Hose Coupling Gasket Gage. Recommended Practice. Sheet M. C. B.—Q-1. Fig. 3058.

In 1915 the hose coupling gasket gage as shown on Sheet M. C. B.—Q-1 was adopted.

Air Brake Hose Coupling and Gaskets. Standard. Sheet M. C. B. 18-A. Fig. 2960.

A committee on air brake hose proposed a standard air hose coupling; 1909 M. C. B. Proceedings, page 179.

In 1911 standard dimensions and contour for air-brake hose couplings and gaskets were adopted.

In 1913 the following specifications were adopted as Standard for gaskets. Revised in 1916.

SPECIFICATIONS FOR AIR-BRAKE HOSE GASKETS

1. *Scope.*—These specifications cover all gaskets for use in air-brake and air-signal hose couplings.

I. MANUFACTURE

2. *Material.*—Gaskets shall be made of a rubber compound that will be tough and have enough elasticity to conform to the requirements for strength and elongation, and that the gasket can be readily applied in the couplings under all service conditions and form an air-tight seat.

II. PHYSICAL PROPERTIES AND TESTS

3. *Deflection Test.*—(a) Gaskets shall be subjected to a deflection test by suspending a weight of 20 lb. on the gasket. Under this load the increase in the inside diameter shall not exceed ⅞ in., the measurement to be taken on the inside of the gasket within 15 to 20 seconds after the application of the load, with the load applied. The support and the hook to which the weight is attached shall each have a diameter of ¼ in.

(b) When the deflection test has been completed the gaskets shall be allowed to relax, before subjecting them to the tension test, for a period of not less than 15 minutes.

4. *Tension Test.*—Gaskets shall be subjected to a tension test by inserting into the gasket two semi-circular blocks, each having a 180-degree fillet of the same radius as the original inner radius of the gasket, and pulled at a speed of 20 in. per minute. Under this test the gasket shall show a minimum tensile strength of 90 lb. and a minimum elongation of 200 per cent.

5. *Test Specimens.*—Deflection and tension test specimens shall be the finished gasket and tests shall be made with the temperature of the air not lower than 65 or higher than 90° F., and the specimens shall be kept at a temperature within these limits for at least one-half hour previous to the time of test.

6. *Number of Tests.*—(a) One deflection and one tension test shall be made on each of five gaskets selected, to represent each lot of 1000 gaskets or fraction thereof.

(b) Not less than 80 per cent of the gaskets tested shall conform to the requirements of both the deflection and tension tests.

III. PERMISSIBLE VARIATIONS

7. *Dimensions.*—All gaskets shall conform, within the minimum and maximum tolerances, to the nominal dimensions shown in Fig. 1, and as adopted by the Association in 1911. All gaskets shall be uniform in size and section.

IV. WORKMANSHIP

8. *Workmanship.*—The gaskets shall be free from fins and surface defects.

V. MARKING

9. *Marking.*—All gaskets shall have the manufacturer's name or trade-mark, M. C. B. standard monogram and the date when made legibly marked on the inside edge, as shown in Fig. 1.

VI. INSPECTION AND REJECTION

10. *Inspection.*—(a) The inspector representing the purchaser shall have free entry, at all times while work on the contract of the purchaser is being performed, to all parts of the manufacturer's works which concern the manufacture of the material ordered. The manufacturer shall afford the inspector, free of cost, all reasonable facilities and necessary assistance to satisfy him that the material is being furnished in accordance with those specifications.

(b) The purchaser may make the tests to govern the acceptance or rejection of the material in his own laboratory or elsewhere. Such tests shall be made at the expense of the purchaser.

(c) All tests and inspection shall be so conducted as not to interfere unnecessarily with the operation of the works.

11. *Rejection.*—(a) Gaskets represented by samples which fail to conform to the requirements of these specifications will be rejected.

(b) Gaskets which, subsequent to test and inspection at the factory or elsewhere and their acceptance, show defects or imperfections will be rejected and shall be replaced by the manufacturer.

12. *Rehearing.*—Samples tested in accordance with these specifications, which represent rejected gaskets, shall be held for fourteen days from date of test report. In case of dissatisfaction with results of tests, the manufacturer may make claim for a rehearing within that time.

Air Brake Hose Label. Standard.—Sheet M. C. B. 18-A. Fig. 2960. In 1902 the label for hose, as shown in the specifications for air-brake hose, was made a Standard. Revised in 1903, 1911, 1912, 1913 and 1915. The specification for its use is as follows:

Each length of hose must have vulcanized to it a standard air-brake hose label of red rubber as shown. The following information must be branded on the label: On the top of the badge the initials or name of road or purchaser and date of manufacture; on the bottom the name of manufacturer and serial number. In the center a monogram as shown. The label should be applied around the hose within 6 inches of one end (a variation of ½ inch either way being permitted), as shown on M. C. B. Sheet Q¹. In mounting the air hose, the coupling should be applied to the end near which the label is located, so that the drawbar will not obscure the same when an inspector is on the right forward or left back side of the car.

In 1915 a variation of ½ inch either way in the application of the label was adopted.

Air Brake Hose Label (M. C. B. Standard). Fig. 2960. In 1902 the label for hose, as shown in the specifications for air-brake hose, was made a Standard. Revised in 1903, 1911, 1912 and 1913. The specification for its use is as follows:

Each length of hose must have vulcanized to it a standard air-brake hose label of white or red rubber as shown. The following information must be branded on the label: On the top of the badge the initials or name of road or purchaser and date of manufacture.

Air-Brake Hose, Location of Label. Standard Sheet M. C. B. 18-A. Fig. 2960.

In 1911 a Recommended Practice that air-brake hose should be so mounted that the label will show toward the side of car in such a position that the car inspector can readily read it.

In 1912 the drawing showing position of air-brake hose label on mounted hose on Sheet M. C. B.—Q was altered to correspond with the new design of hose label. Label redesigned in 1913 and shown on Sheet M. C. B.—Q¹.

In 1914 advanced to Standard and shown on Sheet M. C. B. 18-A.

In 1916 a variation of ½ in. either way in location of label was adopted.

Air Brake Hose Nipple. Figs. 1385, 1413. A short metal tube fitting into the end of the brake hose and fastened by a suitable clamp and screws. One end is threaded and screws into the angle cock.

Air Brake Hose Specifications (M. C. B. Standard). In 1902 the label for hose, as shown, was made a standard. Revised in 1903, 1911 and 1912. The specification for its use is as follows:

Each length of hose must have vulcanized to it a standard air brake hose label of white or red rubber as shown. The following information must be branded on the label: On the top of the badge the initials or name of road or purchaser and the size, 1⅜ inches; on the bottom the name of manufacturer; on the left-hand end the month and year of manufacture; on the right-hand end the serial number and 2 inches removed therefrom a separate badge consisting of a band 1 inch wide encircling the hose and bearing in triplicate the letters "M. C. B. Std."; in the center field the letters "A" and "R" and the numerals for the month to show the date of application and removal. These letters must be clear and distinct, not less than ¼ inch in height, excepting name of manufacturer, which must not be less than ⅛ inch in height and stand in relief not less than 1/32 inch.

Letters and figures covering the application and removal of the hose must be so applied that they can be removed by cutting without endangering the cover.

Dimensions of label to be 3 9/16 by 2½ inches, as shown on the illustration, also a band 1 inch wide encircling the hose 2 inches to the right. Extensions may be made on right-hand end.

Air Brake Inspection. See AIR BRAKE, CLEANING AND TESTING.

Air Brake Instruction Car. Figs. 369, 423-425. A car, usually a passenger equipment car, in which is mounted the apparatus necessary to illustrate and explain the construction and operation of the air brake. It is used for the instruction of railroad employees and is stationed at different points along the line for a week or two at a time. Regular classes are conducted and

lectures given by the instructor in charge, who is usually provided with living quarters in the car. See CAR.

Air Brake Maintenance. An individual paper on this subject by F. W. Brazier, will be found in the 1915 M. C. B. Proceedings, page 483.

Air Brake Repairs. See AIR BRAKE CLEANING AND TESTING (REPAIRS).

Air Brakes for Street Cars. See TRACTION AIR BRAKE.

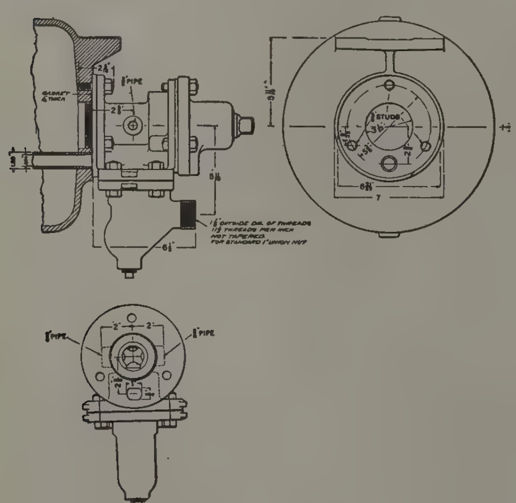
Air Brake, Testing. See AIR BRAKE, CLEANING and TESTING.

Air-Brake Tests. (M. C. B. Recommended Practice). The report of the committee on Train Brake and Signal Equipment in the 1910 M. C. B. Proceedings, page 83, contains a resume of the emergency brake tests made on the Lake Shore & Michigan Southern in 1909.

In 1895 the following code for the guidance of the Committee on Air Brake Tests in testing triple valves was adopted as Recommended Practice for such tests. Revised 1911.

CONDITION OF TESTS

Construction of Rack.—Triple valves will be tested on a rack representing the piping of a one-hundred (100) car train. All cocks, angles and connections will be as nearly as possible identical with those in



H² TRIPLE VALVE ON END OF 10" FREIGHT RESERVOIR—D-15611.

train service. The rack shall conform to blue-print No. C-11379 (Rev. 3-9-09) in the hands of the committee, which gives the proper fittings, piping, cylinders, auxiliary reservoirs, main reservoirs, automatic brake valves, etc.

Reservoir Capacity.—The main reservoir capacity shall be approximately 57,000 cubic inches.

The capacity of each auxiliary reservoir shall be such as will, with a pressure of 70 pounds, produce 50 pounds pressure in its brake cylinder when fully equalized in service application with 8 inches piston travel.

Air Supply.—The air supply for the test rack shall be obtained from a locomotie type of air compressor having a capacity of from 80 to 120 cubic feet of free air per minute. The compressor to be controlled by a single top-pump governor adjusted to maintain 110 pounds main reservoir pressure.

Brake-pipe Pressure.—Tests will be made with a brake-pipe pressure of 70 pounds, except when otherwise specified.

Brake-pipe Leakage.—With brake-pipe and auxiliary reservoirs charged to 70 pounds, the section of branch

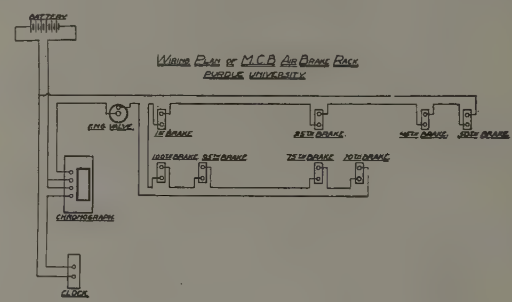


PLATE A.

pipe between the cut-out cocks and triple valves, also the triple valves, should be tested with soapsuds and leakage eliminated.

Branch pipe cut-out cocks should then be closed and brake valve placed in lap position; brake-pipe leakage should then not exceed 2 pounds per minute.

Brake Cylinders.—Brake-cylinder packing leathers must be maintained in good condition and free from leakage.

Piston Travel.—All tests shall be made with 8-inch piston travel, except when otherwise specified.

Construction of Triple Valves.—Triples must be so constructed that they can be secured and operated on apparatus conforming to Diagram No. D-15611 (which shows triple-valve end of auxiliary reservoir, branch-pipe union and location of bosses for retaining-valve pipe, with detail dimensions of each, as well as detail dimensions between these parts when in the relative position they would occupy if triple valve were in place).

Gages and Recording Instruments.—The auxiliary reservoirs, brake pipe and brake cylinder of the 1st, 25th, 50th, 75th and 100th brakes shall be fitted with test gages. All gages must be calibrated and maintained in good condition.

Brake No. 1 shall be fitted with two recording pressure gages, one to be connected to the brake-pipe branch pipe, the other to the brake-cylinder, and brake No. 100 shall be fitted with a test gage connected to the brake cylinder.

The attachment of electric circuit closers, also the general arrangement of the electric circuit wiring, shall be as shown on Plate A and Plate A-1.

Repetition of Tests.—Tests shall be repeated three times under the same general condition, a record being taken of each test, also the average result of each three tests. The room temperature at the time of the tests shall be recorded, also humidity.

Triple-valve Essentials.—The essentials of a quick-action triple valve are: first, charging; second, service application; third, graduation; fourth, release; fifth, quick action.

INDIVIDUAL TRIPLE VALVE TESTS.

No. 1.—Charging Tests.

(Time to charge auxiliary reservoir.)

Not less than three triples, selected at random, shall be tested, as follows:

With the triple valve cut out at the branch pipe cut-out cock, the auxiliary reservoir empty, and 90-pound brake-pipe pressure maintained, the triple valve should be cut in.

A. Under these conditions the auxiliary reservoir should be charged from 0 to 70 pounds in not more than 90 seconds nor less than 70 seconds.

B. When triple is in normal release position, the auxiliary reservoir should be charged from 0 to 70 lbs., in not more than 60 seconds and not less than 40 seconds.

No. 2.—Service Application Tests.

Section "A."—(To determine sensitiveness to Service Application.)

1. Three valves, selected at random, shall be taken for this test and each tried separately. They will be tested on the first brake of the rack using the brake pipe only of the first car and locomotive, having the engine and tender brakes cut out.

2. These triple valves should apply in service when the brake-pipe pressure is reduced by direct discharge to the atmosphere through an orifice which will reduce brake-pipe pressure from 70 to 60 pounds, in 16 to 18 seconds, with brake valve and triple valves on locomotive and first brake cut out.

3. In preparing for this test, insert the required disk in union shown on Plate B with all cocks closed, after which open cock C and start test by opening cock B.

Section "B."—(Graduating Test.)

1. Three valves, selected at random, shall be taken for this test and each tried separately. They will be tested on the first brake of the rack, using the brake pipe only of the first car and locomotive having the engine and tender brakes cut out.

2. The first admission to the cylinder should be made with a reduction of brake-pipe pressure not ex-

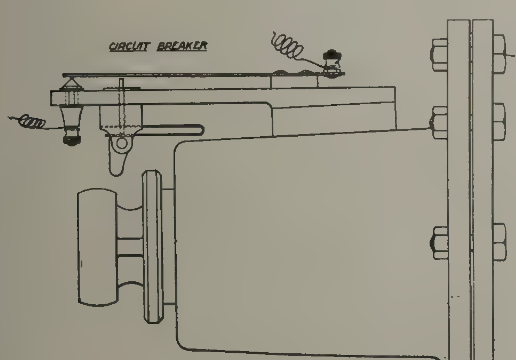


Plate A[1].

ceeding 5 pounds; each succeeding reduction should reduce the pressure in the auxiliary reservoir not to exceed 3 pounds, until equalization takes place. The pressure in the brake pipe should not be more than 3 pounds lower than the equalized pressure in the brake cylinder and reservoir at equalization.

Section "C."—(Holding Test.)

Three valves, selected at random, will be taken for this test and each tried separately on the first brake on the rack, using the brake pipe only of the locomotive and the first car, having the triple valves cut out on engine and tender. The one brake will be applied, admitting as nearly as may be 15 pounds into the brake cylinder following a service application. Record of pressures in the auxiliary reservoir cylinder and brake pipe will be taken as follows:

First. At completion of application.
Second. In five minutes.
Third. In ten minutes.
Fourth. In fifteen minutes.

In this test, when a constant brake-pipe pressure is maintained, the brake-cylinder pressure must not be increased more than 5 pounds in 5 minutes.

Section "D."—(Release Test.)

Three triple valves, selected at random, shall be taken for this test and each tried separately. They will be tried on the first brake of the rack, using the brake pipe only of the first car and locomotive having the engine and tender brakes cut out. When the triple goes to normal release position it must exhaust the air from the brake cylinder from 50 to 0 pounds in not more than 15 seconds.

When the triple goes to retarded-release position it must exhaust the air from the brake cylinder from 50 pounds to 0 pounds in not more than 40 seconds.

No. 3. Emergency Application Tests

(To determine sensitiveness to quick action.)

Three triple valves, selected at random, shall be taken for this test and tried separately on the first brake of the rack. During this test the locomotive and tender triples are to be cut out.

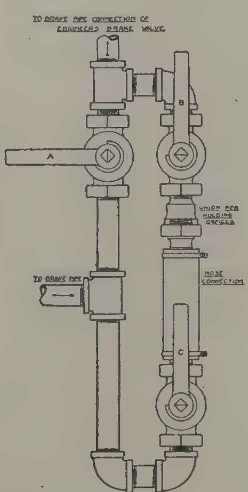


Plate B.

Section "A."—These triple valves must give a quick-action application when the brake-pipe pressure is reduced by direct discharge to the atmosphere through disk with a 14/64-inch orifice.

Section "B."—These triple valves must not give a quick-action application when the brake-pipe pressure is reduced by direct discharge to the atmosphere through a disk with a 10/64-inch orifice.

Section "C."—(Holding Test.) Three triple valves,

selected at random, shall be taken for this test and tried separately on the first brake on the rack.

The brake will be applied in quick action by moving the brake-valve handle to emergency position, where it must remain until completion of test for the purpose of insuring the discharge of all brake-pipe pressure. Record of pressure in auxiliary reservoir and brake cylinder will be taken as follows:

First.—At completion of application.

Second.—In five minutes.

Third.—In ten minutes.

Fourth.—In fifteen minutes.

In this test, the auxiliary reservoir and brake-cylinder pressure must not show a reduction of more than 5 pounds in 5 minutes.

RACK TESTS

No. 4. Service Application Tests

Section "A."—(Service Equalization.)

With a service reduction of 25 pounds from brake-pipe pressure, a brake-cylinder pressure of not less than 48 pounds, nor more than 52 pounds, must be obtained.

Section "B."—(Graduating Test.)

1. A reduction of 5 pounds in brake-pipe pressure should apply lightly the 100 brakes. However, the brake-cylinder pressure may not be sufficient to show on all test gages.

2. A further reduction of 4 pounds to 6 pounds should increase the cylinder pressure of all brakes.

3. A further reduction, making a total of 25 pounds, should equalize the pressure between the auxiliary reservoirs and brake cylinders.

Section "C."—(Service application time.)

Brakes will be applied by reducing brake-pipe pressure 10 pounds.

There shall not be more than 25 seconds difference in the time of obtaining 10 pounds pressure in the cylinders of the 1st and 100th brakes.

No. 5. Emergency Application Tests

Section "A."—(Quick action, time and pressure.)

The 100th brake must be applied with at least 45 pounds pressure in 6¼ seconds from the movement of the brake-valve handle to emergency position and at least 55 pounds in 7 seconds. The final maximum pressure in this test must not be less than 15 per cent nor more than 20 per cent above the pressure given by the same brake in full service application.

This test will also be made to determine that quick action is obtained with:

First.—Four inches piston travel.

Second.—Twelve inches piston travel.

Note.—The object of this test is to secure, as nearly as possible, uniformity of pressures in brake cylinders in an emergency application and uniformity of time required to obtain the pressures; to secure a minimum length of stop and a minimum of shock, and of trains parting.

Section "B."—(To determine whether quick action will follow a service application.)

Using the one hundred brakes, make a service reduction such as will give 20 pounds cylinder pressure on the first brake. Then place the brake-valve handle in emergency position, which should cause quick-action of all triple valves.

The pressure in the first cylinder will be increased or decreased by steps of about 5 pounds until the point at which quick action commences or ceases is determined.

Section "C."—(Quick-action jumping test.)

With brakes Nos. 1, 2 and 3 cut out, quick action should be obtained with the remainder of the brakes by an emergency reduction, and the time, from the movement of the brake-valve handle to emergency position to obtain 45 and 55 pounds cylinder pressure on the 100th brake, should not be increased more than one second over that required to obtain the same pressures with all brakes cut in.

This test should be repeated with groups of three brakes cut out, consisting of Nos. 2-3-4, 3-4-5, 4-5-6 and 5-6-7, and the time from the movement of the brake-valve handle to emergency position to obtain 45 and 55 pounds cylinder pressure in the 100th brake should be the same as with all brakes cut in.

These tests will also be made with piston travel of 4 inches.

No. 6. Holding Tests

Section "A."—(Following a service application.)

The one hundred brakes will be applied, admitting, as nearly as may be, 15 pounds into the cylinder of the first brake. Record of pressures in the auxiliary reservoirs and cylinders will be taken at all record points as follows:

First.—At completion of application.

Second.—In five minutes.

Third.—In ten minutes.

Fourth.—In fifteen minutes.

In this test any increase of brake cylinder pressure should be in proportion to the reduction in brake-pipe pressure due to leakage.

Section "B."—(Following a quick-action application.)

The 100 brakes will be applied in quick action by placing the brake-valve handle in emergency position, where it will be left until completion of test, for the purpose of insuring the discharge of all brake-pipe pressure. Record of pressures in auxiliary reservoirs and cylinders will be taken at all record points as follows:

First.—At completion of application.

Second.—In five minutes.

Third.—In ten minutes.

Fourth.—In fifteen minutes.

The results of this test must not indicate an excessive amount of back leakage into brake pipe.

No. 7. Release Tests

Section "A."—(Release Time.)

The 100 brakes shall be applied with an 18-pound service reduction of brake-pipe pressure and brake valve then placed in release position. Time will be taken from the movement of the brake valve into release position until pressure is reduced to 5 pounds in the cylinder of the first brake.

The pressure in the cylinder of the first brake should not reduce to 5 pounds in less than 18 seconds nor more than 25 seconds.

Note.—Main reservoir pressure must be 110 pounds at time of release.

Air Compressor. Figs. 1422-1429, 1492. A motor driven air pump which supplies compressed air for operating the air brakes on electrically operated cars.

Air Compressor Cylinder (Motor Compressor). Fig. 1321. A hollow cast iron cylinder with a piston, which piston compresses the air required to operate the brakes. The pistons in the air cylinders are connected

with connecting rods to a crank shaft geared to a small motor.

Air Compressor Cylinder Head (Motor Compressor). The cover for the lower end of the air cylinder of a motor driven air pump for an air brake.

Air Compressor Governor. Figs. 1439, 1442, 1445, 1491. An adjunct to the electrically driven air compressor, designed to open or close automatically the motor circuit when the air pressure in the reservoir exceeds or falls below certain predetermined limits; these limits are usually 95 and 80 pounds for automatic brake service and 65 and 50 pounds for straight-air brake equipments.

Air Compressor Governor, Synchronizing System. Figs. 1425, 1426. An arrangement for insuring an equal division of work of furnishing compressed air for braking and other purposes among all the motor-driven air compressors in a train. The current supply to the motor of the motor-driven air compressor is controlled by a compressor switch operated by air pressure, as in the ordinary form of compressor governors, except that the cutting-in and cutting-out of this switch is controlled by the operation of a magnet valve. In addition, a master governor is used on each motor car or locomotive, similar in all respects to a compressor governor except that instead of controlling the current supplied to the motors of the motor-driven air compressors, it acts simply as a pilot or master switch to control the current to the magnets which operate the compressor switches. The magnets of the compressor switches are connected in parallel between the trolley (or positive battery terminal) and the synchronizing wire which runs the entire length of the train. The cutting-in of any master governor connects the synchronizing wire to ground (or negative battery terminal) and thereby operates all the compressor switch magnets. With all the compressors cut out and the pressures in the main reservoir line equalized, as soon as this pressure is decreased to a point at which any one of the master governor controlling mechanisms operates the closing of this master governor switch supplies current to the magnets of each compressor switch in the train, causing them to operate so as to cut-in these switches and start all the compressors simultaneously. Whether one or more of the master governors cut-in at the same time is immaterial since the compressor will continue to operate and raise the pressure in the main reservoirs on each vehicle and in the main reservoir line throughout the train, until the controlling portion of the last master governor remaining cut-in operates to open the circuit to the compressor switch magnets, which causes all the compressor switches to cut out and stop the operation of all the compressors simultaneously. In this manner, all the compressors operate the same length of time, thus avoiding a condition in which some compressors are overworked while others are not working up to their full capacity.

Air Compressor Switch. See Electro-Pneumatic Compressor Switch.

Air Connections. See Steam and Air Connections for Passenger Equipment Cars.

Air Gage (Air Brake). Figs. 1387, 1512-1514. A gage to register the pressure of air in the reservoirs, brake pipe or brake cylinders, similar to an ordinary steam pressure gage. They are made either with a single pointer, or with two pointers, to indicate on one dial both the reservoir pressure and the brake pipe pressure. The latter type is called a duplex gage. See Gage.

Air Gaps (Generators). The clearance between the body or iron core of the rotating armature and the stationary field poles or pieces of a generator. Small air gaps are beneficial in that they permit of smaller, lighter, slower speed and cheaper machines than is the case with large air gaps. On the other hand, the bearings of machines with small air gaps require closer attention and more frequent renewals and are more apt to give trouble at the commutators and brushes than machines with large air gaps.

Air Inlet. An opening for the admission of air to an air compressor or to a refrigerator car. The term includes both the air strainer and air pipe.

Air Pipe (Air Brake). More properly brake pipe. Often called train pipe.

Air Pipe Strainer. See Brake Pipe Air Strainer.

Air Pump. See Air Compressor.

Air Pump Governor. See Air Compressor Governor.

Air Signal. See Back-Up Air Signal, Train Air Signal.

Air Signal Reducing Valve. See Reducing Valve.

Air Space (Refrigerator Cars). A space left between the linings to aid in insulation. It is sometimes called dead air space in distinction from the ventilating passages, as the air in it is confined or dead and is not being constantly changed. Unless air is confined so that it does not continually change it is a poor insulator.

Air Strainer. See Brake Pipe Air Strainer.

Air Valve (Steam Heating). A small outlet valve which will pass air but not water, applied to the ends of storage heaters to allow the air to escape when the steam or hot water is turned on.

Aisle. The longitudinal passageway through a passenger car, between the seats.

Aisle Seat End. The end or arm of a transverse car seat next the aisle. See also Wall Seat End.

Alcohol Burner. Used for heating refrigerator or produce cars when transporting perishable products during cold weather.

Alcohol Stove. See Stove.

Alcove. A recess. See Water Alcove.

Alcove Faucet. A faucet in a water alcove connected with a water cooler to supply drinking water.

Alley Apartment. Fig. 2902. A compartment in a passenger equipment car, reserved for mail, and serving the same purpose as a postal car on runs where an entire car is not required for mail. It occupies only a part of the width of the car and has an alley or passageway at one side.

Alley Lamp. A lamp placed in a recess in the side of a car. Also called Panel Lamp, as it is usually covered by a panel.

Alleyway. More properly a corridor. A narrow passage at the side of staterooms or compartments in parlor or sleeping cars.

American Continuous Draft and Buffing Apparatus. An apparatus by which the drawbars at both ends of the car are connected by two rods with loops at the ends, that hook over the ends of a bar or key passing through the shank of each drawbar. Each car is in

this manner pushed from the rear end and all the pull is transmitted through the train by the draft rods. It has two buffer springs and two follower plates at each end of the car. Not now used in new construction.

Ammeter. An instrument for measuring electric current in amperes.

Ampere. The unit of electric current.

Ampere-Hour Meter. Figs. 2482, etc.

Angle Cock (Air Brakes). Figs. 1366, 1367, 1384, 1410, 1472; Pages 1250, 1308. A cock placed in the brake pipe under each end of the car just back of the hose connection. This must always be open except at the rear end of the last car, where it must always be closed to prevent escape of air from the brake line and setting of the brakes.

Angle Cock Holder. Fig. 1519; Page 1226. A clamp or bracket for securing the angle cock at the end of a car.

Angle Iron or **Angle.** A general term applied by makers to iron or steel rolled in the form of an L.

Anti-Collision Bulkhead. See Anti-Telescoping Device.

Anti-Friction Car Door Hanger. See Door Hanger.

Anti-Friction Center Plate. Devised to reduce the friction between the body and truck in curving. See Roller Center Plate and Ball Bearing Center Plate.

Anti-Friction Side Bearing. Devised to reduce the friction between body and truck in curving. See Roller Side Bearings, Ball Bearing Side Bearings, Gravity Side Bearings and Rocker Side Bearing.

Anti-Slip Surface. See Safety Tread.

Anti-Telescoping Device. Figs. 298, 532. A type of end framing in which the end sill is greatly strengthened by an end sill stiffening plate, an end sill stiffening angle bar, corner angle posts, and end plate strengthening angles or knee irons. Its object is to prevent one car from entering or telescoping another in a collision. An anti-telescoping plate is intended for the same purpose. A device in use for this purpose on the New York subways has a corrugated face, into which the corresponding corrugations on the next car are forced.

Anti-Telescoping Plate. See Anti-Telescoping Device.

Anvil (of Track Torpedoes). Interior pieces of iron placed directly over the fulminating powder to insure its ignition. Some track torpedoes have three anvils.

Apprentices, Car Shop. An individual paper by I. S. Downing, describing the apprentice courses on the New York Central Lines, will be found in the 1912 M. C. B. Proceedings, page 337.

Arbitration Committee. A committee of members of the Master Car Builders' Association whose duty is to settle disputes arising between the members under the Rules of Interchange; to recommend at each convention such changes, suggestions, amendments or additions to the Rules of Interchange as may be thought advisable from the experience of the preceding years.

A general review of the decisions which had been made by the Arbitration Committee, previous to 1903, was prepared by George L. Fowler and will be found in the M. C. B. Proceedings for 1903, page 295.

Arbor. A spindle or axle for a wheel or pinion; a mandrel on which a ring or wheel is turned in a lathe.

Arch (Elliptic Spring). The height from the center of the scrolls at the ends of the elliptics to the under side of the main leaf of the spring. Twice the arch of an elliptic spring, less the thickness of the spring bands, is the set and is the maximum amount which an elliptic spring can be compressed. In a half elliptic spring the arch and set differ only in the thickness of the spring band.

Arch Bars. The wrought iron or steel bars which form the top and bottom members of a diamond arch bar truck side frame. They are attached to the bolster guides or truck columns by column bolts and to the journal boxes by the journal box bolts. See also

Arch Bar Truck. See Diamond Arch Bar Truck.

Arch Bars, Column and Journal-Box Bolts for 80,000-Pound Capacity Cars. (M. C. B. Standard.) Fig. 2980. Sheet M. C. B. 20

In 1897 a committee on this subject reported designs which were subsequently adopted by letter ballot as Recommended Practice. Proceedings 1897, pages 188 to 192.

In 1901 these were, by letter ballot, changed from Recommended Practice to Standard. Modified 1907. They were formerly shown on Sheet M. C. B.—A, but are now shown on Sheet M. C. B. 20.

In 1907 the following changes were made:

The journal bearing centers spaced to 5 feet 6 inches, the additional four inches being added to the total length.

The spacing of bends increased to 20-inch centers, and the horizontal distance between bends increased to 17½ inches.

The turned up lip on the ends of tie bar was eliminated, the total length of tie bar remaining the same as arch bar, as follows: 78 inches over all.

The addition to Sheet M. C. B. 20 of the following note:

A single nut with nut-lock or cotter may be used instead of double nuts.

Modified 1909.

In 1917 a note was added reading: "Arch bars, column and journal box bolts may be manufactured under the specifications for refined wrought iron bars or mild steel bars for passenger and freight equipment cars.

Arch Bars, Column and Journal-Box Bolts for 100,000-Pound Capacity Cars. (M. C. B. Standard.) Fig. 2980 Sheet M. C. B. 20. In 1909 a design for arch bars, column and journal-box bolts for 100,000-pound capacity cars was adopted as standard.

Specifications were recommended at the 1905 convention, but were rejected by letter ballot.

Arched Roof. Fig. 283. A roof, the surface of which is curved, and which has no upper deck or clear story It is sometimes used for passenger cars. See Turtle Back Roof.

Argand Lamp. A lamp invented by Argand, a native of Geneva, about the year 1784. The burner consists of two concentric cylindrical tubes in which is the annular wick. The tube inclosing the wick is closed at the bottom and communicates by a pipe with the oil reservoir. The interior tube being open, free access of air is allowed to the interior and exterior of the flame, insuring more perfect and equal combustion. Some gas lamps are constructed on this principle.

Arm Cap. A metal plate, wooden cap, or piece of upholstery with which the top of a seat end, arm rest or chair arm is covered.

Arm Holder. (British.) See ARM SLING.

Arm Pivot See SEAT ARM PIVOT.

Arm Rest. A wooden or metal bar or ledge attached to the side of a car, and not, like an arm cap, to the top of a seat end, for passengers to rest their arms on.

Arm Rest Bracket. See ARM REST. A bracket supporting the arm rest.

Armature. Fig. 2549, etc. The rotating part of a motor or dynamo. It consists of a laminated iron cylinder or core keyed to a shaft, and in the slots of which are wound the armature coils of insulated copper wire or ribbon. At one end of the core on the shaft is mounted the commutator, a copper cylinder composed of insulated segments, which are connected to corresponding armature coils.

Armature Spider (Electric Motor). Fig. 2582. A skeleton center fastened to the armature shaft and surrounded by the laminated iron core in which the armature coils are imbedded.

Armored Brake Hose. Fig. 1504. Brake hose covered with a woven wire fabric, steel, or other material, to protect it from injury or abrasion. Vacuum brake hose, for vacuum brakes, is usually lined with coiled wires on the inside to prevent collapsing, but such is not properly termed an armored brake hose. The M. C. B. standard brake hose is not armored.

Asbestos Felt. A preparation of asbestos in loose sheets similar to felt, for use as a non-conductor. It is largely used in refrigerator cars and is manufactured for that purpose in rolls about 42 in. wide, and weighs about 1 lb. per square yard. It must be handled with care to prevent tearing.

Asbestos Protected Metal. A material for use as roofing, side walls, partitions and ceilings in buildings; also for inside box car roofs, passenger car and locomotive cab roofs, head linings and interior finish for passenger cars.

Ash Receiver. Fig. 2016.

Asphalt Car Roofing. A saturated and coated felt applied in sheets.

Atmospheric Brake. This term, but little used, includes both the air brake and the vacuum brake. See AIR BRAKE, VACUUM BRAKE.

Automatic Air Brake. An air brake system with which the brake will be applied automatically in case of an accident which permits air to escape from the system. To accomplish this there is added to each vehicle equipped with the Straight Air Brake (1) a reservoir called an auxiliary reservoir, in which a supply of compressed air is stored sufficient to operate the brake on that vehicle; (2) a device called a triple valve to which the brake pipe, auxiliary reservoir and brake cylinder are all connected. The brake is applied by reducing the pressure in the brake pipe below that in the auxiliary reservoirs. Such a reduction is caused by an opening made from the brake pipe, or its connections, to the atmosphere, and may be intentional, as when the engineer opens the brake pipe to the atmosphere through the brake valve, or accidental, as in case of a burst hose or broken pipe. The reduction in brake pipe pressure thus made destroys the equality of brake pipe and auxiliary reservoir pressures, which existed when the brake system was fully charged, and the auxiliary reservoir pressure, which is then higher than that in the brake pipe, causes the triple valve on each car to operate so as to apply the brakes by admitting compressed air from the auxiliary reservoir to the brake cylinder, where it exerts its pressure on a piston, pushing it outward and thus applying the brakes. The brake is released by admitting compressed air from the main reservoir on the locomotive through the brake valve into the brake pipe, thus increasing its pressure above that remaining in the auxiliary reservoir. This causes the triple valve parts to return to their original positions, again opening communication from the brake pipe to the auxiliary reservoir to recharge the latter and making a connection through which the compressed air in the brake cylinder escapes to the atmosphere, thus permitting the release spring in the brake cylinder to return the piston to its former position, thereby releasing the brakes. See AIR BRAKE.

Automatic Connector (Steam and Air Pipes). Figs. 1496-1503. A device by means of which the steam, air brake and signal pipes are automatically coupled by impact. Allowance is made for vertical and lateral movement, and arrangement is provided for interchange with cars not equipped with the device. See EMERGENCY HEAD BACK-UP CONNECTION.

The M. C. B. committee on steam line connections reported in 1904 that because of the experiments with automatic couplings a new committee should be appointed to study this situation; 1905 M. C. B. Proceedings, page 206.

The new committee made a progress report and recommended that the railroads discourage the use of such connectors until some arrangement could be made for the interchangeability of the different devices; M. C. B. Proceedings, 1906, page 416.

The committee report in the 1908 M. C. B. Proceedings, page 271, explains the steps which the committee had taken with a view to getting the manufacturers to make their devices interchangeable.

Automatic Lubricator. A device for feeding at regular intervals a certain quantity of oil or lubricant to a cylinder or some mechanism requiring lubrication. See LUBRICATOR.

Automatic Reducing Valve. See REDUCING VALVE, AUTOMATIC.

Automatic Slack Adjuster. See SLACK ADJUSTER.

Automatic Switch (Electric Lighting). A device connected to the armature of the generator, by which the current is automatically turned onto the lights and batteries when the armature has reached a predetermined speed of rotation and consequent voltage output.

Automatic Train Stop. Fig. 1454. A valve mechanism mounted on the car or locomotive, operated by a track trip, and connected with the brake system so as to produce an automatic emergency application of the brakes at predetermined points when the conditions within any block are such as to forbid train movement into it.

Automatic Ventilator. Figs. 2184-2211. A ventilator which is self-adjusting, so as to exhaust air from a car if the train runs in either direction. See VENTILATOR.

Automatic Window Catch. A device to hold a window sash from being shoved up or down. See SASH LOCK.

Automobile Car. Figs. 39-46. A box car for carrying automobiles and having exceptionally large side or end doors. See CAR.

Auxiliary Belt Rail. A strip of wood nailed to the Belt Rail as a reinforcement.

Auxiliary Brake Equalizing Lever (Six-Wheel Truck). A short lever to which the brake lever connecting rod is fastened, and which divides the power equally between the center pair of wheels and the outside pair of wheels.

Auxiliary Compression Beam Brace. The same as a CENTER COMPRESSION BEAM BRACE.

Auxiliary Contactor (Motor Cars). A Contactor applied to a control system to open and close the main motor circuits at a point remote from the platform controller, thus eliminating heavy arcing in the controller.

Auxiliary Reservoir. Figs. 1367, etc. A cylindrical reservoir attached to the under side of a car or tender. It serves to hold a supply of compressed air to operate the brakes of each car, and is supplied from the main reservoir on the engine through the brake pipe.

Auxiliary Reservoir Hanger. A support for the reservoir.

Axle (M. C. B. Standard). Fig. 2944.

In 1899 it was decided that the standard axles should be known by letters.

In 1901 a designation was given the standard axles, whereby each shall be known to carry a definite weight instead of for cars of particular capacity. See Sheet M. C. B. 15. Fig. 2944.

Axle.—A. With journals, 3¾ by 7 inches. Sheet M. C. B. 15. Designed to carry 15,000 pounds.

This axle is the standard of the Association for cars of 40,000 pounds capacity.

In 1873 a standard for car axle was recommended, the form and dimensions of which, excepting the diameter in the middle, were substantially the same as shown in this sheet. In 1884 the diameter at the middle was increased from 3⅞ inches to 4¼ inches, by letter ballot.

In 1901 the diameter of wheel seat was changed from 4⅞ to 5⅛ inches.

In 1901 a notation was added to the drawing of this axle showing a straight taper between certain points on the axle; also a diagram showing location of the borings to be taken from steel axles for analysis. See Sheet M. C. B.—A.

In 1902 further changes were made in the diameter of the tapered portion where it joins the fillet next to the rough collar; also in the diameter of the rough collar.

For action of the Association see Proceedings 1876, page 99; Proceedings 1878, page 129; Proceedings 1879, page 103; Proceedings 1880, page 130; Proceedings 1884, pages 156-162.

In 1907 the radius between the wheel seat and the rough collar on the inside of the hub of the wheel was changed to ¾ inch, with the center from which the radius is struck coincident with the inside face of the hub of the wheel.

The radius between the dust guard and wheel seat was changed to ¼ inch.

Axle.—B. Standard. With journals, 4¼ by 8 inches. Sheet M. C. B. 15. Designed to carry 22,000 pounds.

This axle was adopted as a standard of the Association for cars of 60,000 pounds capacity, by letter ballot, in 1889; see Proceedings 1889, pages 88-109.

In 1901 the diameter of wheel seat was changed from 5⅜ inches to 5¾ inches.

In 1901 a notation was added to the drawing of this axle, showing a straight taper between certain points on the axle; also a diagram showing location of borings to be taken from steel axles for analysis.

In 1901 the diameter of the middle was increased from 4⅝ inches to 4¾ inches.

In 1902 changes were made in the diameter of the tapered portion of the axle where it joins the fillet next to collar.

In 1907 the radius between the wheel seat and the rough collar on the inside of the hub of the wheel was changed to ¾ inch, with the center from which the radius is struck coincident with the inside face of the hub of the wheel.

The radius between the dust guard and wheel seat was changed to ¼ inch.

In 1910 the radius of dust-guard fillet was increased from ¼ inch to ⅝ inch, and the wheel seat fillet from ¾ inch to ⅝ inch.

Axle.—C. Standard. With journals, 5 by 9 inches. Sheet M. C. B. 15. Designed to carry 31,000 pounds.

This axle was adopted as recommended practice in 1896, and was made a standard of the Association in 1898.

In 1901 the diameter of wheel seat was changed from 6⅜ inches to 6½ inches.

In 1901 a notation was added to the drawing of this axle showing a straight taper between certain points on the axle; also a diagram showing the location of borings to be taken from steel axles for analysis.

In 1902 changes were made in the diameter of the tapered portion of the axle where it joins the fillet next to collar, also in the diameter of the rough collar.

In 1907 the radius between the wheel seat and the rough collar on the inside of the hub of the wheel was changed to ¾ inch, with the center from which the radius is struck coincident with the inside face of the hub of the wheel.

The radius between the dust guard and wheel seat was changed to ¼ inch.

In 1910 the radius of the dust-guard fillet was increased from ¼ inch to ¾ inch.

Axle.—D. Standard. With journals, 5½ by 10 inches. See M. C. B. 15. Designed to carry 38,000 pounds.

This axle was adopted as a standard of the Association in 1899.

In 1901 the diameter of wheel seat was changed from 6⅞ inches to 7 inches.

In 1901 a notation was added to the drawing of this axle showing a straight taper between certain points on the axle; also a diagram showing the location of borings to be taken from steel axles for analysis.

In 1902 changes were made in the diameter of the tapered portion of the axle where it joins the fillet next to collar; also in the diameter of the rough collar.

In 1906 a ¾-inch radius was adopted between the wheel fit and the rough collar adjoining the inside hub of the wheel; also the radius between the dust guard and wheel fit was increased to ¼ inch.

In 1907 the center from which the radius of ¾ inch

is struck was made coincident with the inside face of the hub of the wheel.

In 1910 the radius of the dust-guard fillet was increased from ¼ inch to ¾ inch.

Axle.—E. Standard. Sheet M. C. B. 15. With journals 6 by 11 inches, Sheet M. C. B.—B. Designed to carry 50,000 pounds.

In 1910 an axle of the design and carrying capacity shown on Sheet M. C. B.—B was adopted as Recommended Practice. Advanced to Standard in 1913.

Axle, Specifications (M. C. B. Recommended Practice).

In 1899 the following specifications, including tests for iron axles, were adopted as Recommended Practice:

SPECIFICATIONS FOR IRON AXLES

Car axles for the use of this company will be ordered subject to the following conditions:

1. All axles must conform in shape and size to the dimensions shown on the blue-prints, which will be furnished by the .... R. R. Co.

2. All axles must be cut off and faced to exact lengths, and be centered with 60 degree centers in the manner indicated in blue-prints, so as to prevent lathe centers from bottoming. Axles must be made of double-work fagoted scrap, 16 per cent of new bar iron worked into the center of the axles being allowed if desired. Axles must be well hammered and free from any clearly defined open seams. They must finish in the lathe with journal free from flaws in the shape of holes, pieces shelled out, or open seams large enough, so that with a knife blade scale or dirt can be removed from such seams, or open seams showing a clear opening of 1-32 inch or over, and being more than 1 inch long. The maker's name or initials must be stamped plainly on each axle.

3. All axles are to be inspected and tested at the works where they are made. The .... shall be notified when they are ready for inspection. Under no circumstances shall car axles be shipped from the works where they are made until they have been tested, inspected and accepted by a proper representative of the company.

4. For each one hundred axles or fraction thereof ordered, one additional axle must be furnished for test. This axle will be selected at random from the pile, and subjected to the prescribed drop test for iron axles of its class. If it stands the test the one hundred axles, or fractional part thereof that it represents, will be inspected, and only those accepted that are made in a workmanlike manner and are free from defects mentioned in these specifications. All axles received are subject to rejection if they do not finish in the lathe in accordance with the requirements herein given. The manufacturer must furnish, free of charge, the axles that are to be tested, the testing apparatus, and the assistance necessary to enable the inspector to make a satisfactory inspection and test. Axles will not be accepted if the diameters fall below the dimensions for forged sizes given in the blue-prints, or if exceeding those dimensions by more than ⅛ inch. Car axles in the rough must not have less than the prescribed minimum weight, nor more than the prescribed maximum weight for axles of their class.

AXLE DROP TEST

Sheet M. C. B.—I.

5. All axles will be tested physically by drop test. The testing machine must conform in its essential parts to the drawings adopted by the Master Car Builders' Association. These essential parts are: The points of supports on which the axle rests during tests must be three (3) feet apart from center to center; the tup must weigh 1,640 pounds; the anvil, which is supported on springs, must weigh 17,500 pounds; it must be free to move in a vertical direction; the springs upon which it rests must be twelve in number, of the kind described on drawing, and the radius of the supports and of the striking face on the tup in the direction of the axis of the axle must be five (5) inches. When an axle is tested it must be so placed in the machine that the tup will strike it midway between the ends, and it must be turned over after the first and third blows, and when required after the fifth blow. After the first blow the deflection of the axle under test will be measured in the manner specified below.

6. It is desired that the axles when tested as specified above shall stand the number of blows at the heights specified in the following table without rupture, and without exceeding, as the result of the first blow, the deflections given:

Axle.	No. Blows.	Height of Drop.	Deflection.
M. C. B. 4¼ by 8-inch journals.....	5	21½ ft.	7⅛ in.
M. C. B. 5 by 9-inch journals.......	5	29 ft.	6 1/16 in.
M. C. B. 5½ by 10-inch journals....	5	36 ft.	5 7/16 in.

7. Axles will be considered as having failed on drop test and will be rejected if they rupture or fracture in any way, or if the deflection resulting from the first blow exceeds the following:

M. C. B. axle, 4¼ by 8-inch journals...........	8⅛ inches.
M. C. B. axle, 5 by 9-inch journals.............	8 1/16 inches.
M. C. B. axle, 5½ by 10-inch journals.........	6 1/16 inches.

In order to measure the deflection, prepare a straight-edge as long as the axle by reinforcing it on one side, equally at each end, so that when it is laid on the axles the reinforced parts will rest on the collars of the axle, and the balance of the straight-edge not touch the axle at any place. Next place the axle in position for test, lay the straight-edge on it, and measure the distance from the straight-edge to the axle at the middle point of the latter. Then, after the first blow, place the straight-edge on the now bent axle in the same manner as before, and measure the distance from it to that side of the axle next to the straight-edge at the point farthest away from the latter. The difference of the two measurements is the deflection.

Axle, Specifications. Sheet M. C. B. 15. (M. C. B. Standard.)

In 1899 the following specifications, including tests for steel axles for passenger and freight equipment cars were adopted as Recommended Practice:

In 1914 they were modified and revised as to form and advanced to Standard. Section 5 modified in 1916.

SPECIFICATIONS FOR STEEL AXLES

I. MANUFACTURE

1. *Process.*—The steel shall be made by the open-hearth process.

II. CHEMICAL PROPERTIES AND TESTS

2. *Chemical Composition.*—The steel shall conform to the following requirements as to chemical composition:

Carbon	0.38 — 0.52	per cent.
Manganese	0.40 — 0.60	"
Phosphorus, not over..........	0.05	"
Sulphur, not over.............	0.05	"

3. *Ladle Analysis.*—An analysis shall be made by the manufacturer from a test ingot taken during the

pouring of each melt, to determine the percentage of carbon, manganese, phosphorus, sulphur and silicon. Drillings for analysis shall be taken not less than ¼ in. beneath the surface of the test ingot. A copy of this analysis shall be given the purchaser or his representative. This analysis shall conform to the requirements specified in Section 2.

4. *Check Analysis.*—A check analysis shall be made from the finished material representing each melt, by the purchaser or his representative, and shall meet the requirements specified in Section 2.

III. PHYSICAL PROPERTIES AND TESTS

5. *Drop Tests.*—The axles shall conform to the following drop-test requirements:

(a) The test axle shall be so placed on supports 3 ft. apart that the tup will strike it midway between the ends. It shall stand without fracture five blows from a tup of 2240 lb. falling from a height as specified, and the permanent set produced by the first blow shall not exceed that specified for axles of corresponding dimensions, as shown in the following table. The axle shall be turned through 180 degrees after the first and third blows.

Size of Axle, In.			Height of Drop, Ft.	Number of Blows.	Maximum Permanent Set.
Journal.	Diameter at Center.	Length Overall, In.			
4¼x8	4¾	84½	22½	5	7½
5 x9	5⅜	86½	29	5	6¼
5½x10	5⅞	88½	34½	5	5½
6 x11	6 7/16	90¾	41½	5	4¾

(b) The permanent set is the difference between the distance from the straight-edge to the middle point of the axle measured before the first blow and the distance measured in the same manner after the blow. The straight-edge shall rest only on the collars or ends of the axle.

(c) The temperature of the axle, when tested, shall be between 40 and 120° F.

6. *Drop-Test Machine.*—The anvil of the drop-test machine shall be supported on 12 springs, as shown on the M. C. B. drawings, and shall be free to move in a vertical direction, and shall weigh 17,500 lb. The radii of the striking face of the tup and of the supports shall be 5 in.

7. *Number of Tests.*—(a) One drop test shall be made from each melt. Unless otherwise specified, not less than 30 axles shall be offered from any one melt.

(b) If the test axle passes the physical tests, the inspector shall draw a straight line 10 in. long parallel with the axis of the axle, and starting with one end of it he shall prick-punch this line at several points. A piece 6 in. long shall be cut off from this same axle so as to leave some prick-punch marks on each piece of axle. Drillings for chemical analysis shall be taken by using a ⅝-in. drill and drilling in the cut-off end 50 per cent of the distance from the center to the circumference and parallel with the axis of the axle.

IV. WORKMANSHIP AND FINISH

8. *Workmanship.*—All axles shall be made and finished in a workmanlike manner and all journals and wheel seats shall be rough-turned. In centering, unless otherwise specified, 60-deg. centers shall be used with large diameter of countersink not less than ⅞ in. and with clearance drilled ½ in. deep.

9. *Finish.*—The axles shall be free from injurious defects and shall have a workmanlike finish.

V. PERMISSIBLE VARIATIONS AND WEIGHTS

10. *Permissible Variation.*—The axle shall conform in size and shape to the standard M. C. B. drawings (see Sheet No. 15). Length shall not be less than shown and not more than ⅛ in. over.

VI. MARKING AND STORING

11. *Marking.*—The manufacturer's name or brand, melt number and month and year when made shall be legibly stamped on each axle on the unfinished portion, unless otherwise specified.

12. *Storing.*—If, as a result of the inspection and tests, more axles are accepted than the order calls for, such accepted axles in excess shall be stamped by the inspector with his own name, and will then be piled and allowed to remain in stock at the works, subject to further orders from the purchasing agent. On receipt of further orders, axles once accepted will not be subjected to further test. In all cases the inspector will keep an accurate record of the melt numbers and the number of axles in each melt which are stored and will transmit this information with each report.

VII. INSPECTION AND REJECTION

13. *Inspection.*—(a) The inspector shall examine each axle in each melt for workmanship, defects, and to see whether the axles conform to the dimensions given on the order or tracing, or whether they conform to the specifications. All axles not satisfactory in these respects shall not be considered further. If in this inspection defects are found which the manufacturer can remedy while the inspector is at the works, he may be allowed to correct such defects.

(b) The inspector representing the purchaser shall have free entry, at all times while work on the contract of the purchaser is being performed, to all parts of the manufacturers' works which concern the manufacture of the material ordered. The manufacturer shall afford the inspector, free of cost, all reasonable facilities to satisfy him that the material is being furnished in accordance with these specifications.

(c) The purchaser may make the tests to govern the acceptance or rejection of the material in his own laboratory or elsewhere. Such tests, however, shall be made at the expense of the purchaser.

(d) All tests and inspection shall be so conducted as not to interfere unnecessarily with the operation of the works.

14. *Rejection.*—Material which, subsequently to above tests at the mills or elsewhere, and its acceptance, develops any imperfections, shall be rejected and shall be replaced by the manufacturer at his own expense.

15. *Rehearing.*—Samples tested in accordance with this specification, which represent rejected material, shall be preserved for 14 days from date of test report. In case of dissatisfaction with results of the tests, the manufacturer may make claim for a rehearing within that time.

An individual paper by E. D. Nelson on the design of freight car axle to carry a load of 50,000 pounds will be found in the 1910 M. C. B. Proceedings, page 478.

Axle Collar. A rim or enlargement on the end of a car axle, which takes the end thrust of the journal bearing.

Axle Gages. Gages for fixing the lengths and diameters of an axle. Were at one time standards of the M. C. B. Association.

Axle Generator (Electric Lighting). Figs. 2471, etc; Pages 1167, 1183, 1256, 1294, 1295. A small direct current generator usually mounted on a car or tender truck and driven by a belt, gear, or chain from the axle. These generators are always provided with some automatic device, forming either a part of the machine itself or being in the form of an auxliary device mounted inside the car, for preserving the polarity of the terminals or leads of the generator.

The fact that a car may run in either direction and thereby cause rotation in either direction of the armature of the generator renders an automatic device of this kind absolutely necessary.

Axle Guard. 51; Fig. 1003. A beam or bar supported by a truck frame and extending over the axles. Iron straps attached to this beam form a support for the axle in case of breakage. See END AXLE GUARD.

Axle Guard Truss. A wrought iron forged bar connecting the iron transoms of a six-wheel truck, and carrying the middle axle guard.

Axle Lighting. See ELECTRIC LIGHTING.

Axle Limits. A report of a committee on this subject will be found in the 1906 M. C. B. Proceedings, page 299.

Axle Pulley. Figs. 2481, etc. The belt pulley mounted upon the car axle for driving the axle generator. When a chain is used the pulley is commonly termed a sprocket wheel.

Axle Pulley Bushing. Fig. 2488. A bushing or sleeve, split longitudinally and bored conically inside to fit the tapering car axle and turned cylindrically outside to fit the hub of the axle pulley.

Axle Safety Bearing (Passenger Car Trucks). The axle guard of a truck above the axle and the axle safety hanger below it, together forming a circle around the axle, are sometimes called axle safety bearing.

Axle Safety Hanger. 55, Fig. 1003. A strap connected to an axle guard and passing under the axle to support it in case of breakage. See AXLE GUARD.

Axle Seat. The inside surface of the hole in a car wheel which comes in contact with the axle, and not the hole itself. The corresponding part of an axle is called the wheel seat or wheel fit.

B

Babbitt Metal. An allow, consisting of nine parts of tin and 1 of copper, used for journal boxes; so called from its inventor, Isaac Babbitt, of Boston. Some variations have been made, and among the published formulae are:

Copper	1	1
Antimony	1	5
Tin	10	50

Another formula substitutes zinc for antimony.

The term is commonly applied to any white alloy for bearings, as distinguished from the box metals or brasses in which copper predominates.

Babbitt Metal Bearings. A style of bearing of which a great variety of forms exist, which in effect substitutes Babbitt metal in some of its many forms for brass as a bearing surface. Lead lined bearings are different in that they merely use a thin sheet of lead over the brass, to correct slight irregularities and give an even bearing surface.

Back Cylinder Head (Air Brake Cylinder). See NON-PRESSURE HEAD.

Back Face Plate (Steel Tired Wheels). The inner one of the two plates connecting the tire with the hub.

Back Guy (Steam Shovel). An iron rod running from the top of the "A" frame to an anchor over the body bolster under the boiler.

Back Seat Bottom Rail (Longitudinal Seat). A horizontal wooden strip at the back edge, to which a wooden seat bottom is attached.

Back Stop Timber. See BUFFING SUB-SILL.

Back-Up Air Brake. A device on the rear end of the train by which the brakeman can blow a warning whistle or apply the brakes when backing up.

Back-Up Air Brake Cock. Fig. 1512. A cock which is operated by the brakeman in applying the back-up air brake.

Back-Up Air Signal. Fig. 1512. A warning signal which can be operated at the rear of the train when backing up.

Baggage-Buffet Car. A passenger train car with club and dining facilities and a compartment for carrying baggage. See CAR.

Baggage Car. Figs. 268-290, 352, 353, 358, 2877-2879; Page 1300. A car run in passenger service, having wide side doors for the admittance of baggage and with or without windows and end doors. See CAR.

Baggage Car Generator. See ELECTRIC LIGHTING.

Baggage and Express Car. Figs. 283, 284; Page 1300. See CAR. A car similar to a baggage car, used for either baggage or express matter.

Baggage and Postal Car. Figs. 268-274. A car run in passenger service and providing facilities for both baggage and mail matter. See CAR.

Baggage Rack. See BASKET RACK.

Baggage Truck. A vehicle with a frame or rack for carrying baggage, used to move the latter by hand about railway stations.

Bail. A curved handle of a more or less semi-circular form for a pail, bucket, lantern or other utensil.

Baker Car Heater. Figs. 2054, etc. A heater arranged to heat water in a coil of pipe in the inside of the stove, and cause it to circulate through a series of pipes laid near the floor of the car. The fireproof heater has a single coil, 30 feet in length, or a double coil, in a flexible steel, jointless, fireproof safe, with no apertures large nough to permit the escape of live coals. This inner fire pot or safe is enclosed in a flexible steel outside casing, with asbestos sheets between the safe and casing, and between the ash pit bottom and sheet iron bottom; a safety plate covers the feed chute at the top, and a cinder-proof door effectually closes the ash pit at the bottom. The smoke pipe and smoke flue base may be destroyed and leave the fire pot practically fireproof.

Balance Hanger. See BRAKE BEAM ADJUSTING HANGER.

Balance Spring (Passenger Truck Brake Gear). A flat spring from which the brake beam adjusting hanger is suspended and which keeps the brake head balanced in its proper position.

Balance Valve Pressure Regulator. A valve for automatically regulating the pressure in the steam pipes in a car-heating system.

Balanced Side Bearing Truck. See Side Bearing Truck.

Ball-Bearing (Car Journals). Figs. 1071-1073.

Ball-Bearing Butt Hinge. A butt hinge, the washer of which is a ball-bearing.

Ball-Bearing Center Plate. Figs. 1078-1080. A center plate fitted with ball-bearings to reduce the friction in turning.

Ball-Bearing Side Bearing. A side bearing fitted with ball-bearings to reduce the friction in curving. See Side Bearing.

Ballast Car. Figs. 114, 115, 123, 2808; Page 1253. A car for carrying ballast for repair and construction work, usually of either the flat or gondola type. See Car.

Ballast Plow or Ballast Spreader. Figs. 455-458. A plow for removing ballast either from cars or from the track. The plows shown in Figs. 456, 457 are used on the tops of flat cars or gondola cars which have side doors and are hauled over the cars either by a locomotive and cable or a special winding engine which takes steam from the locomotive. The plows shown in Figs. 455, 458 are for plowing and spreading ballast from the center of the track and are drawn or pulled by a locomotive. The plows are raised or lowered by hand or compressed air.

Band (for Seat Backs). More properly Seat Back Molding.

Bar Sash Lift. A sash lift having a short horizontal metal bar attached to two flanged studs or stanchions; used for the large sashes of sleeping and parlor cars.

Bar Shackle (of a Padlock). A rectangular, instead of U-shaped, shackle.

Barrel Car. A flat car, racked so as to carry many empty barrels. They are made long, and the racks are very high in order to make up a carload weight.

Barrel Door Bolt. A door bolt made of a round metal bar and held in a round tube or "barrel." It is constructed so that when it is either engaged or disengaged from its keeper it can be turned by a short lever or knob and held in either position by suitable stops.

Barrow Truck. A term sometimes used to designate a two-wheel baggage truck.

Bars, Wrought Iron, Refined, Specifications for.—(M. C. B. Recommended Practice.)

In 1914, by letter ballot, specifications for refined wrought iron bars for passenger and freight equipment cars were adopted as Recommended Practice, as follows:

I. MANUFACTURE

1. *Process.*—The finished product shall consist either of new muck-bar iron or a mixture of muck-bar iron and scrap; but shall be free from any admixture of steel. Muck bars shall be made wholly from puddled iron.

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II. PHYSICAL PROPERTIES AND TESTS

2. *Tension Tests.*—Unless otherwise specified, the iron shall conform to the following requirements as to tensile properties:

Tensile strength, lb. per sq. in...47,000—53,000
Elongation in 8 in., minimum per cent......22

3. *Permissible Variations in Physical Properties.*—(a) Tensile Strength.—Large sections reduced or flats and rounds of ½ in. or under may show a tensile strength of 45,000-52,000 lb. per sq. in.

(b) Elongation.—Twenty per cent of the test specimens representing one size may show the following percentage of elongation in 8 in.:

½ in. or over, tested as rolled......20 per cent
Under ½ in., tested as rolled......16 per cent
Reduced by machining............18 per cent

Flat Bars:

⅜ in. or over, tested as rolled......18 per cent
Under ⅜ in., tested as rolled.......16 per cent
Reduced by machining............16 per cent

4. *Bend Tests.*—(a) Cold-bend Test.—For round, square and hexagon bars under 2 sq. in. in section, and for flats less than ¾ in. thick, shall bend cold around a pin the diameter of which is equal to the diameter or thickness of the specimen. For rounds, flats and hexagon bars 2 sq. in. or over section, and for all flat bars over ¾ in. in thickness, around a pin the diameter of which is equal to twice the diameter or thickness of the specimen.

(b) Hot-bend Test.—The test specimen, when heated to a temperature between 1700 and 1800 deg. F. (light cherry red), shall bend through 180 deg. without fracture on the outside of the bent portion, as follows: For round, flat and hexagon bars under 2 sq. in. in section, flat on itself; for round, flat and hexagon bars 2 sq. in. and over in section, around a pin the diameter of which is equal to the diameter or thickness of the specimen.

(c) Nick-bend Test.—The test specimen, when nicked 25 per cent around the round bar, and along one side for flat bars, with a tool having a 60-deg. cutting edge, to a depth of not less than 8 or more than 16 per cent of the diameter or thickness of the specimen, and broken, shall not show more than 10 per cent of the fractured surface to be crystalline.

5. *Test Specimen.*—Tension and bend test specimens shall be of the full section of material as rolled, if possible, otherwise the specimens shall be machined from the material as rolled; the axis of the machined specimen shall be located at any point one-half the distance from the center to the surface of round bars, or from the center to the edge of flat bars, and shall be parallel to the axis of the bar.

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6. *Number of Tests.*—(a) All bars of one size shall be piled separately. One bar from each 200 or less shall be selected at random and tested as specified.

(b) If any test specimen from the bar originally selected to represent a lot of material contains surface defects not visible before testing, but visible after testing, or if a tension-test specimen breaks outside the middle third of the gage length, one retest from a bar will be allowed.

III. PERMISSIBLE VARIATIONS IN GAGE

7. *Permissible Variations.*—(a) Round bars shall conform to the standard M. C. B. limit gages.

(b) Flat Bars.—Thickness shall not vary more than corresponding diameter for rounds: thus, 1 in. thick could vary from 0.9905 to 1.0095 in.

(1) Sizes under 3 in. wide shall not be more than 1/32 in. under or over size in width.

(2) Sizes 3 in. and over shall not be under size or more than 1/16 in. wider than order.

IV. FINISH

8. *Finish.*—The bars shall be smoothly rolled and free from slivers, depressions, seams, crop ends, and evidences of being burned.

V. INSPECTION AND REJECTION

9. *Inspection.*—(a) The inspector representing the purchaser shall have free entry, at all times while work on the contract of the purchaser is being performed, to all parts of the manufacturer's works which concern the manufacture of the material ordered. The manufacturer shall afford the inspector, free of cost, all reasonable facilities to satisfy him that the material is being furnished in accordance with these specifications.

(b) The purchaser may make the tests to govern the acceptance or rejection of the material in his own laboratory or elsewhere. Such tests, however, shall be made at the expense of the purchaser.

(c) All tests and inspection shall be so conducted as not to interfere unnecessarily with the operation of the works.

10. *Rejection.*—Material which, subsequently to the above tests at the mills or elsewhere, and its acceptance, develops weak spots, cracks or imperfections, or is found to have injurious defects, shall be rejected and shall be replaced by the manufacturer at his own expense.

11. *Rehearing.*—Samples tested in accordance with this specification, which represent rejected material, shall be preserved for 14 days from date of test report. In case of dissatisfaction with results of tests, the manufacturer may make claim for a rehearing within that time.

Base Board Corner Molding. A light molding at the junction of the base board and the floor.

Base Plate (of a Derrick or Crane). A large plate placed on the floor of the car for supporting the mast. Another method of support is by mast pocket.

Base Washer (Passenger Equipment Car Platform Posts). A metal ring or plate, which forms a bearing for the post on the platform end timber.

Basin. Figs. 1747-1776, etc. A hollow vessel made of porcelain or metal, and in cars usually fixed in a suitable stand with pipes and other attachments for filling it with water and emptying it. Such basins are used as lavatories in sleeping and other passenger cars. They are emptied at the bottom through a pipe connected to the basin by a basin coupling, or basin bushing, which is closed by a basin plug. The basin plug is attached to a basin chain, which again is fastened to a stanchion called the basin chain holder. For standard postal car basin see Fig. 2922. See also FOLDING LAVATORY.

Basin Bushing and Plug. Figs. 1721-1723, etc. See BASIN.

Basin Plug. Figs. 1721-1723, etc. See BASIN.

Basin Pump. Figs. 1745, 1746, 1762. A pump of peculiar construction for supplying the basin of sleeping and parlor cars from the tank carried under the slab. It is called single or double acting, according as the upward stroke only, or both the upward and downward strokes, eject water. Double acting is most used. The use of basin pumps has been practically discontinued on standard sleeping cars, the water being carried in tanks under the car and forced through the pipes by compressed air. They are still in general use, however, on tourist sleeping cars, chair cars and many day coaches.

Basin Valve. The valve which allows the water to escape from the basin is usually in the form of a plug or waste cock. See BASIN.

Basket Rack. Figs. 1847-1857; Pages 1118, 1162. A receptacle made of metal ends and rods, or a combination of rods and wire netting for holding parcels and hand baggage. They are attached to the sides of passenger cars, above the heads of the passengers, so as to be out of the way. Continuous basket racks extend the full length of the car, and are increasing in favor.

Basket Rack Bracket. A light metal support for the end or center of a basket rack.

Basket Rack Netting. Wire netting with very large meshes, which forms the bottom or back of a basket rack.

Basket Rack Rod. Small round metal bars, with which form the main portion of a basket rack, and to which the netting, when used, is fastened.

Batten. A piece of board or scantling of a few inches in breadth.

Battery. See STORAGE BATTERY.

Bayonet Catch. A general term derived from the manner of fastening on a bayonet to a gun, applied to the mode used in many forms of hardware and mechanical construction for connecting separate parts so as to be firmly united and yet easily removable. Many lamps are held in place by a form of bayonet catch.

Bead. A small salient molding of semi-circular section. Also the strips on the sash frame which form a guide for the sash. These beads are known as the inside bead, outside bead and parting bead. The term is frequently applied to any form of small, light molding of simple outline.

Beam. The term beam is generally applied to any piece of material of considerable scantling, whether subject to transverse strain or not; as, for example, 'collar beam,' 'tie beam,' 'Brestsummer beam,' the two former being subject to longitudinal strains of compression and tension, respectively, and the latter to transverse strain.

Any large piece of timber, large in proportion to its thickness and squared or hewed for use.

A bar of metal of similar proportions is also called a beam.

A bar supported at two points and loaded in a direction perpendicular or oblique to its length is called a beam.

By analogy the term has of late years come to be applied to similar pieces or bars of iron and steel. Thus we have iron I-beams and deck beams to take the place of wooden beams in structures. The term is also used to designate such things as the beam of a balance or scales, a plow beam, the walking-beam of a steam engine, brake beam, etc.

Bearing. That which supports or rests on something, and is in contact with it. Thus a block or stone on which the end of a timber rests is called a bearing. The metal block or bushing in contact with a journal is called a bearing.

Bearing Casting (Tip Cars). A casting, one of a pair attached to either the car body or to the truck which supports the car body and its loads. In tip cars it is pivoted or hinged so as to permit the body to tip or rock literally and to thus discharge its load.

Bearings, Journal. See JOURNAL BOXES AND DETAILS.

Bell Cord. See SIGNAL CORD.

Bell Crank. An L-shaped rectangular lever, often with the two extremities connected so as to be of triangular form, for changing the direction of motion by 90 degrees, more or less.

(Hand Car.) A crank attached to the propelling lever shaft, giving more favorable direction to the power applied to the levers.

Bell Rope. See SIGNAL CORD.

Belt Aligning Device (Electric Lighting). Mechanism consisting of screws and slip collars for adjusting the alignment of the belt, by shifting the generator so that its pulley shall be in the same vertical plane with the axle pulley.

Belt Molding. A molding passing entirely around the interior of a passenger car directly above the windows.

Belt Rail. 27, 57, Figs. 34, 35; 30, Fig. 348. A part of a passenger or street car frame below the windows on the outside, extending the whole length of the car body and attached to each post. It is usually framed into the posts and supports the window sills. The upper belt rail is a similar strip directly above the window. See AUXILIARY BELT RAIL.

Belt Rail Cap. A strip of wood nailed to the top of a belt rail, and forming a seat for the window sill.

Belt Rail Stiffener. A reinforcing member riveted to a belt rail in steel passenger cars.

Belt Tension. Mechanism consisting of springs, rods and nuts for adjusting and maintaining the tension of a belt used for driving an axle generator.

Bench Cap. Transverse timbers resting upon the side sills of a coal or ore car, to tie the sills together and prevent spreading, and also to support the doors or winding shaft about which the winding shaft chain is wound.

Berth. Figs. 1625-1628. 1, 2, 3, Figs. 1626, 1627. A bed in a sleeping car; also, the shelf or support on which the bed rests. There are two such beds in the space occupied by two double seats, which is called a section. The lower berth is made up on the seats and the upper one on a shelf, which can be raised or folded

Berth Arm. A BERTH BRACE.

Berth Brace. A metal rod, chain, or wire rope sometimes attached to the side and near the top of a sleeping car, and at the other end to the outer edge of a berth, which is supported by the brace. In the later designs it is done away with, the berth being supported by the berth chain.

Berth Brace Eye. A metal plate with suitable lugs for fastening the brace to the top of the car or to the berth.

Berth Bracket. A bracket on which an upper berth of a sleeping car rests when lowered.

Berth Chain. 10, Figs. 1626, 1627; Fig. 1628. A chain passing from the berth spring through the overhead pulley and to the corner of the upper berth to support it. The berth spring is attached to the chain to counteract the weight of the berth. The berth chain does the service of the berth spring rope and berth brace.

Berth Chain Pulley. 11, Figs. 1626, 1627; Fig. 1628. A pulley atached to the roof of a sleeping car, over which a berth chain runs.

Berth Curtain. 7, Figs. 1626, 1627. A curtain hung in front of a sleeping car section to afford privacy to occupants. A single curtain covers both berths, and is hung from the berth curtain rod.

Berth Curtain Hook. Figs. 1635, 1637. A metal hook attached to a berth curtain, and by which the latter is hung on a rod above the berths; usually covered with leather to prevent rattling.

Berth Curtain Pole. See BERTH CURTAIN ROD.

Berth Curtain Rod. 6, Figs. 1626, 1627. A rod usually made of metal tubing, fastened above a section of a sleeping car to support the berth curtains. They are now made in sections, supported by folding brackets, and swing into the upper berth out of sight, except when berths are made up. See BERTH CURTAIN ROD BRACKET.

Berth Curtain Rod Bolt. A small vertical bolt, usually tipped with an ornament fastening the curtain rod in the coupling on the bracket.

Berth Curtain Rod Bracket. Figs. 1641, 1642. A metal bracket attached to the deck of a sleeping car, which forms a support for a berth curtain rod. Such brackets usually have a coat and hat hook attached to them. A hanger is sometimes used as a substitute for a bracket at certain points. The stationary bracket has been replaced by the folding curtain rod bracket, which folds, with the rod attached, into the upper berth and out of sight when the curtains are not in use. See CURTAIN ROD FOLDING BRACKET.

Berth Curtain Rod Coupling. A fastening by which a berth curtain rod of a sleeping car is secured to a bracket. It usually consists of a bolt or screw.

Berth Curtain Rod Socket. A metal flanged ring which supports the berth curtain rod. Also called berth curtain rod bushing.

Berth Front. The bottom or front of an upper berth.

Berth Headboard. See HEADBOARD.

Berth Hinge. Fig. 1630. A hinge or joint by which the back edge of an upper berth of a sleeping car is attached to the side of a car.

Berth Hinge Bushing. A hollow metal socket in which the spindle of a loose berth hinge works.

Berth Hinge Plate. A plate which takes the place of a berth hinge bushing.

Berth Lamp. 9, Figs. 1626, 1627; Figs. 2375, 2376, 2390, etc. A lamp for lighting a sleeping car berth.

Berth Latch. A device for holding the upper berth of a sleeping car up in its place when not in use. To obviate the danger of the berth shutting up in case of overturning of the car, the safety berth rope and attachments are used. Safety berth latches have also been used to obviate the necessity of using a safety rope. See SAFETY BERTH LATCH.

Berth Latch Bolt. A bar or pin of an upper berth latch which engages in a corresponding strike plate or keeper to hold the berth up.

Berth Latch Keeper. Also called STRIKE PLATE. See BERTH LATCH BOLT.

Berth Latch Lever. The part by which the berth latch handle operates the berth latch bolt; also called a berth latch rocker plate.

Berth Latch Rocker Plate. See BERTH LATCH LEVER.

Berth Lock. See BERTH LATCH.

Berth Lock or **Latch Handle.** Fig. 1634.

Berth Lock or **Latch Rods.** Fig. 1633.

Berth Mattress. The mattresses which cover the seat cushions of the lower berth and the springs of the upper berth. When the berths are made up for day travel the mattresses are stored in the upper berth.

Berth Numbers. Fig. 1629. Figures or numbers, usually made of metal or porcelain, for numbering the berths or sections of sleeping cars. They are frequently sewed to plush panels and hung from the berth curtain rods.

Berth Partition. The partition between the upper berths of two adjacent sleeping car sections. It is of the same outline as the upper berths' cross-section.

Berth Safety Rope. 13, Figs. 1626, 1627. A wire rope fastening the upper berth of a sleeping car to the fixed arms of the lower berth, to prevent accidental closing up of the upper berth in case of overturning of the car. The rope is fastened to the upper berth by a berth safety rope fastener and to the lower berth by inserting a knob into a berth safety rope holder. See SAFETY BERTH LATCH.

Berth Safety Rope Hook. Fig. 1636. A hook for holding a berth safety rope.

Berth Spring. Fig. 1628. A spring usually made in a spiral form, like a watch spring, coiled within a device called the berth spring fusee and attached to the upper berth of a sleeping car by a berth chain so as to counteract the weight of the latter and make it easy to raise and lower.

Berth Spring Frame. Fig. 1628. A metal support which holds a berth spring and fusee.

Berth Spring Fusee. See FUSEE.

Berth Spring Lug or Clip. The means by which the end of a berth chain is fastened to the upper berth, sometimes called a berth chain end plate.

Berth Striker Plate. A Berth Latch Keeper.

Beveled Washer. A washer used to give an even bearing for rods which stand at an acute angle to the surface on which the nut or bolt head bears. Sometimes two such washers which come near together are cast in one piece, and are then called double beveled washers. See TRIANGULAR WASHER.

Bezel. A term applied by watchmakers and jewelers to the groove and projecting flange or lip by which the crystal of a watch is retained in its setting.

Bibb Cock. Literally, a cock with a curved nozzle or spout, but commonly restricted to a cock with a plain valve without springs, moved by the hand only.

Billet Car. A low side gondola car, built of steel throughout for transportation of hot steel billets or other heavy material.

Bit (of a Key). The part of a key which enters the lock and acts upon the bolt and tumblers. The bit consists of the web and wards. The web is the portion left after the wards are cut out. The wards consequently are those spaces which fit over the wards of a lock. Some bits have no wards.

Bleeding Valve or **Bleeding Cock.** Another term for Release Valve or Release Cock. The operation of releasing the brakes when applied upon a car detached from the locomotive is sometimes called bleeding. The bleeding valve is located on the auxiliary reservoir, and the brakes may be released by opening it and allowing the air in the brake cylinder and auxiliary reservoir to escape.

Blind. A Window Blind. They are sometimes single, but usually double, distinguished as lower and upper. Flexible window blinds are rarely used now, having been displaced by window shades.

Blind Ceiling (Refrigerator Car). A layer of light boards next above the inside ceiling in the roof of the car.

Blind End Car (Passenger Equipment). A term sometimes used to designate non-vestibuled cars, but more properly a car without end doors, either non-vestibuled (dummy) or with open platforms.

Blind Floor (Refrigerator Cars). A layer of boards under the sub-floor and fastened to ceiling strips secured to the bottom of the sills.

Blind Lining (Refrigerator Cars). A thin layer of boards between the outside sheathing and the inside lining; also sometimes called intermediate lining.

Block. A heavy piece of timber or wood, usually with one plane surface; or it is rectangular and rather thick than long.

A pulley or system of pulleys mounted on its frame or shell, with its band or strap. A block consists of one or more pulleys or sheaves, in a groove of which the rope runs, fastened in a shell or frame by pins, on which they revolve.

The interior wheels are termed sheaves, which latter term is often used to designate the whole block or pulley. A snatch block is a block with only one sheave, and with an opening at the side for the ready insertion and removal of the rope. Blocks without this opening, however, are also sometimes termed snatch blocks.

Block and Tackle. A general term applied to a pair or more of pulleys and accompanying rope. Also termed fall and tackle, or simply tackle.

Blocking. A mode of fastening together the vertical angles of woodwork by blocks of wood glued or nailed in the inside angle. The method is largely used in every form of carpentry, where great strength is not required in the joint. In car work, generally known as furring blocks.

Blocking, Continuous (Passenger Equipment Car Framing). A term used to designate planks or blocking used to strengthen the side frame.

Board. A piece of timber sawed thin, and of considerable length and breadth, compared with the thickness, used for building and other purposes.

Boarding Car. A term commonly applied to a car used as a place of lodging for workmen. In the case of wreck trains they are more often called dining and sleeping cars.

Body (of a Car). The main or principal part in or on which the load is placed. American cars usually consist of a body carried on two trucks.

(Of a Valve, Cylinder, etc.) The main or principal part, to which the other parts are attached, as cylinder body, etc.

Body Bolster. 5, Figs. 34, 35; 7, Fig. 80; 10, Fig. 111; 4, Figs. 147, 210; 2, Fig. 173; 5, Fig. 260; Figs. 505-531, 1153; Pages 1126, 1137, 1182, 1197. The transverse members of the underframe over the trucks which transmit the load carried by the longitudinal sills to the trucks through the center plates. A double body bolster is a wide bolster with two transverse

members, and is used on cars equipped with six-wheel trucks.

Body Bolster Bottom Cover Plate. 7, Fig. 348. The bottom cover plate used on a bolster of the built-up type. Also known as the Body Bolster Compression Bar and Body Bolster Tie Plate.

Body Bolster Compression Bar. The lower or compression member of a built-up body bolster. Also designated as the Body Bolster Bottom Cover Plate.

Body Bolster Cover Plate. Fig. 968. See BODY BOLSTER TOP COVER PLATE and BODY BOLSTER BOTTOM COVER PLATE.

Body Bolster End Pocket Casting. A cast cap that fits over the end of a combined wood and steel body bolster, through which the truss rods pass, and on which the truss rod nuts bear. It is a body bolster truss rod washer enlarged so as to cover the entire end of the bolster.

Body Bolster Filler. Fig. 968. A plate or casting forming the filling piece between the cover plates of a built-up body bolster. The term also applies to Truck Bolsters. Also frequently called Diaphragm and sometimes Spider.

Body Bolster Flitch Plates. Plates of iron or steel sandwiched between pieces of wood and bolted together to give a wooden bolster greater strength. Frequently called body bolster sandwich plates.

Body Bolster Sandwich Plate. See BODY BOLSTER FLITCH PLATES.

Body Bolster Tension Bar. The upper or tension member of a built-up body bolster. Also designated as the Body Bolster Top Cover Plate.

Body Bolster Thimble. See BOLSTER THIMBLE.

Body Bolster Tie Plate. 7, Fig. 348; Fig. 968. See BODY BOLSTER BOTTOM COVER PLATE.

Body Bolster Top Cover Plate. Fig. 968. The top cover plate used on a body bolster of the built-up type. Also known as the Body Bolster Tension Bar.

Body Bolster Truss Block. A block of wood or distance piece on the top of a wooden body bolster between the center floor timbers and underneath the bolster truss rods.

Body Bolster Truss Rod. A metal rod, used on some built-up body bolsters, which is tied to the ends and passes above the center of the bolster over the truss rod bearing, so as to form a truss; generally two are used for each bolster.

Body Bolster Truss Rod Bearing. See BODY BOLSTER TRUSS ROD.

Body Bolster Truss Rod Washer. An iron bearing plate on the end of a body bolster; often made to take two or more rods.

Body Brace. An inclined member of the body side or end framing. In the usual form of side framing for freight cars the braces are inserted in the panels between the bolster and the center of the car, inclining toward the center of the car, while the counter braces are framed in the panel between the bolster and the end of the car, inclining toward the end of the car. See BRACE and COUNTERBRACE.

Body Brace Rod. An inclined iron rod in the side or end of a car body frame, which acts as a brace. They are distinguished as end and side body brace rods. A brace straining rod is a short vertical rod in the side of a passenger car under the window.

Body Center Plate. 7, Figs. 34, 35, 173; 14, Fig. 111; 5, Fig. 147; 26, Fig. 210; 31, Fig. 260. The center plate attached to the under side of the body bolster. See CENTER PLATE.

Body Check or Safety Chain Eye. An eye bolt or clevis for fastening a truck check chain or safety chain to the car body.

Body Check or **Safety Chain Hook.** An iron hook on the check chain, which enters into the check chain eye.

Body Counter Brace Rod. Usually an inclined iron rod in the side frame of a car body, between the bolster and the end of the car. It may be a diagonal brace rod in a Pratt truss, which runs counterwise with those rods which carry the load. It may then be between the bolsters.

Body Cross Tie. 31, Fig. 80. A metal bar extending across a hopper or other form of open-top freight car and fastened to the sides to prevent their bulging.

Body End Furring. Furring in the end of a car. See FURRING.

Body End Plate. A transverse member in the end of a car connecting the side plates. See END PLATE.

Body End Rail. See END RAIL.

Body Framing. Figs. 490-497. The framework of that part of a car above the underframe, so called to distinguish it from the underframe. It is commonly subdivided into side, end and roof framing.

Body Post (Freight Car Bodies). An upright timber which is framed into the sill and plate of a freight car. The body posts and corner posts form the vertical members of the side frame of a car body. See POST and SIDE POST.

Body Queen Post. See QUEEN POST.

Body Side Bearing. 6, Fig. 35; 8, Fig. 348; Pages 1128, 1149, 1204, 1286, 1314, 1316. The upper one of the two side bearings, which is attached to the body bolster. See SIDE BEARINGS.

Body Transom. A name sometimes given to a Needle-beam or Cross Tie.

Body Truss Rod. A rod extending from end sill to end sill, passing over the body bolsters on truss rod saddles and under the truss rod queen posts hung from the cross tie timbers. With the sills they form a truss and support the car body, preventing the sills from sagging between the bolsters. In passenger cars truss rod anchor irons are sometimes used, which are fastened to the sills near the bolsters. The truss rods are then attached to these anchors and are not brought out through the end sills. Truss rods are distinguished as center, intermediate and side or outside truss rods.

Body Truss Rod Bearing. See QUEEN POST.

Body Truss Rod Hopper Strap. A term applied to a strap passing under and supporting the hopper of a gondola car, the ends of which are fastened to the body truss rods, which carry the stress to the end sills.

Body Truss Rod Saddle. A block of wood or a casting which forms a distance piece on top of a bolster, and on which a continuous body truss rod bears. Properly speaking, a saddle means a common bearing for a pair of rods with a central support, but it is not restricted to such use.

Body Truss Rod Washer. A heavy iron washer on the outside face of the end sill, on which the nut on the end of the body truss rod bears.

Bogie (British). A swiveling car truck. American eight-wheel cars are what are termed in Great Britain bogie carriages, or wagons.

Bogus Plate (Refrigerator Cars). A horizontal timber attached to the posts on the inside of the car, a short distance below the plate. The bogus plates support horizontal cross timbers, called meat timbers, or hanging bars, to which hooks are attached for hanging meat.

Bolster. Figs. 505-531; Figs. 513-516, 519, 522; 2888, 2889; Pages 1126, 1137, 1182, 1197, 1204, 1206, 1230, 1263. A cross timber or beam on the under side of a car body and in the center of a truck, through which the weight is transmitted. The bolsters carry the body and truck center plates, the body bolster resting on the truck bolster.

Truck bolsters are either swing bolsters, admitting of lateral motion to mitigate shocks, or rigid bolsters, which permit no lateral motion. All passenger trucks have swing bolsters. In freight car service the rigid bolster has the preference, and rigid bolster trucks are the more numerous. See Body Bolster, Double Body Bolster, Swing Bolster and Truck Bolster.

Bolster Bridge (Six-Wheel Truck). See Side Bearing Arch.

Bolster Center Casting. 16, Fig. 348; Fig. 969. A hollow rectangular shaped casting placed between the center sills and body bolster plates; the king bolt passes through it. Sometimes called a bolster center filler.

Bolster Center Filler. See Bolster Center Casting.

Bolster Chafing Plate. This is an iron plate attached to the side of the transom to prevent wear from abrasion by movement of the bolster. More properly, transom chafing plate. The corresponding casting on the side of the bolster, which is, strictly speaking, the bolster chafing plate, is commonly called friction block or friction plate.

Bolster Diaphragm. Fig. 968. See Body Bolster Filler.

Bolster Flitch Plate. The iron or steel plates of a built-up bolster, sandwiched between wood pieces. Rarely used now.

Bolster Guide Bars (Diamond Arch Bar Trucks). More commonly called columns. Posts between the arch bars, held in place by column bolts, which form a guide for the end of the bolster. These columns are sometimes also required to perform the office of a brake hanger carrier. An offset shoulder is then cast on the column near the top and on the inside with a jaw, to which the brake hanger is fastened by a pin. They are also often combined in one casting with the spring seats.

Bolster Hanger. See Swing Hanger.

Bolster Hanger Carrier. A Swing Hanger Pin Bearing.

Bolster Jack Screw (Wreck Cranes). A jack screw attached to the spring plank for the purpose of taking the load off the springs and making the entire truck and car body one rigid structure when the derrick of the crane is in use.

Bolster Plate (Passenger Equipment Trucks). Wrought iron plates bolted to the sides of wooden bolsters to strengthen them.

Bolster Sandwich Plate. See Bolster Flitch Plate.

Bolster, Specifications for Cast-Steel (M. C. B. Recommended Practice).

In 1912 specifications were adopted for cast-steel bolsters. Modified in 1915.

In 1916 dimension from center line of holes in bottom of bolster changed to 3 inches.

Specifications

1. When the manufacturer is ready to make a shipment of material he shall notify the purchaser of that fact and await the arrival of the purchaser's inspector, to whom he shall furnish free any assistance and labor needed to make satisfactory inspection test and prompt shipment.

2. The manufacturer shall protect all castings so that they do not become covered with rust.

3. *Cleaning.*—At his option the inspector may require that any or all castings be subjected to sand blast in order to make an examination of the surface for checks or cracks.

4. *Painting.*—They shall not be painted before being inspected, unless otherwise specified.

Manufacture

5. *Process.*—Castings furnished under these specifications shall be made by the open-hearth process in accordance with the best foundry methods.

I. Chemical Properties and Tests

6. *Chemical Composition.*—The steel shall conform to the following requirements as to chemical composition:

Carbon	not below [illegible] or above [illegible] per cent
Manganese	not above [illegible] per cent
Phosphorus	not above [illegible] per cent
Sulphur	not above [illegible] per cent

7. *Ladle Analysis.*—To determine whether the material conforms to the requirements specified in Section 6, an analysis shall be made by the manufacturer from test ingot taken during the pouring of each melt. Drillings for analysis shall be taken not less than ¼ inch beneath the surface of the test ingot. A copy of this analysis shall be given to the purchaser.

8. *Check Analysis.*—A check analysis may be made by the purchaser from a test coupon representing each melt, and this analysis shall conform to the requirements of Section 6.

9. *Sampling for Chemical Analysis.*—From the coupon described in Section 12 (a), which has satisfactorily passed the physical requirements, borings shall be taken for chemical analysis.

II. Physical Properties and Tests

10. *Physical Properties.*—The physical properties of the steel shall be as follows:

Ultimate tensile strength, lbs. per sq. in., not less than 60,000.

Yield point (by drop of beam), not less than 50 per cent of the ultimate tensile strength.

Elongation in 2 in. per cent, not less than 1,400,000 [illegible]

11. *Annealing.*—All castings shall be thoroughly annealed. Test coupons shall be annealed with the casting, before they are detached. To determine the quality of annealing, the inspector will have one of the test coupons mentioned in Section 12 (b) cut half way through and broken off from the casting for examination of fracture. If, in his opinion, the annealing has not been properly done, he may require the castings to be reannealed, using the second test coupon for examination in this case. If after annealing or reannealing any casting is so much out of gage

as to require heating in order to bring it within the gage, it shall again be annealed before it may be accepted.

12. *Sampling.*—For the purpose of determining whether the physical and chemical requirements are complied with, the inspector shall select at random one casting from each melt. From this casting the two physical and chemical test coupons shall be removed by the inspector; one of them shall be subjected to physical test, but if the coupon casting proves unsound, the other coupon shall be used in its stead for this purpose.

(a) Physical Test Coupons.—The manufacturer shall have cast upon each bolster two test coupons having a cross section of 1⅛ by 1⅛ in. and 6 in. long. These coupons are to be used for physical and chemical test and their location upon the casting shall be specified by the purchaser.

(b) Annealing Coupons.—There shall be two additional coupons of a cross section not less than the average cross section of the casting, which coupons are to be used to determine the character of the annealing as specified in Section 11.

III. WEIGHTS

13. *Limiting Weights.*—Bolsters shall conform to the weights given in table, which cover the bolster casting, either with center plate cast integral or separate center plate, and do not include side bearings, fulcrum castings, or other attachments. In case the castings have met all requirements except that of overweight, they may be accepted at the maximum allowable weight specified.

Cast-steel truck bolsters with integral center plate. (Exclusive of weight of side bearings, fulcrum brackets, or other attachments.)

Car Capacity, Lbs.	Weight, Lbs. Minimum.	Normal.	Maximum.
80,000	660	680	700
100,000	740	765	790
140,000	945	975	1,005

Cast-steel truck bolsters with separate center plate. (Exclusive of weight of center plate, side bearings, fulcrum brackets or other attachments.)

Car Capacity, Lbs.	Weight, Lbs. Minimum.	Normal.	Maximum.
80,000	670	690	710
100,000	755	780	805
140,000	960	990	1,020

IV. WORKMANSHIP AND FINISH

14. *Workmanship.*—They shall conform to the dimensions shown on drawings and shall be free from rust, scale, blowholes and shrinkage cracks.

V. MARKING

15. *Marking.*—Each casting shall have the following markings cast upon it in raised letters and figures:

(a) Initials of Railroad Company.

(b) Month and year in which cast, thus, 6-12.

(c) Manufacturer's serial number and trade marks (or other designation).

(d) M. C. B. S.

VI. REJECTION

16. *Rejection.*—In case the test pieces selected do not meet the specifications, all castings from the entire melt shall be rejected.

17. *Removal of S.*—From each casting rejected by the inspector under these specifications he shall cause to be chipped the "S" of the letters M. C. B. S. which are specified in Section 15 (d).

Bolster Spring. 80, Fig. 1003; Figs. 1189-1198; Pages 1175, 1239, 1248, 1283, etc. The main spring of a car, carried on the spring plank and supporting the truck bolster, on which the weight of the car body rests.

Bolster Spring Cap. See Spring Cap and Spring Seat.

Bolster Spring Seat. See Spring Seat.

Bolster Thimble. A small filler sometimes used between the cover plates of a bolster when the main filler or web does not extend clear to the end of the bolster.

Bolster, Truck, Gages for Cast and Pressed Steel. See Truck Bolster.

Bolster, Truck, Cast Steel, 80,000, 100,000 and 140,000 Lb. Capacity Cars (M. C. B. Recommended Practice.) Figs. 3024-3026. (Sheets A, A1 and A2)

In 1915 designs for cast-steel truck bolsters with center plate cast integral for 80,000, 100,000 and 140,000 lb. capacity cars, as shown on Sheets M. C. B.—A, A1 and A2, were adopted.

In 1916 the diameter 2 13/16 in. center line of holes in bottom of bolster changed to 3 in. See Sheets A and A1.

Bolster, Truck, Cast Steel, for 80,000, 100,000 and 140,000 Lb. Capacity Cars. (M. C. B. Recommended Practice.) Figs. 3027-3029. (Sheets A3, A4 and A5).

In 1915 designs for cast-steel truck bolsters with center plate separate for 80,000, 100,000 and 140,000 lb. capacity cars, as shown on Sheets M. C. B.—A3, A4 and A5.

In 1916 error in dimension 5¾ in. at left-hand end of bolster in elevation corrected to 4¾ in. See Sheet A4.

In 1916 the dimension 2 13/16 in. center line of holes in bottom of bolster changed to 3 in. See Sheets A1, A3, A4 and A6.

Bolster, Truck; Specifications and Tests for Pressed Steel, for 80,000, 100,000 and 140,000 Lb. Capacity Cars. (M. C. B. Recommended Practice Figs. 3030-3032 (Sheets—A6, A7 and A8).

In 1915 designs for pressed-steel truck bolsters for 80,000, 100,000 and 140,000 lb. capacity cars, as shown on Plates M. C. B.—A6, A7 and A8, were adopted.

In 1916 the dimension 2 13/16 in. in center line of holes in bottom of bolster changed to 3 in. See Sheet A6.

In 1915 a recommendation was adopted that the steel for pressed-steel truck bolsters should conform to the requirements of the specifications and tests for structural steel for freight cars. See Steel, Specifications for Structural Sheets and Plates.

In 1915 the following weight requirements were adopted.

WEIGHTS

Limiting Weights.—Bolsters, including center plate and side bearings, shall conform to the weights given in table. In case the bolsters have met all requirements except that of overweight, they may be accepted at the maximum allowable weight here specified.

Car Capacity, Lb.	Weight, Lb. Minimum.	Normal.	Maximum
80 000	775	795	815
100 000	840	865	890
140 000	1 110	1 140	1 170

Bolt. A pin, rod or bar of metal used to hold or fasten anything in its place; ordinarily a bolt has a head on one end and a screw and nut on the other, while a rod has a nut on both ends.

Bolt Heads and Nuts. See SCREW THREADS, BOLT HEADS and NUTS.

Bolt Heads, Square. (M. C. B. Standard.)

In 1899 the following dimensions for square bolt heads were adopted as Recommended Practice.

The side of the head shall be one and one-half times the diameter of the bolt, and the thickness of the head shall be one-half the side of the head.

In 1900 these dimensions were adopted as a Standard.

Bolted Commutator (Motor Cars). Figs. 2583, etc. A motor commutator in which the segments and mica insulation are held in place between two retaining rings by bolts.

Bonnet (Passenger Cars). A Platform Hood.

Boom (Steam Shovel). The heavy swinging arm which carries the boom engine and ratchet beam. It is stepped at the foot of the "A" frame and held in its inclined position by boom guys.

Boom Cap Clevis (of a Derrick, Steam Shovel or Crane). A clevis sometimes attached to the upper end of the boom [illegible] rope is attached. [illegible] purpose is [illegible]

Boom Engine [illegible]

Boom Foot Sheave (Steam Shovel). A fixed sheave or pulley at the bottom of the boom over which the hoisting chain is passed.

Boom Guys (Steam Shovel). Iron rods from the point of the boom to the top of the "A" frame, holding the boom in its inclined position.

Boom Idler Sheave [illegible] mounted on the boom, the purpose of which is to slightly change the direction of the hoisting chain.

Boom Point Sheave (Steam Shovel). The pulley at the outer end of the boom over which the hoisting chain runs. See BOOM SHEAVE.

Boom Sheave (of a Derrick, Steam Shovel or Crane). A sheave carried at the upper extremity of the boom, over which the hoisting chain passes.

Boom Shoe (of a Derrick or Crane). A casting carried at the foot of the mast and constructed so as to be able to revolve against the boom base. It is supported by boom shoe rods.

Boom Shoe Rods (of a Derrick or Crane). Iron rods attached to the head block or cap at the top of the mast and supporting the boom shoe.

Boom Shoe Rollers (of a Derrick or Crane). Rollers at the foot of the mast upon which the boom shoe revolves.

Boom Step and Trunnion (Steam Shovel). The socket in which the boom is seated and about which it turns.

Booster. [illegible] electro-motive force generator arranged to add its E. M. F. to that of another circuit or "boost" the same. [illegible]

Boss or **Hub** (of a Steel Tired Wheel). The central portion, through which the axle passes. Boss is the usual British term, but little used in the United States.

Bottom Arch Bar. See ARCH BAR.

Bottom Chord (of Trusses). See LOWER CHORD. Neither term is regularly used to designate any part of car trusses, but the side sills are bottom chords in trussed side frames.

Bottom Connecting Rod. [illegible] Fig. [illegible]; Page [illegible]. The brake rod connecting the bottom ends of the live and dead truck brake levers.

Bottom Door Rail. The lower transverse piece of a door frame.

Bottom Door Track. A door track below a sliding door. Usually a metal bar. Sliding doors are often provided with rollers [illegible] the track. Freight car doors usually slide on a TOP DOOR TRACK.

Bottom Rod. See BRAKE ROD and BOTTOM CONNECTING ROD.

Bottom Truck Connection. See BOTTOM CONNECTING ROD.

Bow. See PLATFORM HOOD BOW.

Bowl. Figs. [illegible]. A glass bowl used on center and vestibule gas lamps. See also BASIN.

Box. See JOURNAL BOX.

Box Car. [illegible] A car with sides enclosed and with a roof; doors are placed in the sides or sides and ends. Used for general service and especially for lading which should be protected from the weather. See CAR.

Box Car Details. [illegible]

Box Car Door. [illegible]

Box Car End, Design and Strength. [illegible]

The design and strength of box car ends was considered in the report of the committee on car construction in the M. C. B. Proceedings, 1911, page 396, [illegible]

[illegible] modulus of not less than 9; or one vertical and two diagonal steel braces with a total section modulus of not less than 10; or three horizontal steel braces with a total section modulus of not less than 10.

New cars may have the following alternative arrangement: Three or more steel braces, two of which run diagonally, with a total section modulus of not less than 12, and wood lining [illegible] in. thick.

To concentrate strength at a point near floor line or vertical center line of car, diagonal braces should extend from the center sills to the side plates, and not from the bottom corner to the ridge.

The attachments for the braces and the members to which they are attached must be sufficiently strong to realize the full strength of the braces.

[illegible] equivalent to the steel members, if the section modulus is four times as great.

Wooden posts and braces should be set in metal [illegible] in place by adequate tie rods.

Lining at car ends should be supported at intervals not greater than 30 times the thickness.

Two 4 by 3 in. Z bars, [illegible] lb. per ft., have a total section modulus of [illegible]

Two 5-in. I beams, 9.75 lb. per ft., have a total section modulus of 9.6.

Three 4-in. I beams, 9.5 lb. per ft., have a total section modulus of 10.2.

Three 3-in. Z bars, 14.2 lb. per ft., have a total section modulus of 10.3.

Type of ends similar to VanDorn ends, made of ¼-in. plate, or Murphy ends, with the lower half made of ¼-in. corrugated plate, and the upper half with 3/16-in. corrugated plate, may be substituted for those described. See END FRAME.

Box Cars, Framing for (M. C. B. Recommended Practice). (Sheet M. C. B.—K.) Fig. 3048.

In 1904, the style of framing shown on Sheet M. C. B.—K, for cars of 60,000 pounds capacity was adopted as Recommended Practice.

In 1904, the style of framing shown on Sheet M. C. B.—K, for cars of 80,000 pounds and 100,000 pounds capacity, was adopted as Recommended Practice.

In 1904, the style of framing shown on Sheet M. C. B.—K, for cars of 60,000 pounds, 80,000 pounds and 100,000 pounds capacity, was adopted as Recommended Practice.

In 1904, the use of a plank lining 1¾ inches thick, on the inside of the ends of cars, extending from the floor to the underside of the car line, was adopted as a Recommended Practice. See letter ballot, Proceedings 1904.

Box Cars, Inside Dimensions of (M. C. B. Recommended Practice).

In 1904, the inside dimensions of box cars approved by the American Railway Association, namely, 36 feet long, 8 feet 6 inches wide and 8 feet high, were adopted as Recommended Practice.

Box Cars, Height and Width of (M. C. B. Recommended Practice).

The first report of a committee on the outside dimensions of box cars will be found in the 1902 M. C. B. Proceedings, page 274.

In 1904 the following dimensions for box cars, built on low trucks (3 feet 6 inches to top of floor) were adopted as Recommended Practice:

Height from top of rail to upper edge of eaves, 12 feet ¾ inch; width at eaves at above height, maximum, 9 feet 7 inches.

Box Car Inspection, Overhead. A thorough report as to the causes of damage to freight because of defective box cars is included in a report of the committee in the 1912 M. C. B. Proceedings, page 275; other reports by the committee will be found in the 1913 Proceedings, page 480; 1914 Proceedings, page 302; and 1915 Proceedings, page 347.

Box Car Side and End Door Fixtures. See DOOR FIXTURES.

Box Car, Ventilated. See VENTILATED BOX CAR.

Box Cover. See JOURNAL BOX LID.

Box Cushion. A cushion for passenger car seats made on a wooden frame. In distinction from a squab cushion, now little used, which is a loose pad on the seat. Box cushions are sometimes stuffed with hair or other elastic material alone, but usually steel springs are used in addition.

Box Fruit Car. See VENTILATED BOX CAR.

Box Guide. See PEDESTAL.

Box Lid. See JOURNAL BOX COVER or LID.

Box Packing. See JOURNAL PACKING.

Box Section Bolster. Fig. 498. A bolster whose cross-section has a box of rectangular shape.

Box Steps. A term sometimes used to distinguish platform steps made with wooden stringers or sides from open steps.

Box Stock Car. An ordinary box car with large grated openings for ventilation, but excluding rain. Little used except for horses. See STOCK CAR.

Boxes, Journals and Details. See JOURNAL BOXES AND DETAILS.

Brace. 16, 18, Figs. 34, 35; 12, 13, Fig. 260. An inclined beam, rod, or bar of a frame, truss, girder, etc., which unites two or more of the points where other members of the structure are connected together, and which prevents them from turning about their joints. A brace thus makes the structure incapable of altering its form from this cause, and it also distributes or transmits part of the strain at one or more of the joints toward the point or points of support, or resistance to that strain. A brace may be subjected to either a strain of compression or tension. In the former case, in car construction it is called simply a brace; in the latter it is called a brace rod. They are called right or left handed, according to the inclination of their top to a person standing facing the car. See BERTH BRACE, BODY BRACE, BRAKE LEVER BRACKET BRACE, BRAKE SHAFT STEP BRACE, COMPRESSION BEAM BRACE, DOOR BRACE, END BRACE, ROOF BRACE, SIDE BRACE, SIDE BODY BRACE, SIDE LAMP BRACE.

Bracing. A committee report on lateral bracing of the steel freight car will be found in the 1908 M. C. B. Proceedings, page 280.

Brace Pocket. A casting which forms a socket for holding the ends of the braces in the car body framing. See POST POCKET.

Brace Rod. An inclined iron rod which acts as a brace. A vertical rod acting in conjunction with a brace is called a sill and plate-tie rod, or, in passenger cars, for short rods below the window, brace straining rod. See BODY BRACE ROD, COUNTERBRACE ROD.

Brace Rod Washer. Fig. 972. A bearing plate for the nut or head of a brace rod, sometimes made in a triangular or beveled shape, and sometimes a flat bar of iron bent to fit into a notch cut in the timber.

Brace Straining Rod (Passenger Car Framing). A vertical iron rod in the side or end frame of a car body by which the upper end of a brace is connected or tied to the sill of the car. The brace rods are members of the truss, of which the sill, braces, posts or plates, etc., form parts. Such rods often have hook heads at the upper ends, against which the braces bear, and nuts at the lower ends by which they are screwed up, and are thus brought into a state of tension and the braces into compression. An equivalent in freight service is the sill and plate-tie rod.

Brace and Tie Rod Washer. See BRACE ROD WASHER.

Bracket. An angular stay in the form of a knee to support shelves and the like.

(Framing for Bridges or Cars.) An L-shaped angle plate riveted to each of two members which it is desired to connect at right angles to each other, as an end sill bracket or sill knee iron. A stronger form, now used in car construction, is called a gusset plate.

(Cast Iron Wheels.) The stiffening ribs cast on the plate.

Bracket Gas Burner. A gas burner attached to the side of a car. See BRACKET LAMP.

Bracket Lamp. Figs. 2254, etc. A lamp attached to a wall by a suspension in the form of a bracket.

Bracket Steps (Hopper Cars). Steps secured to the side of the car on the inside to serve as a substitute for a running board.

Brake or Brake Gear. The whole combination of parts by which the motion of a car is retarded or arrested. The foundation brake gear includes all the parts by which the pressure of the air in the brake cylinder is transmitted to the wheels. See HIGH SPEED AIR BRAKE, QUICK ACTION BRAKE, STRAIGHT-AIR BRAKE, FOUNDATION BRAKE GEAR, TRACTION AIR BRAKE, VACUUM BRAKE.

Brake Beam. 84, Fig. 1003; Figs. 1227-1299; 1128, 1140, 1149, 1161, 1197, 1205. Transverse members to which the brake heads and shoes are attached. They are either inside hung or outside hung, and are often trussed, especially in passenger service.

A very complete review of the brake beam situation, together with an appendix covering the tests at Purdue University, of 47 brake beams, is included in the committee report in the 1906 Proceedings, page 179.

The report of the committee in the 1910 M. C. B. Proceedings, page 222, consists largely of recommendations as to details.

Other reports will be found in the 1912 Proceedings, page 125; 1913 Proceedings, page 95; 1914 Proceedings, page 87 (contains a report of a series of tests made by the Pennsylvania Railroad at its Altoona laboratories); 1915 Proceedings, page 74; 1916 Proceedings, page 277.

Brake Beams, Truss vs. Steel. A topical discussion on this subject will be found in the 1903 M. C. B. Proceedings, page 332.

Brake Beams. (M. C. B. Recommended Practice.)

In 1907 the following details regarding brake beams were adopted as Recommended Practice.

That brake hangers shall have an angle as nearly as possible to 90 degrees from a line drawn from the center of the brake shoe to the center of the axle when the shoes are half worn.

In 1910 a Recommended Practice was adopted that all beams be inside hung beams.

In 1912 the practice was adopted that, in order to designate an M. C. B. brake beam, the letters "M. C. B." and the numerals "No. 1" or "No. 2," as the case may be, be cast, forged or stamped on the fulcrum, and that after January 1, 1913, this be cast on the fulcrum if the fulcrum be a casting, or forged on the fulcrum if the fulcrum be a forging.

In 1914 the marking of No. 1 and No. 2 beams was added to Sheet M. C. B. 17-A.

In 1917 the recommendation of the Brake Beam Committee showing construction of a No. 2 brake beam, with the understanding that a future report will be made on the compression member and its attachments to the head and strut members, was adopted. In 1917 a dimension of 1 in. for brake beam hangers was adopted.

Brake Beam Adjusting Hanger. A link sometimes attached to a brake beam to cause the latter and the brake head and shoe to maintain the same relative positions when the brakes are released, so as to prevent the ends of the brake shoes from coming in contact with the wheel when the brakes are released. It is attached to the truck frame or truck bolster by a projecting brake beam adjusting hanger carrier, and to the brake beam by an eye or clip. Sometimes called a parallel brake hanger.

Brake Beam Chafing Plate. A plate attached to a brake beam against which a brake spring bears, designed to resist the wear due to the action of the spring.

Brake Beam, Details and Capacities (M. C. B. Standard). Sheet M. C. B. 17-A, Fig. 2953.

Certain dimensions and capacities of brake beams were adopted as standard of the Association, by letter ballot, in 1889, and these standards, as modified by subsequent action, are shown on this drawing for iron brake beams.

Standard heights of brake beams, when measured from the tops of the rails to the center of the face of new shoes, were adopted in 1894, as follows:

For inside hung beams, 13 inches.

For outside hung beams, 14½ inches.

In 1907 the following details for brake beams and gages were adopted as standard:

All brake beams shall be 60¼ inches in length from center to center of brake head, with an allowable variation of ⅛ inch in either direction.

All brake beams shall be proven by gage shown on Sheet M. C. B. 17, which shall be the standard gage for that purpose.

Attachments for safety hangers shall be 51 inches from center to center.

The angle of the lever fulcrum shall be 40 degrees from the vertical.

The lever pin hole shall be either 2 inches or 3 inches in front of the top of the brake head lugs. The variations in either direction from above measurements shall not exceed 1/16 inch. Holes should be made straight and true by drilling, reaming or broaching, and shall be not less than 1 3/32 inches nor more than 1⅛ inch in diameter.

All lever pin holes shall be proven by gage shown on Sheet M. C. B. 17-A, which shall be the standard gage for that purpose.

In 1908 the following detail regarding brake beams was advanced from Recommended Practice to Standard:

Brake beam hangers shall be ⅞ inch in diameter.

In 1908 two brake beams were adopted as standard, as follows:

Brake beam No. 1 to be suitable for cars weighing not over 35,000 pounds light weight.

Brake beam No. 2 to be suitable for cars exceeding 35,000 pounds light weight.

In 1909 the following was adopted to establish a uniform practice for designating right and left hand brake beams:

When facing back of brake beam with center strut pointing away from observer, where the top of lever slot inclines toward the right, it shall be known as right-hand beam, and where top of lever inclines toward the left, it shall be known as left-hand beam.

On cars built after September 1, 1909, it will not be permissible to hang brake beams from any portion of the body of the car.

In 1910 the drawing of the brake head was modified as regards the size and shape of the hanger hole.

In 1910 the following Recommended Practice was advanced to Standard:

The brake beam hanger bracket shall be attached to some rigid portion of the truck.

In 1911 the use of brake beam No. 2 was extended as follows: Beam No. 2 must be used on cars of more than 35,000 pounds light weight, and it may be used on cars of 35,000 pounds light weight or less.

In 1913 a spacing of 60 inches from center to center of brake heads, with an allowable variation of ⅛ inch in either direction, was adopted.

Brake Beam Eye Bolt. An eye bolt in the brake beam to which the safety hanger is attached.

Brake Beam Fulcrum. See BRAKE LEVER FULCRUM.

Brake Beam Gage. A metal templet for ascertaining or regulating the several dimensions of brake beams.

Brake Beam Gage (M. C. B. Standard). Sheet M. C. B. 17-A.

In 1907 a brake beam gage as shown on Sheet M. C. B. 17-A was adopted as standard.

In 1912 this gage was redesigned and adopted as Recommended Practice. It determines the following dimensions and adjustments: (1) Limiting outline of brake beam; (2) length of beam; (3) proper alignment of the heads in relation to each other; (4) proper location of pin hole and center of strut; (5) angle of lever fulcrum.

In 1913 the limiting outline gage for brake beams was altered to suit the change in beam from 60¼ inches to 60 inches, center to center of head, and a new brake beam gage with details adopted as Standard.

Brake Beam Gage Limiting Outlines (M. C. B. Standard). Figs. 2953-2955. Sheet M. C. B. 17-A

In 1911 a limiting outline gage shown for No. 2 brake beams used on cars built after January 1, 1908, was adopted as Standard.

Brake Beam Hanger. See also BRAKE HANGER.

A topical discussion on the proper hanging of brake beams to secure brake shoe clearance will be found in the M. C. B. Proceedings, 1904, page 254.

Brake Beam King Post. See BRAKE BEAM STRUT.

Brake Beam Release Spring. See RELEASE SPRING.

Brake Beam Safety Chain. A chain sometimes attached by eye bolts to a brake beam to act as a safety device in the same manner as a brake beam safety hanger.

Brake Beam Safety Chain Eye Bolt. An eye bolt attached to a truck or car body to hold a brake beam safety chain.

Brake Beam Safety Hanger. A metal strap suspended from a truck frame and surrounding a brake beam, so that in case of a broken brake beam hanger the beam will not drop to the track.

Brake Beam Specifications and Tests (M. C. B. Standard).

In 1915 the following specifications and tests for brake beams were adopted in place of those heretofore approved, and in 1916 the tension members made in accordance with M. C. B mild-steel specifications and malleable parts be made in accordance with M. C. B. specifications for malleable iron were adopted. Revised in 1917.

1. *Scope.*—This specification covers all complete brake beams for M. C. B. equipment cars.

I. MANUFACTURE

2. *Material.*—The tension member shall conform to the M. C. B. Specifications for Mild Steel.

3. *Heads.*—The heads and struts, where struts are of malleable iron, shall conform to M. C. B. Specifications for Malleable Iron.

II. PHYSICAL PROPERTIES AND TESTS

4. *Proof Tests.*—The manufacturer shall give each beam a proof test load equal to the deflection load, as shown in Table No. 1, before offering them for inspection and tests.

5. *Deflection Measurement Tests.*—The test beam will be mounted in the testing machine in accordance with Section 8, and a load applied equal to deflection load as shown by Table No. 1, and then reduced to 500 lb. and the deflection instrument set at zero. The deflection load will then be reapplied and the deflection shall not be more than 0.07 in.; in event this deflection is exceeded, no further tests will be made, but the lot will be rejected and held in accordance with paragraphs 15 (b) and 17.

6. *Set Test.*—After the deflection measurements have been completed, the beam will be loaded to the set load shown in Table No. 1, and then released to 500 lb., when the beam shall not show a set greater than 0.01 in.

7. *Total Deflection Test.*—The brake beam shall stand a total movement of the head of the test machine of not less than 2 in. without failure at any point. The speed of the head of the machine shall be 1 in. per minute.

TABLE No. 1.

M. C. B. Beam No.	Deflection Load	Set Load	Ratio
1	6,500	14,000	47
2	12,000	24,000	50
3	18,000	30,000	60
4	24,000	36,000	66.7
5	30,000	42,000	71.2
6	36,000	48,000	75

8. *Machine.*—The brake beam testing machine shall have suitable castings to represent the tread of the car wheels so that the beam can be mounted with the load applied at the pin hole in strut.

9. *Test Specimen.*—The test specimen shall consist of a complete brake beam, and may, at the option of the inspector, be either right or left hand.

10. *Number of Tests.*—The manufacturer shall have the brake beams piled according to size, regardless of requisition numbers, and sampled as follows: If the beams in a pile are either right or left hand, the lot shall consist of 501 beams or less, and if the pile consists of both right and left hand beams, the lot shall consist of 502 beams, but in either case only one beam will be selected for test. The extra beam in the lot of 502 will be returned to stock. If the pile contains more than 501 of either right or left hand beams, or 502 of both right and left hand beams, and not more than 1,002 or 1,004, two samples will be taken, and so on, for each additional 500 beams.

III. PERMISSIBLE VARIATIONS

11. *Gage.*—Brake beams shall conform to the dimensions shown on M. C. B. Sheets Nos. 17 and 17-A.

IV. WORKMANSHIP AND FINISH

12. *Workmanship.*—The beam shall be made in a workmanlike manner and be free from injurious defects.

13. *Finish.*—(a) Brake beams shall be free from rust, scale, paint or any covering that will hide defects.

(b) After the beams are inspected and marked, they shall be given one coat of a quick-drying black, protective paint.

V. MARKING

14. *Marking.*—The M. C. B. Nos. 1, 2, 3, 4, 5 or 6, as the case may be, shall be cast on the center strut with raised letters and figures not less than ⅝ in. high and ⅛ in. in relief, as required on M. C. B. Sheet No. 17-A.

VI. INSPECTION AND REJECTION

15. *Inspection.*—(a) The inspector representing the purchaser shall have free entry at all times while work on the contract of the purchaser is being performed, to all parts of the manufacturer's works which concern the manufacture of the material ordered. The manufacturer shall afford the inspector, free of cost, all reasonable facilities to satisfy him that the material is being furnished in accordance with these specifications.

(b) When the manufacturer's testing facilities are, in the judgment of the purchaser, adequate, tests shall preferably be made at the manufacturer's laboratory. The purchaser may, however, have tests made at his own or other laboratories, providing the facilities are adequate, and if the manufacturer desires, he may witness such tests.

(c) All tests and inspection shall be so conducted as not to interfere unnecessarily with the operation of the works.

16. *Rejection.*—Material or completed beams which subsequently to above tests at the manufacturer's plant or elsewhere, and their acceptance, develop weak spots or imperfections, or fail to pass any one of the tests herein required, such tests to be made within 30 days of the receipt of the material by the purchaser, will be rejected and shall be replaced by the manufacturer at his own expense.

17. *Rehearing.*—Samples tested in accordance with this specification, which represent rejected material, shall be held for fourteen days from date of test report. In case of dissatisfaction with results of tests, the manufacturer may make claim for a rehearing within that time.

Brake Beam Strut. Figs. 1341-1348; Pages 1140, 1149, 1161. A post or distance piece which forms a bearing for the truss rods of a brake beam. In metal brake beams the brake lever is attached to it, and it then becomes a brake lever fulcrum. For application to brake beams, see Fig. 1227, etc.

Brake Beam Third Suspension. Figs. 1355, 1357, 1359, 1361; Pages 1129, 1148. An overhead arrangement attached to the truck frame and to the Brake Beam Truss Rod at the center, thus keeping the Brake Beam in balance.

Brake Beam Third Point Support. Page 1148, Figs. 1350, 1354, 1356, 1361, 1363. A spring attached to the spring plank and passing underneath the center, and supporting the tension member of the Brake Beam by means of a sliding chair casting which is attached to the brake beam strut.

Brake Beam Truss Rod. A rod used to truss or strengthen a brake beam.

Brake Block. Another name for a BRAKE HEAD.

Brake Burn. A condition of the wheel surface due to excessive heating of the metal by the too prolonged and severe application of the brake, which weakens the structure, sometimes causing shelling out and also flange failure.

Brake Carrier. See BRAKE HANGER CARRIER.

Brake Chain. See BRAKE SHAFT CHAIN.

Brake Chains. (M. C. B. Standard.) Sheet M. C. B. 19-A. Fig. 2961. In 1909 dimensions for brake chains were adopted as Recommended Practice. Advanced to Standard in 1911.

Brake Chain Connecting Rod. An iron rod connecting the hand brake chain to one of the brake levers, usually the floating lever.

Brake Chain Drum. 51, Figs. 34, 35. The enlarged end of the hand brake shaft, on which the chain is wound.

Brake Chain Sheave. An iron wheel or pulley around which the brake chain passes.

Brake Chain Worm. A conical casting attached to the brake shaft with a screw-shaped groove for the brake chain. Its object is to produce a rapid motion at first and increase the power when the brake shoes are brought to a bearing.

A cylindrical casting with a screw-shaped groove, intended only to make the chain wind evenly.

Brake Clevis. A BRAKE LEVER FULCRUM.

Brake Connection. See BRAKE ROD.

Brake Connection Pin. A pin used for connecting brake rods and levers.

Brake Cord Guide. A guide similar to a signal cord guide for the air-brake cord, which passes through cars fitted with automatic air brake apparatus, and operates the conductor's valve.

Brake Cut-out Cock. Figs. 1366, 1367, 1409, 1457, 1468, 1473; Page 1308. A valve inserted in the branch pipe from the brake pipe to the triple valve, which can be closed and the brakes on that one car put out of action in case they are not working properly. The closing of this valve does not interfere with the operation of the brake under any other car in the train.

Brake Cylinder (Air Brake). 15, Fig. 173; Figs. 1403, 1407, 1444, 1470. A cast-iron cylinder attached to the frame of the car, containing a piston which is forced outwardly by the compressed air to apply the brakes, and when the air pressure is released is returned to its normal position by a release spring coiled about the piston rod inside the cylinder. On passenger cars the brake cylinder is fitted with two heads, the pressure head and the non-pressure head. For freight cars the brake cylinder and the auxiliary reservoir are usually combined, the reservoir being bolted to one end of the cylinder and forming one of the cylinder heads. The piston rod of the passenger brake cylinder has a crosshead at its outer end, to which is attached the cylinder lever. The piston rod of the freight brake cylinder is hollow and loosely encloses a push rod, which is attached to the cylinder lever. In the vacuum brake a somewhat similar cylinder is used.

Brake Cylinder Block. A block of wood shaped to fit over the curved surface of a brake cylinder and act as a filler between the cylinder and the sill to which it is attached.

Brake Cylinder Lever. Fig. 1331. See CYLINDER LEVER.

Brake Cylinder Lubricator. A device for lubricating the brake cylinder.

Brake Cylinder Pipe (Air Brake). The pipe which connects the brake cylinder with the triple valve.

Brake Cylinder Plate. Fig. 968. The steel plate to which a brake cylinder is bolted and by which it is attached to the sills.

Brake Cylinder Support. See BRAKE CYLINDER PLATE.

Brake Cylinders, Cleaning and Lubricating. See AIR BRAKES, CLEANING AND TESTING OF.

Brake Dog. A BRAKE PAWL.

Brake Foot Board. A BRAKE STEP.

Brake Gear. Figs. 1309-1364, 1365-1495. See AIR BRAKES, GENERAL ARRANGEMENTS AND DETAILS; FOUNDATION BRAKE GEAR.

Brake Gear, Foundation. See FOUNDATION BRAKE GEAR.

Brake Guard Rail. A rail sometimes placed around the hand brake wheel on box and other house cars to prevent the brakeman falling off in case he misses his footing while applying the hand brakes.

Brake Handle. A BRAKE LEVER.

Brake Hanger. 86, Figs. 1003, 1313. A link or bar by which brake beams and attachments are suspended from a truck frame. It is attached to the truck by a brake hanger carrier.

Brake Hanger Carrier. An eye or U-bolt, a casting or other fastening by which a brake hanger is attached to the truck or body of a car.

Brake Hanger Pin or Bolt. A pin passing through the brake hanger carrier and brake hanger, and supporting the hanger.

Brake Head. 83, Fig. 1003; Figs. 1300-1308; Page 1140. A casting attached to a brake beam which carries the detachable brake shoe. For application to brake beams see Fig. 1227, etc.

Brake Head Gage (M C. B. Standard). Sheet M. C. B. 17, Fig. 2951.

In 1907 a brake head gage was adopted as standard. For action of the Association, see Proceedings, 1886; Proceedings, 1888; Proceedings, 1891; Proceedings, 1908.

In 1912 a brake-head gage was adopted for gaging the top and bottom slot in the head.

In 1918 a radius of 5/32 of an in. was shown at each corner of the gage where it enters the toe of the head, and that open dimension (marked "K") was changed from 1 5/16 in. to 1 3/16 in. in order to provide the proper clearance for the gage entering the head.

A dimension of 1¼ in. was also shown for the width of the head where the gage enters and a ⅛ in. radius at the intersection of the sloping line, with the bottom of the fork at the upper and lower toe openings of the head.

Brake Head and Shoe (M. C. B. Standard). Sheet M. C. B. 17, Fig. 2952.

The brake head and shoe shown on this sheet, known as the Christie brake head and shoe, were adopted as a standard of the Association, by letter ballot, in 1886, with the exception of some slight modification in details made since that date. Drawing revised in 1896, 1898 and 1907.

The revision made in 1896 consisted in the modification of the designs of brake head and shoe so as to secure increased clearance at the ends of shoe and equal clearance both above and below the central lug on the back of the shoe; also, the addition of brackets to support the lower bridge lug of brake head similar to the brackets formerly used to support the upper bridge lug. The taper of the shoe was altered so that it would correspond with the taper of the standard wheel tread, by increasing the thickness of the inner edge of the shoe from 1 3/16 inch to 1 5/16 inch.

The revision made in 1898 consisted in reducing the clearance allowed on either side (above and below) the central lug of brake shoe and adjacent lugs of brake head from ⅛ inch to 1/16 inch—the change being made wholly in the head and no change in the shoe.

In 1907 the drawing was further revised to show only the standard dimensions of the brake head, and also in the combined drawing of the brake head and shoe.

The drawing showing the shoe was also revised in part, as well as the drawing showing the relation of ends of head and shoe. See Sheet M. C. B. 17.

In 1908, the projection, top and bottom, at back of brake shoe, which forms spacer between lugs of brake head, was increased to 9/16 inch in depth.

In 1909 the center lug, and recess for same, in brake head was changed so that the width of lug comes flush with side face of shoe to provide better bearing for center lug of brake shoe and also to prevent twisting of head.

In 1910 a standard was adopted that all inserts in brake shoes must extend in new shoes to a depth equal to at least one-half of the total shoe depth.

In 1912 Sheet M. C. B. 17, illustrating the brake head and shoe, was redrawn.

In 1917, Sheet M. C. B. 17 was revised to eliminate the 1/16 in. clearance between head and shoe.

Brake Hose. See AIR BRAKE HOSE.

Brake Jaw. Figs. 1317-1324, 1332-1336, 1349; Pages 1230, 1285, 1303. Jaws which may be fastened to standard rods to form brake rods.

Brake Lever (Air Brakes). 92, Figs. 1003; Figs. 1314-1316, 1329, 1331. A general term designating all the levers in the Foundation Brake Gear. Also a lever used for applying the hand brake in vestibuled passenger-equipment cars where there is not room for the use of a brake wheel. See also DEAD LEVER, LIVE LEVER, FLOATING LEVER, CYLINDER LEVER.

Brake Lever Bracket. Fig. 1337. A knee on the under side of a car, to which the fulcrum of a brake lever is sometimes attached.

Brake Lever Bracket Brace. A diagonal wrought iron brace to stiffen the brace lever bracket.

Brake Lever Clevis. A BRAKE LEVER FULCRUM.

Brake Lever Coupling Bar (Inside Hung Brakes). See BOTTOM CONNECTING ROD.

Brake Lever Connecting Rod.

Brake Lever Connection. Figs. 1325-1327. Page 1264. A rod connecting two brake levers. Most commonly used to designate the lower ends of the truck brake lever.

Brake Lever, Designation of. Fig. 1356. See FOUNDATION BRAKE GEAR.

Brake Lever Fulcrum. Fig. 968; Page 1161; Figs. 1338, 1341-1348. A forked iron attached to a brake beam, by means of which a brake lever is connected to the beam. In some designs it forms a fulcrum for and also connects the two center levers of a six-wheel truck. In a trussed metal brake beam the king post of the brake

beam becomes the brake lever fulcrum. For application of brake lever fulcrums, see Fig. 1227, etc.

Also a bracket attached to an underframe to support a brake lever, and to which the lever is held by a pin in such a manner that it moves about the pin.

Brake Lever Fulcrum Tie Plate. Fig. 968. A U-shaped plate, riveted at both ends to a plate which acts as a bracket. The brake lever is inserted in the opening between the two and held in place by a pin passing through all three. See BRAKE LEVER FULCRUM.

Brake Lever Guide. Figs. 1322, 1334, 1335. An iron bar which guides the upper end of a brake lever. Further distinguished as live lever and dead lever guides, the latter provided with pins for readjustment as the brake shoes wear, and also called a brake lever stop. See DEAD LEVER GUIDE.

Brake Lever Jaw. A BRAKE LEVER FULCRUM.

Brake Lever, Marking of. See FOUNDATION BRAKE GEAR.

Brake Lever Pin Hole Gage (M.C.B. Standard). In 1907 the lever pin hole gage shown on the drawing was adopted as standard.

Brake Lever Stop. See DEAD LEVER GUIDE.

Brake Lever Strut. A break lever coupling bar or bottom rod connection.

Brake Mast. See BRAKE SHAFT.

Brake Pawl (Hand Brake). Fig. 972. A small pivoted iron bar for engaging in the teeth of a brake ratchet wheel to prevent the wheel turning backward, and thus releasing the brakes. It is placed in such a position as to be worked into engagement by the foot or a brake pawl weight, and out by the foot.

Brake Pawl Carrier. See BRAKE PAWL and BRAKE RATCHET.

Brake Pawl Weight. Fig. 972. A pivoted casting serving as a weight to throw up the brake pawl so that it will engage with the ratchet when the latter is located on the under side of the brake ratchet wheel. Also sometimes applied to an eccentric which holds a pawl against a ratchet wheel.

Brake Pin or Brake Lever Pin. Figs. 1328, 1330. A small metal pin used in the brake lever connections.

Brake Pipe (Air Brake). 18, Fig. 173; Figs. 1366, etc. A pipe extending from one end of the car to the other under the car body and connected to the pipes on adjoining cars by flexible brake hose. The air from the air pump or compressor is conveyed through the brake pipe to the auxiliary reservoir under each car. The brake pipe is normally filled with compressed air at 70 pounds pressure and th auxiliary reservoirs with air at the same pressure. A reduction of this pressure in the brake pipe of from 5 to 20 pounds causes the triple valves to open communication between the auxiliary reservoir and the brake cylinder, so that the compressed air stored in the reservoir acts on the piston and brake levers and applies the brakes. This is called a service application. In case the train parts or a hose bursts, the air is suddenly and completely released from the brake pipe and the triple valves automatically apply the brakes as before, only with more speed and greater power at first. In an emergency application the full main reservoir pressure of 90 to 110 pounds is turned into the brake pipe and this increase of pressure causes the triple valves to open communication from the brake pipe direct to the brake cylinder, applying the brakes with great force and very suddenly. To release the brakes the brake pipe pressure is restored to normal and the triple valves equalize the pressures in the auxiliary reservoirs and the brake pipe, at the same time opening the brake cylinder to the atmosphere and releasing the brakes. This pipe is sometimes called train pipe, train line, or train brake pipe, but its proper name is brake pipe to distinguish it from the signal and steam heating pipes.

Brake Pipe Air Strainer. Figs. 1412, 1434, 1487. A wire strainer inserted in the brake pipe to prevent foreign matter from entering the brake apparatus under the car. See also CENTRIFUGAL DIRT COLLECTOR.

Brake Pipe Pressure. See AIR BRAKE TESTS.

Brake Ratchet (Hand Brake). 50, Figs. 34, 35; 26, Fig. 80; Figs. 1532-1556; Page 1250. A wheel attached to a brake shaft, having teeth shaped somewhat like saw teeth, into which a pawl engages, thus preventing the wheel and shaft from running backward. In some forms the ratchet wheel has the ratch on the under side, instead of on the edge, the brake pawl being automatically pressed upward against the teeth by a Brake Pawl Weight, and without being adjusted by the foot of the brakeman. The brake pawl is pivoted in the Brake Pawl Carrier, the latter being bolted to the roof of the car.

In 1879 the M. C. B. Convention recommended that the practice of placing the ratchet gear on a small platform or brake step be discontinued, and that it be fastened to a suitable casting on the roof. Their recommendation has not been universally adopted, though it is a very common practice.

Brake Ratchet Wheel. See BRAKE RATCHET.

Brake Rod. Fig. 968; Fig. 1003; Figs. 1315, 1317, 1322-1333. A rod connecting brake levers and through which the braking force is transmitted.

Brake Rod Guide. Figs. 967, 970. A wrought iron bracket attached to an underframe as a support for a brake rod.

Brake Rods and Levers, Designation of. See FOUNDATION BRAKE GEAR.

Brake Safety Strap. See BRAKE BEAM SAFETY HANGER.

Brake Shaft. 45, Figs. 34, 35; 14, Fig. 80; 17, Figs. 111, 173; 7, Figs. 210, 211; Figs. 1543, 1544, 1557, 1560. Pages 1275-1277. An iron shaft, usually vertical, and having a hand wheel on one end, by means of which a chain connected to the brake levers may be wound on the shaft and the brakes applied. It is sometimes made horizontal. See also SAFETY APPLIANCES, DROP BRAKE SHAFT, and BRAKE STAFF HEIGHT.

Brake Shaft Bearing. 47, Figs. 34, 35; Figs. 968, 971. A metal eye by which a brake shaft is held in its place, and in which it turns. Sometimes called brake shaft guide. See BRAKE SHAFT STEP, LOWER BRAKE SHAFT BEARING, UPPER BRAKE SHAFT BEARING.

Brake Shaft Bevel Gear Wheel. A bevel gear on the lower end of the brake shaft engaging with a similar gear on the horizontal brake chain worm.

Brake Shaft Bracket. A support for holding a brake shaft in its place.

Brake Shaft Chain. Fig. 967. A chain, connecting the brake shaft with the brake levers through the brake shaft connecting rods, to the end of which it is attached. The force exerted on the shaft is transmitted by this chain.

Brake Shaft Chain Sheave. A roller over which a brake shaft chain passes. A sheave attached to the end sill for the chain of a horizontal brake shaft to work in.

A sheave or pulley is sometimes attached to the end of the hand brake connection and the brake chain, secured at one end to the end sill of the car, is passed around this sheave and back to the brake shaft winding drum. It thus doubles the power of the hand brake, but also doubles the amount of chain to be wrapped and is objectionable from this standpoint.

Brake Shaft Connecting Rod. A rod which is attached at one end of a brake chain and at the other to one of the levers in the foundation brake gear.

Brake Shaft Gear Wheel. A bevel gear wheel attached to the brake shaft, by which the power applied to the brake hand wheel is conveyed to a horizontal winding shaft or worm, called a brake chain guide casting.

Brake Shaft Guide. See BRAKE SHAFT BEARING.

Brake Shaft Holder. See BRAKE SHAFT BEARING.

Brake Shaft Sleeve. That part of a brake shaft on which the brake chain is wound.

Brake Shaft Step. 46, Figs. 34, 35; Figs. 1543, 1557. A bearing which holds the lower end of a brake shaft. It usually consists of a U-shaped bar of iron, the upper ends of which are fastened to the car body, with a hole in the bar which receives the end of the shaft. The brake shaft step should not be confounded with a brake step, which latter is a shelf on which the brakeman may step when applying brakes.

Brake Shaft Step Brace. A wrought iron brace sometimes attached to the brake shaft step to resist the pull of the brake chain.

Brake Shaft Thimble. An iron bushing attached to the end of the car to form a bearing for a brake shaft.

Brake Shoe. Figs. 1309-1312; Page 1119. A piece of metal shaped to fit the tread of a car wheel and attached by a key or otherwise to a brake block or brake head. The brake shoe rubs against the tread of the wheel when the brakes are applied. See also WHEEL TRUING BRAKE SHOE.

Brake Shoe Back. Steel backs are often used for cast shoes to reinforce and strengthen them.

Brake Shoe Gage (M. C. B. Standard). Fig. 2951. In 1910 a brake shoe gage shown on the drawing was adopted as standard.

Brake Shoe Key. Fig. 1339 A key or wedge by which a brake shoe is fastened to a brake head.

Brake Shoes, Specification for. (M. C. B. Standard). In 1901 specifications for brake shoes were adopted as Standard as a result of letter ballot. In 1910 they were replaced by the following:

I. TESTS

1. *Kinds of Test.*—Shoes shall be tested for coefficient of friction and for wear upon the Master Car Builders' Association testing machine, or upon a machine with equivalent characteristics.

II. COEFFICIENT OF FRICTION TEST

2. *Cast-iron Wheel.*—Shoes shall develop upon the cast-iron wheel, in effecting stops from an initial speed of 40 miles per hour, a mean coefficient of friction of not less than:

(a) 22 per cent when the brake-shoe pressure is 2,808 lbs.

(b) 16 per cent when the brake-shoe pressure is 6,840 lbs.

3. *Steel-tired Wheel.*—Shoes shall develop upon the steel or steel-tired wheel, in effecting stops from an initial speed of 65 miles per hour, a mean coefficient of friction of not less than:

(a) 12½ per cent when the brake-shoe pressure is 6,840 lbs.

(b) 11 per cent when the brake-shoe pressure is 12,000 lbs.

(c) No limitation is placed upon the rise in coefficient of friction at the end of the stop.

III. SHOE-WEAR TEST

4. *Cast-iron Wheel.*—Shoe wear shall be determined upon the cast-iron wheel by making not less than 100 applications of the shoe to the wheel, under pressure of 2,808 lbs., and at a constant peripheral speed of the wheel of 20 miles per hour. At each application, the shoe shall remain in contact with the wheel during 190 revolutions of the latter and between applications the shoe shall remain out of contact during 610 revolutions of the wheel. Under these conditions, the shoe shall lose in weight not more than 0.8 of a pound for each 100,000,000 foot-pounds of work done.

5. *Steel-tired Wheel.*—Shoe wear shall be determined upon the steel or steel-tired wheel by making not less than ten stops from initial speed of 65 miles per hour and under a pressure of 12,000 pounds. Ten minutes shall intervene between successive applications of the shoe. Under these conditions the shoes shall lose in weight not more than 4.0 lbs. from each 100,000,000 foot-pounds of work.

NOTE.—When a shoe, not entirely metallic in its composition, is tested for wear, its actual loss in weight shall be increased in the ratio which the density of the cast iron bears to the mean density of the abraded parts of the shoe, in order to determine the weight which is to be compared with the specifications.

IV. GAGING AND DRAWING

6. *Gaging.*—That the back of the shoe be made to conform to the gage shown, Sheet M. C. B. 17.

7. *Drawings.*—In 1912 the drawing of the brake head was changed to show the hanger hole straight with a radius of ⅜ in. at each end to accommodate the straight hanger with filleted corners.

Brake Shoe Tests. A brief report of the M. C. B. standing committee on brake shoe tests in 1900 developed an extensive discussion on the scope of the work of this committee; see M. C. B. Proceedings, 1900, page 72.

The report of the committee in the 1901 M. C. B. Proceedings, page 99, includes the results of the tests of 12 different brake shoes.

The results of the tests of four different brake shoes will be found in the 1903 M. C. B. Proceedings, page 85.

The committee report for 1905 included reports of the tests of four brake shoes; see page 57 of the Proceedings for that year.

The committee report at a 1906 convention included tests of a number of brake shoes taken from actual service to see whether they met with the M. C. B. requirements; M. C. B. Proceedings, 1906, page 137. An appendix to the report includes the description of a machine designed to determine the wearing qualities of brake shoes.

The report for 1907 includes tests under the specifications of the Association, of brake shoes submitted by railway companies and an analytical study of the past work of the committee; also recommendations as to the design and construction of additional test-

ing equipment in order to subject the brake shoes to an endurance or wearing test; M. C. B. Proceedings, 1907, page 135.

Tests of five brake shoes were reported upon in the 1908 Proceedings, page 103, as well as special tests of nine shoes to determine the wearing qualities.

The report in the 1909 Proceedings, page 85, is a statement of progress with an outline of the work planned for the coming year.

The report of the committee in the 1910 M. C. B. Proceedings, page 201, contains the results of the tests of 28 shoes to determine the coefficient of friction under the current specifications, the loss in weight of the shoe under repeated applications, and the loss in the weight of the wheel.

The report in the 1911 M. C. B. Proceedings, page 138, gives a full account of the tests made under heavy brake shoe pressures.

The report in the 1913 Proceedings, page 13, contains an appendix showing the results of a series of tests made for the New York Central Lines at the laboratory of the American Brake Shoe & Foundry Company.

The report in the 1914 Proceedings, page 74, includes the final tests of the series that the committee had been working on for a considerable period.

The report of the committee in the 1915 Proceedings, page 59 contains a compresensive resumé of the tests that had been made from 1906 to 1914, inclusive.

Brake Slack Adjusters. Pages 1120, 1121. A device to take up any slack in the brake gear between the air brake cylinder and the brake shoe, so that the piston travel shall not be too great. See SLACK ADJUSTER.

Brake Spool. See BRAKE SHAFT SLEEVE.

Brake Spool Step (Logging Cars). A U-Shaped strap inclosing the brake spool, and equivalent to a brake shaft step.

Brake Spring. See RELEASE SPRING.

Brake Staff. See BRAKE SHAFT.

Brake Staff Carrier Iron (M. C. B. Standard). In 1908 a Recommended Practice was adopted to use a "U"-shaped carrier iron for brake shaft bow for new cars, so that the half yoke now largely used would not be extended to new cars. Advanced to Standard in 1910.

Brake Staff, Height of (M. C. B. Standard). In 1907 a standard maximum height of brake staff, for standard box cars, from top of rail to top of brake staff of 14 feet was adopted.

Brake Step. 48, Figs. 34, 35; 25, Fig. 80; 18, Fig. 111; 19, Fig. 173; Figs. 1543, 1557; Page 1164. A small shelf or ledge on the end of a freight car near the top, on which the brakeman stands when applying the brake from the top of a car. Also called a brake footboard. A brake step should not be confounded with a BRAKE SHAFT STEP, which is a bearing for the lower end of a brake shaft.

Brake Step Bracket. 49, Figs. 34, 35; Fig. 970. An iron bracket to support a brake step.

Brake Strut. A compression bar or strut between the live and dead levers of a truck with inside hung brakes. Probably the term brake strut is more common than brake lever coupling bar. Brake strut should not be confused with brake beam strut. A bottom connection rod.

Brake Treadle (Hand Cars). A lever for applying brakes with the foot.

Brake Valve (Air Brakes). Figs. 1430-1435, 1461. The valve operated by the motorman to apply and release the brakes. Also called operating valve and motorman's brake valve.

Brake Van (British). American equivalent, caboose, or baggage car. A covered vehicle in which the guard (conductor) of a train travels, and which is fitted with a powerful screw hand brake. On passenger trains it carries the passengers' luggage (baggage), etc. On goods (freight) trains it is weighted with pig iron, and is primarily used as a source of brake power. Also called guard's van.

Brake Wheel. See HAND BRAKE WHEEL.

Brake Windlass. A term sometimes used to designate the brake shaft, with all its attached parts.

Brakeman's Step. A step on the inside of a wide vestibule for the use of trainmen in applying hand brakes.

Branch Pipe (Air Brake). Figs. 1366, 1367. A pipe extending from the triple valve to the brake or train pipe.

Branch Pipe Strainer. Fig. 1477. A strainer used in the branch pipe.

Branch Pipe Tee (Air Brake). Figs. 1419, 1483. A tee used to connect the branch pipe to the brake or train pipe.

Branding Steel Wheels. See WHEELS, STEEL; BRANDING OF.

Brass. An alloy of copper and zinc. A term commonly used to designate a JOURNAL BEARING.

Bridge. In car construction the term bridge means a timber, bar or beam which is supported at each end.

Bridging (Passenger Equipment Car Framing). Short transverse distance blocks between the sills of an underframe to keep the sills from displacement or buckling. A sill tie rod is usually employed to keep the sills drawn tightly against the bridging. It is toe-nailed and sometimes tenoned into the sills with small tenons.

Broad Gage. A term applied to a gage when the distance between the head of the rails is greater than 4 ft. 9 in. See NARROW GAGE, STANDARD GAGE.

Broiler and Oven. Figs. 1711-1715, etc. Those illustrated are adapted for use in parlor and buffet cars and use gas as a fuel.

Bronze. An alloy composed of copper and tin, sometimes with a little zinc and lead.

Brush. Figs. 2574, etc. A device bearing on an armature, and through which current is supplied to an electric motor and received from an electric dynamo or generator.

Brush Holder. A support for the brushes of an electric motor, providing by means of springs for a constant pressure of the brushes on the commutator.

Brush Rigging. Figs. 2472, etc. The apparatus pertaining to the brushes of a motor or generator.

Bucker (Electric Lighting). A machine somewhat like a small dynamo which has a field and a revolving armature and which is used for automatically maintaining a constant predetermined voltage in the lamp circuit regardless of the speed of the dynamo or the demand for lights.

Bucket. Page 1223. A bucket usually made in two or more parts and provided with mechanical means of opening and closing which is used for handling vari-

ous materials such as coal or earth and is controlled by the operative of a crane by means of cables connected with the crane mechanism.

Buffer. Fig. 527-551; Pages 1182, 1301. An elastic apparatus or cushion attached to the end of a car to receive and absorb the shocks caused by other cars running against it. The term is generally applied to those attachments in which springs are used to give the apparatus elasticity.

Buffer Beam (Freight Cars). See DEAD WOOD.
(Passenger Cars.) See PLATFORM END SILL.

Buffer Beam Extension. 22, Fig. 348. A buffer block on the platform end sill of a passenger car.

Buffer Block. Usually one of a pair of buffing devices placed on either side of the coupler to receive severe shocks and prevent damage to the car. It also acts in the same capacity as a Dead Wood, the latter sometimes being termed Buffer Block. See DEAD WOOD.

Buffer Block Face Plate. A metal plate bolted to the face of a wooden buffer block or dead wood to protect the wood from wear. Usually called striking plate.

Buffer Plate (Passenger Equipment Cars). An iron or steel plate (usually bolted to the end of the buffer stems) which bears and rubs against the opposing plate of the next car of the train. The vestibule face plate is bolted or riveted to, and carried by, the buffer plate.

Buffer Safety Lug. A projecting horn cast on top of freight couplers to bear against a buffer block and relieve the draw gear from excessive compressive strains. COUPLER HORN is the more common name.

Buffer Shank. The square part between the buffer head and buffer stem.

Buffer Sill. See BUFFER and PLATFORM END SILL.

Buffer Spring (Passenger Equipment Cars). Figs. 1192, 1194, 1195. The springs that resist the compression of a train or the impact when they come together as in coupling. In passenger equipment this thrust is not taken by the drawbar alone, but by the buffers, which transmit it to the buffer springs, which absorb or transmit it to the car body.
(Freight Cars.) A draft spring.

Buffer Stem (Three-Stem Couplers). The round bar which passes through the buffer springs. The term is sometimes applied to the buffer bar, which includes the round stem and the square shank.

Buffer Stem Guides. Iron bushings inserted in the platform end sill, in which the buffer stems work. They are to protect the wood from abrasion and wear.

Buffet Car. Fig. 358. The cars in which a buffet are most used are parlor, sleeping, observation, library and smoking cars, and in such cases the cars are termed buffet-sleeping, buffet-observation, or observation-buffet, buffet-library and buffet-smoking cars. See CAR.

Buffing Sub-Sill. A sub-sill bolted to the center sills on the underside and forming a continuous buffing sill in conjunction with the draft timbers. They are bolted and keyed to the center sills with key blocks and bolts. Also called back stop timber.

Bulkhead (Refrigerator Car). 10, Figs. 210, 211; Fig. 891, 915. A partition which separates the ice chamber from the part of the car in which the lading is placed.
(Passenger Equipment Cars.) Fig. 1615. A partition which divides the car into rooms or compartments.

Bull's-Eye. A convex glass lens, which is placed in front of a lamp to concentrate the light so as to make it more conspicuous for a signal.

Bumper. A term sometimes used to designate a buffer.

Bunk. 24, Fig. 260. A rough form of sleeping berth built against the side of a car.
(Logging Cars.) Figs. 434-437. A cross piece similar to a body bolster, on which timber is loaded.

Bunk Apron. A board attached on the deck sill of a sleeping car and projecting below it to cover the edge of the upper berth when it is closed. In the later sleeping cars it is not used.

Bunk Panel. A panel below the cornice and behind the upper berth in sleeping cars, shutting off the upper part of the side windows.

Bunk Truss (Logging Cars). An iron strap to stiffen the bunk.

Burlap. A coarse canvas used in upholstery.

Burner. Fig. 2235, etc. That part of a lighting apparatus at which combustion takes place. (Also Fig. 898. See LAMP BURNER.

Burner Cock (Pintsch System of Gas Lighting). A cock used for wall lamps. It is opened and closed with a key.

Bushing. Usually a metal cylinder which is inserted in an opening and forms a bearing for some other object, as a shaft or valve. Often contracted to bush.
(Pipe Fitting.) A short tube with a screw cut inside and outside, used to screw into a pipe to reduce its diameter. Generally, a bushing has a hexagonal head by which it is turned, and is more commonly termed reducer.

Business Car. A term frequently applied to a car used by railway officials while traveling. See CAR and PRIVATE CAR.

Butt Hinge. A hinge for hanging doors, etc., which is fastened with screws to the edge of a door, so that when the latter is closed the hinge is folded up between the door and its frame. A hinge the two parts of which are so fastened together that they cannot readily be detached is called a fast joint butt hinge. A loose pin butt hinge (Fig. 1828) is one having a removable hinge pin, and a loose joint butt hinge (Fig. 1829) is one with which the doors may be lifted off of the hinges when desired.

By-Pass Valve. Fig. 2053. A valve which, either through manual control or automatically, will pass a gas or fluid through a direct route or an alternate route, as may become necessary in connection with the operation of the particular apparatus to which it is applied.

C

Cabin Car. A term sometimes applied to CABOOSE CARS. but more particularly to the four-wheeled type. See CABOOSE.

Cabin Door Hooks. See DOOR HOOK.

Cabinet Lock. It may be applied either to the inner edge of the door or drawer or be set into a mortise. Cabinet locks vary from the cheapest type to the pintumbler type which gives the highest possible security.

Caboose or Caboose Car. Figs. 249-267. A car which is attached to the rear of freight trains for the accommodation of the conductors and trainmen, and

for carrying the various stores, tools, etc., required on freight trains. Sometimes called conductor's car, cabin car, train car, way car or can. See CAR.

Caboose Deck or **Cupola Lamp.** Fig. 2238, etc. A signal lamp used in a caboose cupola.

Café Car. Figs. 315, 329, 330. A passenger equipment car having a kitchen, usually in the center, and one end arranged as a café or dining room, the other being usually fitted for use as a parlor or smoking room. See CAR.

Café Coach. Figs. 329, 330. A combined day coach and café car. See KITCHEN CAR and LUNCH COUNTER CAR.

Café-Parlor Car or **Parlor-Café Car.** Fig. 315. A combined café and parlor car.

Calcine Car. Figs. 94-97. A hopper car specially designed to carry calcined ore.

Cam. A device used to convert rotary into reciprocating motion; commonly an eccentric disc.

Camber. The upward deflection or bend of a beam, girder, or truss.

Candelabra. Fig. 2461. A term applied to an ornamental lamp; sometimes shaped like a candlestick.

Candle. A special candle of large diameter called car candle was at one time used for lighting passenger cars and burned in CANDLE LAMPS.

Candle Bracket Lamp (Pintsch System). Fig. 2257. For use in emergency, as in case gas gives out. May be attached to wall or to any center lamp at will.

Candle Lamp. Fig. 2257. A lamp for burning candles, sometimes elaborated into a chandelier with two or three burners. Candles, however, are now almost never used except in emergency bracket lamp, to be used when the gas or electric lights fail.

Cane Car. Figs. 2773-2792; Pages 1124, 1186, 1188, 1215, 1318. A car usually having a superstructure of the rack type, provided with slat floors and having various provisions to facilitate the handling of sugar cane. They are sometimes constructed with the gondola body and provision made for dumping the load. Various types of cane cars are known as Side Discharge, End Discharge, Chain Lift, etc. See SUGAR CANE CAR.

Canopy. See LAMP CANOPY. A term sometimes applied to the SMOKE BELL of a lamp. A platform hood is sometimes called a canopy.

Cant Rail (British). American equivalent, plate. A horizontal timber running along the top of the upright pieces in the sides of the body, and supporting the roof and roof timbers. Its upper edge is cut to the bevel of the roof; hence its name.

Cantilever. A term sometimes, but not desirably, applied to a Cross Bearer. See CROSS BEARER.

Cantilever Cover Plate. See CROSS BEARER or CROSS TIE COVER PLATE.

Cantilever Diaphragm. See CROSS BEARER DIAPHRAGM.

Cantilever Truss (Overhang of Underframe). An inverted truss which bears upon the side sill directly over the body bolster. The inner end is connected by a tie rod to the inner end of the truss at the other end of the car body, while the outer end supports the overhang of the underframe by a vertical tie rod and by a diagonal brace rod similar to the overhang truss rod of the old Pullman wooden framing.

Canvas. A coarse cloth, made of cotton, used for upholstering seats, and sometimes for the finish of the ceiling of passenger cars when it is painted or otherwise decorated. Roofing canvas is also used for covering passenger equipment cars.

Car. See BOX CAR, AUTOMOBILE CAR, etc.

A vehicle used on railways for the transportation of passengers or material.

CLASSIFICATION OF CARS

In 1910 a committee considered the question of harmonizing the terms used in designating the different kinds of cars in each class according to their physical requirements and submitting the following definitions, which were adopted by letter ballot as Recommended Practice.

In 1912 the designations RS, RA, RB, VS and VA were adopted.

In 1913 the following designations were adopted: BM, ES, GB, MBE, XI, MWX, MWE, MWJ, MWP, MWR, MWM, SH. Revised 1915. In 1917 designation FT was adopted.

DEFINITIONS AND DESIGNATING LETTERS OF GENERAL SERVICE PASSENGER EQUIPMENT CARS

Recommended Practice. In 1915 the following definition was submitted by the American Railway Association:

A passenger train car is defined as a car suitably built to operate in passenger trains, its characteristics being: passenger type of truck passenger brake, air signal, steam train line, in accordance with definition and designating letters for general passenger equipment cars as follows:

CLASS "B"

"BA"—Baggage Car. A car constructed and equipped to render it suitable for passenger train service having wide side doors for the admittance of baggage, with or without windows or end doors.

"BE"—Baggage Express. A car similar to baggage, used for either baggage or express matter.

"BH"—Horse or Horse and Carriage Express. A car constructed and equipped to render it suitable for passenger train service for the transportation of fine stock, fitted with stalls (movable or stationary) and space left for carriage or horse equipment.

"BM"—Milk Car. Exclusively for the transportation of milk, being a car for this purpose and fully equipped for handling in passenger trains.

"BR"—Refrigerator Express. A car constructed and equipped for passenger train service and fitted with ice bunkers or boxes, and suitable to carry produce, oysters, fish or any commodity requiring icing in transit.

"BX"—Express Car. Constructed and equipped for passenger train service and used for express matter, having suitable side doors, with or without end doors or windows.

CLASS "C"

"CA"—Combined, Car, Baggage and Passenger. A car having two compartments, one suitable for transporting baggage, the other fitted with seats for passengers, the two compartments separated by bulkheads.

"CS"—Combined Smoking and Baggage Car (Club Car). A car having two compartments, separated by bulkheads, one compartment suitable for trans-

porting baggage, the other fitted with seats or chairs and used as smoking car; at times equipped with buffet or bar.

"CO"—Combined car having three separate compartments, separated by bulkheads, one compartment suitable for transporting baggage, one for mail fitted with suitable apparatus for sorting and classifying mail, and the other fitted with seats for the transportation of passengers.

"CB"—Business Car. A special type of car for the convenience of business men, used as smoker and fitted with tables or desks, carrying stationery and fitted with typewriters and carrying regular stenographers.

CLASS "D"

"DA"—Dining Car. Regular dining car, for the use of passengers in transit, fitted with regular kitchen, tables, chairs or seats, with or without bar, carrying cooks and waiters.

"DB"—Buffet Car. Car for the transportation of passengers and fitted with small broiler or buffet to serve simple meals to passengers; cooking and serving done on removable tables by regular porter in charge of car. With or without facilities for serving liquor.

"DC"—Café Car. A car fitted with kitchen, usually in center of car, one end used as café where meals are served, also liquor and smoking allowed, the other end of car fitted with either regular dining room or smoking and card room; carrying cooks and waiters.

"DG"—Grill Room Car. Very similar to café car.

"DO"—Café Observation Car. Car fitted with café at one end, kitchen in center or extreme end, having observation compartment fitted with stationary or movable tables and observation platform at rear.

"DP"—Dining and Parlor Car. A car fitted with dining compartment, kitchen and compartment for passengers, fitted with chairs, stationary or otherwise, carrying regular cooks and waiters.

CLASS "E"

"EA"—Electric Street Railway Service Car, direct current, for transportation of passengers; without automatic couplings.

"EP"—Electric Passenger Car, for long hauls or suburban service, multiple unit and fitted with automatic couplings and air brakes. Third rail, trolley or pantagraph contact.

"EB"—Electric Baggage Car, for long hauls or suburban service, multiple unit with automatic couplings and air brakes and suitable for the transportation of baggage. Third rail, trolley or pantagraph contact.

"EM"—Electric Mail Car, for use in United States Mail Service, fitted with side doors, with or without mail hook, and suitable apparatus for the sorting and classifying of mail en route. With or without end doors or windows.

"EC"—Electric Combined. A car for long hauls or suburban service, multiple unit with automatic couplings and air brakes. This car is made up of two compartments, separated by bulkhead, one suitable for the transportation of baggage and the other fitted with seats or chairs for the use of passengers. Third rail, trolley or pantagraph contact.

"EG"—Gasoline Motor Propelled Car, for inspection or private use, or use in suburban service, hauling one or more trailers.

"ED"—Gasoline Motor Car. Gasoline engine or engine serving to run dynamo to furnish electricity for axle motors. Car to be used for inspection, private use, or as motive power to haul trailer or trailers; fitted with storage cells and with or without booster.

"ES"—Electric Passenger Car. For long hauls or suburban service; multiple unit, and fitted with automatic couplings and air brakes, operating power, storage battery.

CLASS "M"

"MA"—Postal Car. For use of United States Mail Service, fitted with side doors, with or without mail-bag hook, and having suitable apparatus for the sorting and classifying of mail in transit, with or without end doors or windows.

"MB"—Baggage and Mail. A car having two compartments, one for baggage and one for mail, separated by bulkheads; the mail end fitted with suitable apparatus for sorting and classifying mail, and with or without mail-bag catchers, with or without end doors or windows, and having suitable side doors.

"MP"—Postal Car. Suitable for transporting newspapers or large mail packages for United States Mail Service, having side doors and fitted with stanchions, with or without end doors or windows.

"MR"—Postal Storage Cars. For United States Mail Service, suitable to carry mail in bulk, without appliances for sorting or classifying, fitted with side doors and stanchions and with or without end doors or windows.

"MS"—Mail and Smoker. A combined car having two separate compartments, separated by bulkheads, one compartment suitable for the transportation, sorting and classifying of mail, the other fitted with seats or chairs to be used by passengers as smoking car.

"MBE"—Combination Baggage, Mail and Express Car. A car having three compartments, each entirely separate from the other for handling its individual class of business.

CLASS "P"

"PA"—Passenger Car. A car for ordinary short haul suburban service, with seats and open platforms.

"PB"—Passenger Car. A vestibule (wide or narrow) car for through service, fitted with seats or reclining seats, and having toilet rooms for men and women, also wash basins.

"PE"—Emigrant or Colonist Car. A second-class passenger car, with floors either bare or fitted with matting, used expressly for emigrant trade on trains where low rate of fare is charged.

"PS"—Sleeping Car. A car for passenger service having seats that can be made up into berths, and usually having one or more separate stateroom compartments, also toilet and washroom facilities for men and women, and smoking compartment for men. Some cars of this class are all compartments, and some compartment and observation combined.

"PN"—Passenger car used exclusively as smoking car, with seats or chairs and fitted with cuspidors or having matting or bare floor.

"PO"—Observation Car. A car having observation

compartment at one end and fitted with either berth facilities, parlor chairs or compartments, usually run in first-class service.

"PV"—Private cars used as officers' or private individual's car and railroad pay car—usually composed of sleeping compartments, dining compartments, observation end and with kitchen, servant's quarters and toilet and bathroom.

"PT"—Tourist Car. A second-class sleeping-car, fitted usually with cane seats convertible into berths and used mostly on trans-continental trains; cars fitted with smoking compartment, toilet and washroom.

"PC"—Passenger, Parlor or Chair Car. A car fitted with individual stationary or movable chairs, used on trains for daylight runs and having toilet and washrooms.

Class "I"

"IA"—Instruction Cars for use of employees, usually run from one point to another in passenger trains.

Note.—If it is so desired, a small letter "E" can be placed after the larger designating letters to indicate electric lighting, and small "G" for gas lighting, also figures showing approximate length of car or length of baggage or mail compartment.

DEFINITIONS AND DESIGNATING LETTERS OF GENERAL SERVICE FREIGHT EQUIPMENT CARS. RECOMMENDED PRACTICE.

CLASS "X"

"XM"—Box Car. General service, suitable to lading which should be kept from the weather. A box car is a closed car having side and end housings and roof, with doors in sides or sides and ends.

"XA"—Automobile Car. Box car of similar design to general service car, having exceptionally large side doors or end doors.

"XF"—Furniture Car. Box car of similar design to general service car, except usually greater capacity in cubic feet.

"XV"—Box Car, Ventilated. Similar to ordinary box, only having ventilation, and suitable for the transportation of produce or other foodstuffs not needing refrigeration.

"XI"—Box Car, Insulated. A box car having walls, floor and roof insulated, not equipped with ice bunkers or ice baskets. This car ordinarily used for transporting vegetables, fruit, etc.

"XT"—Box Car Tank. A box car without doors, metal lined, or inclosing tank for the shipment of water or other liquids.

CLASS "R"

"RA"—Meat and Provision Refrigerator. A car with body, doors and hatch plugs equipped with insulation and brine ice tanks and without ventilating devices.

"RB"—Beer and Ice Refrigerator. A car with body and doors equipped with insulation, having no ice tanks or ventilating devices.

"RM"—Refrigerator or Produce Car. A car suitable for carrying commodities that need icing in transit. This car is equipped with two or more ice bunkers or baskets and suitable means for draining off melted ice or briny water. This car has body, door and hatch plugs equipped with insulation, with trap door in the roof for admission of ice and salt; also water seals inside of car.

"RS"—Standard Refrigerator. A car with body, doors and hatch plugs equipped with insulation, with ice tanks and either with or without ventilating devices.

CLASS "V"

"VA"—Vegetable Ventilator. A car equipped with insulation, but having common box car end and side doors which afford no protection against heat or cold.

"VS"—Standard Ventilator. A car equipped with insulation, including insulated side, end and top openings, and ventilating devices without ice tanks.

CLASS "S"

"SM"—Stock Car. This car is for transportation of stock on the hoof, and is equipped with roof, slatted sides and side doors, and single or double deck. With or without feed or feed and water troughs.

"SD"—Stock Car. Composite having drop doors in floor and means of housing in sides and making drop-bottom box car.

"SP"—Stock Car. Used in poultry trade, fitted with roof and sides usually of wire netting, fitted with shelves for storing crates of poultry and leaving space for poultrymen, feed bag and watering facilities.

CLASS "G"

"GA"—Gondola Car. This car has sides and ends; open at top, and drop bottom; suitable for general coal or ore trade, stone or general trade.

"GE"—Gondola car having drop bottoms and drop ends; suitable for general coal or ore or mill trade.

"GC"—Gondola Coke Car. Gondola car fitted with coke racks and having drop bottoms.

"GD"—Gondola car having side-dump arrangement.

"GM"—Gondola Car. Suited to mill trade, having solid bottom, low sides and drop ends to facilitate twin shipments.

"GB"—Gondola Car. A car with solid bottom, sides and ends, and open on top; suitable for mill trade.

"GF"—Gondola Car. A car equipped with coke racks and having solid bottoms.

"GS"—Gondola Car. A car with fixed sides and ends, and flat bottom composed of dump doors hung at inside edge, and dumping to the side of track.

CLASS "H"

"HM"—Hopper Car. Similar in general design to gondola car, having sides and bottom ends and open at top, equipped with hopper bottom and self-cleaning.

"HT"—Hopper (Twin). Similar to ordinary hopper, only equipped with two or more hopper doors instead of one.

"HD"—Hopper car equipped with side-dump hoppers.

"HC"—Hopper car equipped with coke racks.

Note.—If any of these hopper cais are provided with roof or cover for protection of contents, the letter "R" should be affixed to the regular symbol to designate its special class of service.

CLASS "F"

"FM"—Ordinary flat car for general service. This car has flooring laid over sills and without sides or ends.

"FG"—Flat or gun truck car for special transportation of heavy ordnance.

"FW"—Flat well-hole car for special transportation of plate glass, etc. This car is a flat car with hole in middle to enable lading to be dropped down on account of clearance limits.

"FB"—Flat car having skeleton superstructure, suitable for carrying barrels, known as "Barrel Rack Car."

"FL"—Flat logging car or logging truck. This is either an ordinary flat car, or car consisting of two trucks fitted with cross supports over truck bolsters; the trucks connected by a skeleton of flexible frame and logs loaded lengthwise on cross supports.

"FT"—Flat car. A car equipped with holders for the transportation of illuminating gas.

CLASS "T"

"TM"—Tank car for general service. This car is for general oil or liquid service, and consists of steel tank mounted on frame or mounted directly on cradles over truck bolsters. It is equipped with one or two safety release valves, and is emptied by valves or valve at bottom. At the top is a dome, with or withont manhole, and openings through which the tank may be filled.

"TA"—Acid Tank. Of same general construction as oil tanks.

"TL"—Acid Tank. Of same general construction as oil tanks, but having lead lining.

"TG"—Tank car having glass or glass-lined tanks, for use in hauling mineral waters and other special products.

"TS"—Tanks for special commercial service.

"TW"—Tank car having wooden tank, instead of steel, and used for water, pickles, etc.

CLASS "N"

"NM"—Freight train service caboose for convenience of trainmen. This caboose is mounted on four wheels and has lookout at top over roof. It is fitted with bunks or benches and a stove for cooking and heating purposes, also tank for storage of drinking and washing water, and small tool storage boxes.

"NE"—Caboose mounted on eight wheels and longer than four-wheel caboose, but of the same general design.

CLASS "Y"

"YM"—Yard Poling Car. This car used in hump classification and flat-yard classification. This car is usually fitted with small house or protection and benches, tool box and stove, a counterweighted pole on each side and running board or step near the ground for convenience of yardmen. It is protected with safety appliances and, when in use, coupled to an engine.

"YA"—Yard pick-up car for use of car droppers and yardmen in performance of their duty. It might be termed a "Car Dropper's Car." It is protected by house, around which runs a platform and railing, a long running board on sides near ground and is fitted with benches, tool box and stove.

NOTE.—The capacity of car can be shown by affixing two figures after designating letter; for instance, "80" would mean 80,000 pounds capacity; "10" would mean 100,000 pounds capacity; "60" would mean 60,000 pounds capacity. Where tanks are in question the capacity numbers should indicate capacity in gallons instead of pounds.

GENERAL SERVICE MAINTENANCE OF WAY EQUIPMENT CARS

Any of the following classes of equipment, having special heating appliances for the protection of commodities against freezing, to be covered by affixing the letter "H" to the designating symbol.

"SH"—Horse Car. A car specially fitted for the transportation of horses in freight service.

Weed Burner.—A car equipped with machinery for propelling itself, or otherwise, and burning weeds along the track as it proceeds.

Ditching Car.—A car equipped with machinery for propelling itself, or otherwise, and excavating ditches along the sides of the track as it proceeds.

Rail Saw.—A car equipped with machinery for sawing track rails and similar material.

Rail Bender.—A car equipped with machinery for bending track rails and similar material.

Grass Cutter.—A car equipped with machinery for propelling itself, or otherwise, and cutting grass along the track as it proceeds.

Track Layer.—A car equipped with machinery for propelling itself, or otherwise, and laying the track ahead of it as it proceeds.

"MWB"—Ballast Cars. All descriptions of cars used for the purpose of carrying ballast for the laying of new right of way and repairs. The car used generally for this work is of the gondola type, with side or center dump.

"MWD"—Dump Cars. On the type of contractors' car used for building up fills; the body of the car dumps being raised by means of counterweight, air or hand power.

"MWF"—Flat Car. Used for transporting rails, ties or ballast and for storage of wrecking trucks, or gathering scraps along right of way. These cars are at times equipped with low sides, about 10 or 12 inches high.

"MWS"—Steam Shovel. Car equipped with donkey engine housed in. Having a boom of wood or steel and the end of which is a shovel or scoop. It may be propelled by its own power or by means of a locomotive and run as a car in freight trains, being equipped with safety appliances. The cubic capacity of shovels, in yards, can be indicated by figures after classification letters.

"MWW"—Wrecking Derrick. A derrick used for wrecking purposes, having donkey engine to raise and lower booms and hoists; engine housed in and on separate platform with boom, is pivoted in center of car frame in order that it can be worked on either sides or ends; usually fitted with anchor beams to be used for heavy lifting. Fitted with safety appliances and propelled by means of locomotive. Lifting capacity in tons shown by means of figures.

"MWU"—Wrecking Derrick. This derrick has boom and hoist fitted to frame of flat car and lifting done by means of hand power; propelled by locomotive.

"MWV"—Wrecking Derrick. This derrick has boom and hoist fitted to flat car and having drum at one end to furnish means of hoisting; steam furnished to donkey engine, running drum, by means of flexible steam line from attached locomotive; propelled by locomotive.

"MWT"—Tool and Block Car. A car used for carrying all descriptions of tool equipment and blocking. This car has side and end housings and roof, also end platforms. There are doors in sides and ends and usually windows. It is fitted inside with proper racks and boxes for storage of tools.

"MWC"—Caboose and Tool Car. Similar to tool car, but having one end fitted up as a caboose, with bunks, stove and water storage, with or without lookout, and is used in either work or wrecking trains.

"MWH"—Hand Car. This car is flat and mounted on four wheels and propelled by means of pushing; known as "Push Car."

"MWL"—Hand Car. This is a small flat car, with or without seats, mounted on four wheels and propelled by means of cranks or hand levers.

"MWG"—Section Gang or Track Inspection Car. Flat car, with or without seats or tool boxes, and equipped with single or double cylinder gasoline engine serving as motive power.

"MWX"—Boarding Outfit Car. This includes cars used for boarding, sleeping or cooking purposes in construction and similar work.

"MWE"—Ballast Spreader and Trimmer. A car with blades or wings for spreading or trimming ballast.

"MWJ"—Ballast Unloader. A car equipped with machinery for pulling a plow through cars loaded with ballast.

"MWP"—Pile Driver. A car equipped with machinery for pile driving.

"MWK"—Snow-removing Car. A car equipped with any special device for removing snow from between or alongside of rails.

"MWM"—Store-supply Car. A car equipped for handling material to be distributed for railway use.

Car Axle. See AXLE.

Car Box. A JOURNAL BOX.

Car Closet. See DRY CLOSET and WATER CLOSET.

Car Construction. Reports of the committee on car construction will be found in the 1913 M. C. B. Proceedings, page 613; 1914 Proceedings, page 389; 1915 Proceedings, page 351; and 1916 Proceedings, page 371.

Car Discharge Valve (Train Air Signal Apparatus). Figs 1334, etc. A valve placed in the end of the car and connected with the signal cord. When the cord is pulled the car discharge valve is opened and air escapes, resulting, through the construction of the apparatus, in the blowing of the signal whistle in the locomotive or motorman's cab. See TRAIN AIR SIGNAL APPARATUS.

Car Door Sheave. See DOOR SHEAVE.

Car Drain Cup (Air Brake). An attachment to the brake pipe of a car to collect the water of condensation, which is drawn off from time to time through a hole at the bottom closed by a plug; it is usually combined with an air strainer and so called.

Car Heater. Fig. 2054, etc.; Page 1298. Any apparatus for heating cars by convection; that is, by conveying hot water, steam or warmed air into, or through, the car. It generally refers to any arrangement for warming cars other than stoves. With most steam heating systems the steam is taken from the locomotive, but in many cases a heater is supplied to the car to take care of emergencies. See BAKER CAR HEATER.

Car Inspectors, Rules for Examination of. See EXAMINATION OF CAR INSPECTORS.

Car, Lettering. See LETTERING CARS.

Car Lighting. See ELECTRIC LIGHTING, TRAIN LIGHTING.

Car Moldings. See MOLDINGS.

Car Receptacle. A device placed on a car for use in charging storage batteries. A connector carries the current from a charging plug to the car receptacle, from which it enters the batteries.

Car Replacer. Fig. 2703, etc.; Page 1252. A device for getting a derailed truck back on the track. It usually consists of an inclined plane or a curved surface, by which the wheels are raised when the car is pulled, so that the flange of the outside wheel can ride upon and over the rail.

Car Roof. 39, Figs. 34, 35; 17, Figs. 210, 211; Figs. 921-959; Pages 1147, 1197, 1279. A covering for a car supported by carlines and purlins. Several types of roofs are used on freight cars. A double board roof may be built, with or without felt or other material between the boards. Inside metal roofs are formed of metal protected by a covering of roughly matched boards. Outside metal roofs have a metal covering over a single layer of roof boards. Metallic or all-metal roofs use metal only in their construction. See PLASTIC CAR ROOF.

Passenger car roofs are usually covered with canvas, tin, galvanized iron or steel sheets. See ARCHED ROOF, "A" CAR ROOF.

The report of the committee on car framing, roofs and doors in the 1910 M. C. B. Proceedings, page 397, contains certain recommendations as to the construction of car roofs.

Car Seal. Figs. 856-862. A device to secure freight car doors against opening by making it impossible without destroying the seal.

Car Seat. Figs. 1667-1707; Pages 1198, 1255. The complete set of fixtures on which passengers sit in a car. It ordinarily consists of a seat frame, seat cushions, seat back, arm rest, foot rest, and their attachments. Ordinarily, the seats in American cars are placed crosswise of the car, and are made for two passengers. The backs of the seats are generally made reversible. The seats of parlor cars are commonly called chairs, and are usually revolving. In private and parlor cars, sofas, placed longitudinally against the side of the car, are sometimes used. In order to give an inclination to the seats which makes them more comfortable, various devices have been introduced. See GLIDEOVER SEAT, PARLOR CAR CHAIR, RECLINING CHAIR, REVERSIBLE CAR SEAT, ROCKER CAR SEAT, WALKOVER SEAT.

Car Seat Moldings. Metal bands, usually used to finish seat backs. See MOLDINGS.

Car Signal Valve (Train Air Signal Apparatus). A CAR DISCHARGE VALVE.

Car Spring. A general term applied to springs on which the weight of a car rests. See BOLSTER SPRING, ELLIPTIC SPRING, SPIRAL SPRING, SPRING.

Car Steps. See PLATFORM STEPS.

Car Washer. A brush made for washing the outside of passenger cars.

Car Wheel. 28, Fig. 80; 1, Fig. 1003, etc. See WHEEL.

Carburetor. See VAPOR SYSTEM.

Card Rack. A small receptacle on the outside of a freight car to receive cards giving shipping directions.

Carline. 36, Figs. 34, 35; 18, Fig. 260; 35, 36, Fig. 348; Figs. 930-959, Page 1303. A bar of wood or iron which extends across the top of a car or from one side to the others, and which supports the roof. In passenger cars carlines are divided into main carlines; passing entirely across the car; short carlines or deck carlines, which are confined to the upper deck, and rafters, which are confined to the lower deck. The main carlines are usually compound, i. e., built up of wood and iron.

They sometimes pass directly from side to side of the car across and under the upper deck, when they are termed continuous or straight carlines, but usually they are bent to the outline of the clear story and are termed profile carlines. Other carlines having special names are: COMPOUND CARLINE, END CARLINE, PLATFORM HOOD CARLINE, PLATFORM ROOF CARLINE, PLATFORM ROOF END CARLINE.

Carline Knee Iron. An angle iron which connects the end carline to the plate. Also termed inside corner iron.

Carpet Eyelet. See EYELET.

Carpet Knob. An EYELET NAIL.

Carriage Bolt. A bolt made square under the head so as to prevent it from turning when in its place. They have button-shaped heads and are used for fastening wooden pieces together.

Carry Iron. SEE DRAWBAR CARRY IRON, DRAFT GEAR CARRY IRON.

Carrier Iron, Brake Staff. See BRAKE STAFF CARRIER IRON.

Carry Case (Fuses and Torpedoes). A metal receptacle sometimes kept in cabooses for the use of flagmen.

Cars, Reinforcing of Existing Wooden. Recommended Practice. In 1915 the following minimum strength requirements for the reinforcement of existing wooden cars was adopted.

1. The draft attachments, including draft arms, if used, must be of metal, of either integral or riveted construction.

2. The strength value of the draft attachments and center-sill construction must be equivalent to at least 10 square inches of steel in tension and compression, 6¼ square inches of rivet-bearing area and 12½ square inches in shear. The ratio of unit stress to end load must not exceed 0.15.

3. Metal draft arms applied to wooden center sills must extend at least 30 inches beyond center line of bolster, toward center of car, must be securely fastened to bolster and center sills, and where possible should butt against compression members placed between draft arms and needle beams and also between the needle beams.

Hardwood or yellow pine center sills may be considered equivalent to steel in center-sill construction between bolsters, if they have four times the specified unit values, namely, 40 square inch tension and compression area, and a ratio of unit stress to end load not exceeding 0.0375.

Where wooden members are reinforced with metal (composite construction), either the steel or the wood must alone meet the strength requirements.

Where horn of coupler is allowed to come in contact with the end sill, the latter must be provided with a striking plate of sufficient strength to resist its proportionate load without deformation.

4. The draft-gear capacity is indirectly governed by the rules in paragraph 2.

Cartridge (Acetylene Gas Lighting). A cylinder used for holding carbide in the generation of the gas.

Casing. See WINDOW CASING.

Caster. Fig. 1652. A small wheel on a swivel attached to furniture and on which it is rolled on the floor.

Caster Holder (Dining Cars). A shelf or tray for holding bottles of condiments.

Casting. Page 1129. Any piece of metal which has been cast in a mold.

Castle Nut. Fig. 1582. A nut having several slots cut crosswise in the upper portion. The nut is screwed on a bolt so that one of the slots coincides with a hole through the bolt. A cotter pin is then inserted, thus securing the nut.

Catch. A device to prevent a gate, door or window from opening.

Catch Lever (Three-Stem Coupler). A crank lever passing vertically through the catch, by means of which it is caused to release the knuckle for uncoupling.

Catch Spring (Three-Stem Coupler). A coiled spring on the catch spring bolt operating the catch.

Cattle Car. More properly STOCK CAR.

Ceiling. 18, Figs. 210, 211. The inside or under surface of the roof or covering of a car. This term is sometimes used to mean Sheathing. The ceiling of a passenger car is generally termed Head Lining. Deafening Ceiling is boarding under the sills of a car, the space between it and the floor being either left empty or filled with shavings, or some similar substance to deaden the noise of the wheels. See AGASOTE, HEAD LINING, LIGNOMUR.

Ceiling Furring. Strips or pieces fastened to the carlines overhead, to which the paneling or veneering of the ceiling is applied.

Ceiling Veneers. Thin boards with which the ceilings of passenger cars are covered. The term is also misapplied to the thin preparations of papier maché, etc., in imitation of natural wood veneers. See VENEER.

Cell. An electro-chemical device for producing electrical energy, consisting of two metaloid elements immersed in a liquid electrolyte. When the two plates are connected by an exterior conductor a current of electricity is caused to flow from one element to the other through the liquid electrolyte and the exterior circuit. Such a device is called a voltaic or primary cell. A group of such cells connected is called a battery and a single cell is also commonly referred to as a battery. The parts of the elements are referred to as a plate or electrode. See STORAGE BATTERY.

Cement for Mounting Air-Brake Hose, Specifications for. (M. C. B. Standard).

In 1916 the following Specifications were adopted as Recommended Practice for Cement for Mounting Air Brake Hose. Advanced to Standard in 1917.

Shellac: Dissolve 5 lb. of dry shellac in 1 gal. of denatured alcohol and add 2 oz. of castor oil.

Rubber: Dissolve from 4 to 10 oz. of raw rubber (preferably Para) in 1 gal. of gasoline or benzol.

Center Anchor. Page 1122. An arrangement of plates, which are riveted to the tank and to the center sills at the center of a tank car. These plates anchor the tank to the frame and supplant head blocks and double anchors at the ends.

Center Axle Guard. The axle guard for the center axle of a six-wheel truck. See AXLE GUARD.

Center Bearing. Figs 1078-1084. The place in the center of a truck where the weight of the body rests. A body center plate attached to the car body here rests on a truck center plate attached to the truck. The general term center bearing is used to designate the whole arrangement and the functions which it

performs, in distinction from Side Bearing. See also CENTER PLATE.

Center Bearing Arch Bar. See CENTER BEAR.NG BRIDGE.

Center Bearing Beam. See CENTER BEARING BRIDGE.

Center Bearing Bridge (Six-Wheel Trucks). A structure formed by the top and bottom center bearing arch bars to support the center plate block or center bearing beam and transmit the weight of the car to the bolsters, on which its extremities rest.

Center Block Column. A column placed on top of the center plate block or bearing beam, and between it and the center bearing arch bar.

Center Buffer Spring. A spiral spring situated above the draft springs in some forms of passenger draft gear and intended for buffing purposes only.

Center Buffer Stem. See BUFFER STEM.

Center Compression Beam Brace. In wooden passenger equipment car framing, a brace for the compression beam in the center of the side truss.

Center Counterbrace. A counterbrace in the body of the car between the trucks, to stiffen a compression beam brace. See also COUNTERBRACE.

Center Cross Beam. A cross timber framed into the two intermediate sills of a coal or ore car, to which the center doors are hung.

Center Cross Beam Cap. A cap piece to cover the center cross beam.

Center Cross Tie Timber. A cross tie timber in the middle of a car, generally placed between the double drop doors of a gondola car.

Center Door Rail. See MIDDLE DOOR RAIL.

Center Draft Drawbar. A drawbar which is connected directly with the king bolt of a truck. It is a style specially designed for use on the very sharp curves (of 90 and 100 ft. radius) of elevated railroads and subways, and is confined to those lines. Sometimes termed radial draw gear.

Center Draft Tube (Argand Lamp). The hollow passage for air in the center of the burner.

Center Dump Car. Figs. 71, 114, 123, 135, 137. A car which will discharge its entire load between the rails. See also CONVERTIBLE CAR.

Center Floor Timbers. The CENTER SILLS.

Center Frame. See TRUCK CENTER FRAME.

Center Girth. See DOOR CENTER GIRTH.

Center Pin or King Bolt. 32, Fig. 260; Figs. 1081, 1082. A large bolt which passes through the center plates on the body bolster and truck bolster. The truck turns about the bolt, but the stress is taken by the center plates. It is, therefore, a mere pin and not a bolt in the usual sense. The name king bolt is derived from the name of the corresponding part for the front wheels of a wagon. Center pin, however, is the more common term.

Center Pin Floor Plate. An ornamental casting set into the floor of a passenger equipment car to cover the head of the center pin.

Center Plate. 7, Figs. 34, 35, 173; 6, Fig. 80; 14, Fig. 111; 5, Fig. 147; 26, Fig. 210; 31, Fig. 260; Fig. 969; Figs. 1078-1084; Pages 1285, 1316. One of a pair of plates which fit one into the other and which support the car body on the trucks, allowing them to turn freely under the car. The center pin or king bolt passes through both, but does not really serve as a pivot. The body center plate or male center plate is attached to the under side of the body bolster or in cast steel bolsters is made an integral part of the casting. The female or truck center plate is attached to the top side of, or cast integral with, the truck bolster. When the car is tilted, as on a curve, part of the weight is carried on the SIDE BEARINGS. See ANTI-FRICTION, BALL BEARING and ROLLER CENTER PLATES.

Center Plates. (M. C. B. Standard.) Sheet M. C. B. 20. Fig. 2981. In 1903 the center plate shown on Sheet M. C. B. 20 was adopted as a Standard.

Center Plates. (Recommended Practice.) Fig. 3041. Sheet M. C. B.—F. In 1915 the design of center plate shown on Sheet M. C. B.—F was adopted as Recommended Practice.

Center Plate. Fig. 2981. (M. C. B. Standard). The report of the committee on standard center plates in the Master Car Builders' Proceedings, 1900, page 150, is largely based upon replies to a circular of inquiry and includes drawings of typical designs.

The report in the M. C. B. Proceedings, 1902, page 233, contains tests of different designs of center plates.

An extensive series of tests is reported in the 1903 M. C. B. Proceedings, page 109, which were made with a view to determining the best materials for center plates; the best conditions for a given metal; the effect of lubrication; the best shape; comparative value of plates of special design, and a determination of the best size.

The report in the 1908 Proceedings, page 283, gives a synopsis of the reports submitted since the year 1900; it also includes the results of a circular of inquiry and contains detailed recommendations of the committee.

Center Plate Block. The member supporting the center plate of a six-wheel truck. It is in turn supported by the center bearing arch bars.

Center Plate Shim. Fig. 1081.

Center Rod (Postal Car). A device which fits in a socket at the top of the pedestals, and to which the ends of the two rods, which support the distributing trays, etc., near the center of the car, are fastened.

Center Sill. 4, Figs. 34, 35; 2, Fig. 80; 1, Figs 111, 147, 173, 210, 211, 260; 1-4, Fig. 348. The central main longitudinal members of the underframe of a car which are usually close together in the center of the car. They form as it were the backbone of the underframe and transmit most of the buffing shocks from end to end of the car. In steel underframe cars the center sills are usually heavy I-beams, channels, deep built-up fish-belly girders or pressed steel fish-belly girders, often with reinforcing flange angles. See CENTER SILL WEB PLATE, CENTER SILL BOTTOM ANGLE, and CENTER SILL COVER PLATE.

Center Sills (M. C. B. Recommended Practice).

In 1914 by letter ballot, minimum design requirements for new cars were adopted for steel center sills. (See Committee's report, page 433.)

Area of center sills: 24 sq. in. minimum.

Ratio of stress to end load: 0.06 maximum.

Length of center or draft sill members between braces: 20 d, maximum ("d" is the depth of member, measured in the direction in which buckling might take place).

Center Sill Bottom Angle. 2, Fig. 348. The Angle at the bottom of a center sill of the built-up type.

Center Sill Bottom Cover Plate. See CENTER SILL COVER PLATE.

Center Sill Cover Plate. 3, Fig. 80; 13, Fig. 147; 4, Fig. 348. A flat plate riveted across steel center sills, either above or below, to give additional strength.

Center Sills, Spacing Between (M. C. B. Standard). In 1905, the spacing between steel center sills of 12⅞ inches was adopted as Recommended Practice. Advanced to standard in 1907.

Center Sill, Splicing of. See SILL, SPLICING OF.

Center Sill Strength. This subject is given thorough consideration in the report of the committee on car construction in the 1913 M. C. B. Proceedings, page 613, and 1914 Proceedings, page 389.

Center Sill Stiffener. Fig. 970. A filling piece riveted between the center sills to act as a brace for holding them rigid.

Center Sill Top Angle. 3, Fig. 348. The angle at the top of a center sill of the built-up type.

Center Sill Top Cover Plate. See CENTER SILL COVER PLATE.

Center Sill Web Plate. 1, Fig. 348. The plate which forms the web of a center sill of the built-up type.

Center Stay (of a Chandelier). The central support around which the lamps are grouped. In some cases it is the only method of attaching the chandelier to the ceiling, and in others there are several inclined roof braces or vertical lamp arms in addition.

Center Stop (Tip Car). A bracket or block attached to a draw timber to restrain the body from moving longitudinally.

Centering Devices. See DRAWBAR CENTERING DEVICE.

Centering Gage. A gage to fix the middle point of an axle.

Central Filling Piece (Steel Tired Wheels). The part surrounding the hub and connecting it with the tire. Also termed the skeleton. A wheel center is a hub and central filling piece combined.

Centrifugal Dirt Collector. Figs. 1366, 1367, 1411, 1482, Pages 1306-1311. A device connected in the branch pipe between the brake pipe and distributing valve, or triple valve, and so constructed that due to the combined action of centrifugal force and gravity, all dirt and foreign material is automatically eliminated from the air flowing through the collector chamber and by means of a plug may be removed without breaking any pipe connections whatever. When this device is used, the brake pipe air strainer may be omitted.

Chafing Plate. Fig. 1173. A metal plate to resist wear, used on truck transoms, etc.

Chain. A series of links or rings connected or fitted into one another, usually made of some kind of metal. See BERTH CHAIN, BRAKE CHAIN, HAND BRAKE CHAIN, SAFETY CHAIN, etc.

Chain, Specifications for (M. C. B. Standard).

In 1914, by letter ballot, specifications for chain for passenger and freight equipment cars were adopted as Recommended Practice. Revised 1915. Advanced to Standard in 1917.

I. MANUFACTURE

2. *Process.*—(a) The chain may be made of either iron or steel, and may be welded by either the electric or fire process.

(b) Iron chain shall be manufactured from a grade of wrought iron that will meet the requirements of the M. C. B. specifications for Refined Wrought Iron Bars.

(c) Steel chain shall be manufactured from steel which has been made by the open-hearth process, and which shall be ductile and of satisfactory welding quality.

(d) Chain 5/16 in. in diameter or less may have links twisted, if so specified on the order; all other sizes shall have straight links.

II. PHYSICAL PROPERTIES AND TESTS

2. *Tensile Test.*—Samples from finished chain shall conform to the minimum requirements as to tensile properties given in Table No. 1, the elongation being determined in a length of from 12 to 18 in. to the nearest link.

3. *Proof Test.*—(a) All chain shall be proof-tested by subjecting it to the loads given in Table No. 1, and when so tested it shall stand these loads without showing any defects.

(b) The manufacturer shall furnish a certificate of proof-test to the purchaser or his representative.

4. *Test Specimen.*—Tension test specimens shall consist of not less than 2-ft. lengths cut from the finished chain.

5. *Number of Tests.*—One tension test shall be made to represent each 200 ft. or fraction thereof ordered.

TABLE No. 1.

Diameter of bar Inches.	Proof-test loads. Pounds.		Breaking loads. Pounds.		Elongation. Per Cent.		Maximum length 100 links.	Normal weight, 100 feet.
	Steel.	Iron.	Steel.	Iron.	Steel.	Iron.	Ins.	Pounds.
1/4	1,650	1,500	3,300	3,000	12	10	102	75
5/16	2,650	2,400	5,300	4,800	12	10	114.7	110
3/8	3,700	3,400	7,500	6,800	12	10	125	165
7/16	5,100	4,700	10,200	9,400	12	10	137.5	205
1/2	6,700	6,100	13,400	12,200	12	10	150	265
9/16	8,500	7,800	17,000	15,600	12	10	168	325
5/8	10,500	9,600	21,000	19,200	12	10	176	425
11/16	12,500	11,600	25,000	23,200	12	10	195	520
3/4	15,100	13,800	30,200	27,600	12	10	213	610
13/16	17,600	15,800	35,200	31,690	12	10	225	725
7/8	20,600	18,800	41,200	37,600	12	10	238	810
15/16	23,500	21,200	47,000	42,400	12	10	250	925
1	26,900	24,500	53,800	49,000	12	10	263	1,025
1 1/16	30,400	27,600	60,800	55,300	12	10	295	1,225
1 1/8	34,100	31,000	68,200	62,000	12	10	325	1,350
1 1/4	42,100	38,300	84,200	76,600	12	10	353.5	1,650
1 3/8	....	....	....	112,000	....	15	355	1,100
1 1/2	....	....	....	134,400	....	15	390	2,450
1 5/8	....	....	....	138,200	....	15	425	2,875
1 3/4	....	....	....	165,000	....	15	475	3,200
1 7/8	....	....	....	190,000	....	15	525	3,640
2	....	....	....	216,000	....	15	575	4,200

III. PERMISSIBLE VARIATIONS

6. *Length.*—The length of 100 links, inside to inside of end links, shall not exceed the values given in Table No. 1 by more than two, and shall be measured after proof-test has been made. In making this measurement a load not to exceed ten per cent of the proof load shall be applied so that the slack may be taken up.

7. *Weight.*—The weight of the chain shall not vary more than three per cent above and five per cent below the weight given in Table No. 1. Excess over the allowance permitted will not be paid for.

IV. WORKMANSHIP AND FINISH.

8. *Workmanship.*—(a) The chain shall be free from injurious defects and shall have a workmanlike finish. The diameter of the welds shall not be perceptibly less than the diameter of the bar, and unless otherwise specified shall not exceed the diameter of the bar by more than twenty-five per cent.

(b) Prior to inspection, the chain shall be free from paint or any other coating which would tend to conceal defects.

V. INSPECTION AND REJECTION.

9. *Inspection.*—(a) The inspector representing the purchaser shall have free entry, at all times while work on the contract of the purchaser is being performed, to all parts of the manufacturer's works which concern the manufacture of the material ordered. The manufacturer shall afford the inspector, free of cost, all reasonable facilities to satisfy him that the material is being furnished in accordance with these specifications.

(b) The purchaser may make the tests to govern the acceptance or rejection of the material in his own laboratory or elsewhere. Such tests, however, shall be made at the expense of the purchaser.

(c) All tests and inspection shall be so conducted as not to interfere unnecessarily with the operation of the works.

10. *Rejection.*—Material which, subsequently to the above tests at the mills or elsewhere, and its acceptance, develops weakness or imperfections, or is found to have injurious defects, will be rejected and shall be replaced by the manufacturer at his own expense.

11. *Rehearing.*—Samples tested in accordance with this specification, which represent rejected material, shall be preserved for 14 days from date of test report. In case of dissatisfaction with results of tests, the manufacturer may make claim for a rehearing within that time.

(M. C. B. Recommended Practice.)

In 1915 the following rule was adopted for use in all calculations for strength of parts:

The allowable stress per sq. in. for iron or steel, subject to shear in a plane perpendicular to the direction of rolling, shall not exceed 80 per cent of the allowable stress per sq. in. for tension, in the direction of rolling.

(M. C. B. Recommended Practice.)

Chain Holder (for Basin Plug). Fig. 1725. A stanchion provided with a screw thread and nut for passing through the marble slab. Also called a chain post, or chain stay.

Chain Post or **Stay.** See CHAIN HOLDER.

Chair. The usual designation for the seats of parlor cars. Ordinary chairs are used in dining cars. See RECLINING CHAIR, REVOLVING CHAIR.

Chair Arm Plate. A metal plate for the top of a chair arm. If for passenger car seats, it is called an arm cap.

Chair Car. Figs. 314-316, 356. A day coach or passenger car equipped with reclining chairs, providing more comforts than a day coach for passengers traveling at night who do not desire to use a sleeping car. See PASSENGER CAR.

Chandelier. Figs. 2240, etc.; Page 1162. A lamp or lamps having an elaborate form of suspension from a roof or ceiling.

Channel. A rolled steel commercial bar shaped like a trough or channel. It is commonly used in steel car construction.

Channel Section Bolster. A bolster whose cross section has the shape like that of a trough or channel.

Chapel Car. Figs. 333, 334. A car whose interior is arranged as a chapel.

Chaplet. A piece of metal used in a mold for casting, to hold a core in its place.

Charging Plug. An electric fitting or connection device to which wires leading to a yard charging plant or electric-light circuit are attached. The plug is made to fit the receptacle in such a manner that the positive wire from the charging plant will invariably be connected to the positive battery wire. By inserting the plug in the receptacle the battery on the car may be connected with and charged from the stationary charging plant. These devices are used principally in straight storage work where no generating plant is carried on the car.

Charging Receptacle. An electric fitting or connection device attached to the under side of the car body from which wires lead to the storage battery. There is generally one on each side of a car.

Check Chain or Safety Chain. A chain attached to a truck and the body of a car to prevent the former from swinging crosswise on the track in case of derailment. Such chains are usually attached either to two or to each of the four corners of a truck and to the sills of the cars.

At the eighth Annual M. C. B. Convention, Cincinnati, 1874, it was

"Resolved, That truck and car body check chains are, when properly applied, a valuable acquisition on passenger equipment, and your committee recommend their general use." In 1893 the use of truck and car body check chains, properly applied, was adopted as a Recommended Practice. See Proceedings 1874, pages 827 and 72; Proceedings 1893. In 1896 it was agreed that this recommendation referred to passeger equipment cars only. A difficulty with check chains has been that the eyes by which they are attached to the body and truck were not strong enough to resist the strain, and that the chains themselves have been too long to come to a bearing soon enough to have the trucks controllable. See Safety Chain.

Check Chain Chafing Plate. A plate attached to a truck timber to resist the wear of a Check Chain.

Check Valve (Triple Valve). 15, Fig. 1382A; Fig. 1453. The valve under the emergency valve which prevents the escape of brake cylinder pressure back into the train line when a hose bursts or the train parts. In an emergency application the emergency valve opens and allows the brake pipe pressure to enter the brake cylinder through the check valve which is raised off its seat.

Check Valve Case (Triple Valve). See CHECK VALVE.

Check Valve Case Gasket (Triple Valve). 14, Fig. 1382-A.

Check Valve Spring (Triple Valve). 12, Fig. 1382-A.

Cheek Casting. See DRAFT CASTING.

Chill. A kind of crystallization produced when melted cast iron is cooled suddenly. It is usually accomplished by bringing the molten iron in contact with a cold metal (usually iron) mold. The hardened part of a cast iron car wheel is called the chill. The mold in which a chill is produced is sometimes called a chill, but the name chill mold has been given to this. See WHEELS, SPECIFICATIONS FOR.

Chill Crack. An irregular crack developed in casting upon the chilled surface of the tread of car wheels. See WHEELS, SPECIFICATIONS FOR.

Chimney (Gas Lamps). See MICA CHIMNEY.

Chipping (of Chilled Car Wheels). A scaling off of small portions of the chilled metal, due to imperfect or irregular crystallization. See WHEELS, SPECIFICATIONS FOR.

Chock or Chock Piece. In shipbuilding a wedge or triangular-shaped block or timber used to unite the head and heel of consecutive timbers. Also intended as a filling piece to give form or shape. Hence in a snow plow a timber which joins successive timbers, and fills to give shape.

Chock Block. A triangular piece used on the bunk of a logging truck to hold the logs in place.

Chord (of a Truss). The long horizontal members at the top and bottom of a truss. The side sills and plates of a car body are top and bottom chords of the side trusses, but the terms are not used in car building. In Great Britain the chords are sometimes termed booms.

Cinder Deflector. See DUST DEFLECTOR.

Circuit Breaker. Figs. 2596, 2600, 2633, etc. A device for automatically opening the circuit from the trolley or third rail shoe to the controller when the current exceeds a predetermined amount.

Circulating Drum (Baker Heater). Fig. 2058. A cast iron vessel with hemispherical ends, on top or inside of the car, filled with water, and connected by two pipes with the coil in the stove and with the pipes which extend through the car. As the water in the coil becomes heated it ascends to the drum, and from there it descends through the other pipe to the radiating pipes in the car. After passing through them it is brought back by return pipes to the coil, when it is again heated. Thus a continuous circulation is kept up. It is also called the expansion drum.

Circuit Breaker Cylinder. Fig. 1463. A cylinder, included in the Safety Control Equipment, which, when air is admitted to it through the action of the controller pilot valve, operates to open the circuit breaker and thereby break the power circuit.

Circulating Pipes (Car Heaters). A general name for the pipes which carry the steam or heated water through the car and return it again to the heater. The term radiating pipes is also used.

Circumference Measure (M. C. B. Standards). See WHEEL CIRCUMFERENCE MEASURE.

Clam Shell Bucket. Figs. 450, 451; Pages 1135, 1223, 1233. A form of digging or shovelling apparatus, operated by power, and taking its name from its similarity to a clam shell.

Clamp. A device for holding or binding two or more parts together. See PIPE CLAMP, HOSE CLAMP.

(Carpentry.) A frame with two tightening screws, by which two portions of an article are tightly compressed together, either while being formed or while their glue joint is drying.

Clamp Lock (Steam Couplers). A COUPLER LATCH.

Clasp Brake. Figs. 1351-1364; Page 1129. An application of brakes in which two brake shoes are used on each wheel, and opposite to each other, instead of one brake shoe per wheel as is the ordinary practice. The brake pressure per square inch of bearing service is thus greatly reduced. Used on heavy high speed passenger train cars.

Clasp Brake (M. C. B. Recommended Practice).

In 1915 the application of truck clasp brakes to all four-wheel truck passenger cars weighing 96,000 lb. or over, and to all six-wheel truck passenger cars weighing 136,000 lb. or over, was adopted.

Classification of Cars. See CAR.

Claw Jack. A jack having a step or projection at the bottom of the movable column, used when a bearing close to the ground is required. A foot lift jack.

Cleaning Air Brakes. See AIR BRAKE, CLEANING AND TESTING OF.

Cleaning Passenger Cars. See PASSENGER CAR CLEANING.

Clearance or **Clearance Limit.** British equivalent, loading gage. The limiting dimensions of height and width for cars in order that they may safely clear all bridges, tunnels, station platforms and other structures. See also THIRD RAIL CLEARANCES.

Clearance Car. Figs. 2730-2731-A. A car with a light frame built out on all sides to the extreme width and height required for any car that is to pass over the road. The clearance car is used to ascertain what is the maximum cross-section of tunnels, bridges, etc., over a road so that cars can be built within the limits determined by the clearance car.

Clearance Couplers, Side. See AUTOMATIC CAR COUPLERS.

Cleat. A strip of wood or iron fastened across other material.

Clere-Story. See DECK.

Clevis. A stirrup-shaped metallic strap used in connection with a pin to connect a draft chain or tree to a plow or other tool. The term is applied to various kinds of irons resembling a plow clevis in shape, and also to bolts with forked ends.

Clinch Nail. A wrought iron forged nail, so named because it can be bent or clinched without breaking. Cut nails, the common and cheapest kind, although of wrought iron, will not clinch.

Clip. A U-shaped strap for attaching any body, more particularly a pipe, to the side of a partition. More broadly a device permanently attached to one part, whose function it is to hold another part in place which can readily be slipped into position. See RELEASE SPRING CLIP, PIPE CLIP.

Close Return Bend. A short cast iron tube made of a U shape, for uniting the ends of two pipes. It differs from an open return bend in having the two branches in contact with each other.

Closet. A small room, usually for storage.

A retiring room for sanitary purposes, more commonly called a SALOON. See also DRY CLOSET and WATER CLOSET.

Closet Hopper. See HOPPER.

Club Car. See LOUNGING CAR.

Coach. A term commonly used to designate passenger cars which are used for day travel. See CAR; PASSENGER CAR.

Coach Screw (British). American equivalent, lag screw, but coach screw is also used. A square-headed screw with a pointed end used to screw into wood.

Coal Car. A car for carrying coal; usually a hopper or gondola car, but box and stock cars are frequently used for this purpose. See also CAR.

Coat Hook. Figs. 1997-2002.

Coat Hanger. Fig. 337.

Cock. A spout; an instrument to draw out or discharge liquid from a cask, vat or pipe. See Bibb Cock, Main Cock, Faucet.

Coil Spring. See Helical Spring.

Coke Car. Figs. 70, 73, 86. A car of large cubic capacity for carrying coke. Modified forms of hopper cars with doors which discharge the load to one or both sides of the track are commonly used. Frequently a coke rack is applied to the sides of gondola cars. Box and stock cars are often used for carrying coke. See Car, and Coke Rack.

Coke Quenching Car. Fig. 427. A car with an inclined floor, into which coke is discharged from the furnace and quenched with water.

Coke Rack. Fig 80. A slatted frame or box applied above the sides and ends of gondola cars to increase the cubic capacity for the purpose of carrying coke or other freight in which the bulk is large relative to the weight.

Coke Rack Angle. 27 and 32, Fig. 80. A commercial angle used in forming the coke rack on a steel coke car. Commonly termed end and side coke rack angles, and further designated top, center, intermediate or bottom, as the case may be.

Coke Rack Stake Pocket. A metal socket fastened to the sides and ends of a gondola car to receive the stakes of a coke rack.

Cold Shot. Small globules of iron resembling ordinary gun shot, which are found in the chilled portion of cast iron wheels.

Cold-Short. A seam in a casting caused by the congealing of the metal so rapidly as to prevent a proper filling of the mold.

Collar. A ring or round flange upon or against an object.

(Of a Journal.) A rim or enlargement on the end of the car axle which takes the end thrust of the journal bearing.

Colonist Sleeping Car. See Emigrant Sleeping Car, Sleeping Car, and Car, M. C. B., Class PE.

Color Coat (Painting). The coat or coats which follows the rough stuff or scraping filling coat in painting passenger car bodies. See Finishing Varnish and Painting.

Column (Diamond and Other Trucks). Figs. 1174-1177. Another name for a Bolster Guide Bar.

(Of Crane.) Another name for the mast, particularly when entirely supported from below.

Column Bolt. A bolt passing through the arch bars and holding the truck column or bolster guide bar in place and the truck frame together.

Column Bolt (M. C. B. Standard). See Arch Bars, Column and Journal Box Bolts. (M. C. B. Standard.)

Combination Baggage Car. A baggage car having compartments for express or mail, or both, as well as for baggage. See Combination Car.

Combination Car or Combined Car. A passenger train car divided into two or more compartments for the accommodation of different classes of traffic. See Car.

Combination Cock (Baker Heater). A cock with funnel attached, used at the top of the water tank for filling. When opened with the key it allows the inward passage of the water, and at the same time the outward passage of air through a separate channel, hence the name.

Combination Lamp. Figs. 2277, etc. A lamp arranged for two lighting systems, as gas and electricity.

Combination Support and Safety Device. Figs. 1361-1363. Consists of a combination of rigid safety guard and a flexible brake beam support.

Combination Valve (Steam Heating). Figs. 2164, etc.

Combined Platform and Double Body Bolster. A passenger equipment car platform frame and double body bolster made in one piece. See Double Body Bolster and Body Bolster.

Combined Stop and Lock. See Door Stop

Combined Triple Valve, Reservoir and Brake Cylinder (Freight Air Brake). To lessen the complication and reduce the cost of freight brake gear these three parts, which are separate in passenger brake gear, are combined.

Commutator See Armature, Bolted Commutator.

Commutation Pole Motor. Fig. 2585, etc. A railway motor in which four auxiliary coils and pole pieces, called commutating poles, are mounted between the four main field poles. The windings of these poles are connected in series with each other and with the armature. The commutation is improved and the poles perform their functions equally well regardless of the direction in which the motor is run.

Compartment. A subdivision of a passenger car. In British carriages it usually runs entirely across the car. In American parlor and sleeping cars, when used, it runs only partially across, leaving room for a passage or corridor at the side. Often called Stateroom.

Compartment Sleeping Car. A sleeping car which is divided into staterooms all opening into a common corridor which runs the whole length of the car. See Sleeping Car.

Compensating Valve. Fig. 1475. A valve designed for use on high speed trains to regulate the brake cylinder pressure so that the maximum retarding power may be obtained without injury to the wheels.

In service application, with both plain and quick action triple valves, it acts as a safety valve, to relieve the cylinder of surplus pressure. In emergency applications part of the vented brake pipe air passes from the side cap of the triple into the spring box of the compensating valve and, exerting a pressure on the diaphragm in addition to the spring, prevents the valve from opening. After a few seconds the pressure of air in the spring box has become so reduced by back leakage through the small hole in the check valve that the brake cylinder pressure is able to force the piston down, permitting brake cylinder air to escape until the pressure becomes reduced to that at which the valve is adjusted, when the spring moves the piston back and closes the exhaust. With this valve the maximum brake cylinder pressure in emergencies is gradually reduced to that at which the valve is adjusted.

Composite Car. Another name for Combination Car. A freight car with a combination steel and wood frame.

Composite Farming. A type of framing which combines iron and wood, in the sills, posts, plates, etc. The sills and plates of the body and deck consist of two pieces of wood with an iron or steel flitch plate between, the three pieces being bolted together as one.

Compound Carline. A carline having the main or central portion of wrought iron, with a piece of wood on

each side. Commonly used for wooden cars with clere-stories, and sometimes called profile carline, owing to their following the shape of the clere-story.

Compressed Air Jack. See PNEUMATIC JACK.

Compression Beam. A horizontal timber in the side framing of a wooden passenger-equipment car body, which acts as the compression member of a truss. The compression beam brace abuts it. The compression beam is sometimes made double, one piece above the other, with separate braces (main compression brace and center compression brace) acting upon each. See END COMPRESSION BEAM.

Compression Beam Brace. A timber used in connec tion with a compression beam to form a truss in the side framing of a wooden passenger-equipment car. It is sometimes stiffened by a center counter brace, and sometimes two or more braces are used. It is then termed main compression brace.

Compression Faucet. A spring faucet with a flat disc on top. The valve is opened by pressing this disc and closed by a spring when the pressure is removed.

Compression Member. Any bar, beam, brace, etc., which is subjected to strains of compression, and forms part of a frame truss, beam, girder, etc. Struts, body braces, etc., are compression members. Similarly a tension member is used for tensile strains.

Concealing Water Closet. A form of closet covered with a small seat and sometimes placed in the corner of compartments or staterooms in private and sleeping cars.

Condensation Meter (Car Heating). A device for measuring the steam consumption of car heating systems.

Conductor (Refrigerator Car). The drip pipe from the ice pan.

Conductor's Car. A CABOOSE CAR.

Conductor's Lantern. One with an extra-sized bail attached to it by which it can be held on the arm, leaving the hands free.

Conductor's Switch. Fig. 1424. A device used in connection with electro-pneumatic air signal equipments for traction roads, which, when the signal cord is pulled, energizes the signal magnet, opening the magnet valve and admitting air to the signal whistle.

Conductor's Valve. Figs. 1366, 1408, 1481. A valve for applying the train brakes and placed at some convenient point in each passenger car, usually in the saloon.

Conductor's Valve Discharge Pipe. A pipe leading from the conductor's valve down through the floor of the car to carry off the escaping air.

Conductor's Valve Pipe. Connects the brake pipe with the conductor's valve.

Condulet. Fig. 2575. Pages 1155-1159.
Pipe fittings of various designs and forms arranged to connect with conduit and for holding various electrical fittings.

Conduit, Electric Wiring. Figs. 2575-2580. Pages 1155-1159.
A light weight iron pipe treated with a rust preventative consisting of a compound, galvanizing or sherardizing. Used to protect insulated electric wires from injury.

Connecting Chain (Steam Shovel). A pitch chain, connecting the pitch gear on the two axles of a truck, used for making the car self-propelling.

Connecting Rod. A rod which connects two or more parts or objects.
(Hand Car.) The iron rod which connects the bell crank and the crank shaft. See BRAKE ROD.

Connection Angle. A piece of commercial angle or a bent plate riveted to two members of a steel frame to hold them rigidly together.

Connections. See STEAM HEAT AND AIR CONNECTIONS, AND AUTOMATIC CONNECTORS.

Connection Clip. See CONNECTION ANGLE.

Construction Car. A car used in building a new line of railroad or making repairs to roadbed and structures. The cars used as eating and sleeping cars for the men employed on construction work are frequently placed under this heading, as well as ballast cars, etc. See BALLAST CAR and CONTRACTOR'S CAR..

Contactor. Figs. 2618, 2626. A magnetic switch used to make or break a circuit in a motor control system. See AUXILIARY CONTACTOR and CONTROL SYSTEM.

Continuous Basket Rack. See BASKET RACK.

Continuous Brake. A system of brakes so arranged that by connecting the brake apparatus on the different cars forming a train it can be operated on all of them from the engine or from any of the cars. See AIR BRAKE, VACUUM BRAKE.

Continuous Carline. A carline, which passes directly from side to side of the car, across and under the clere-story or upper deck, in distinction from a profile carline, which is bent to follow the outline of the clere-story.

Continuous Draft Gear. A draft gear, having a continuous rod or rods extending throughout the length of the car from the drawbar at one end to the drawbar at the other end, whose office is to transmit the tractive stresses and relieve the draft timbers. See AMERICAN CONTINUOUS DRAFT AND BUFFING APPARATUS.

Continuous Truck Frame. An iron bar which is welded together in a rectangular shape so as to form the sides and ends of a truck frame.

Contour Line. See AUTOMATIC CAR COUPLER.

Contractor's Car. A car used by contractors in construction work; usually a dump car. See DUMP CAR.

Control System. See MULTIPLE UNIT CONTROL, UNIT SWITCH SYSTEM.

Control Valve (Air Brake). Fig. 1393. A device which performs all the functions of the triple valve and, in addition, provides a maintained brake cylinder pressure; automatic emergency should the brake pipe presure be depleted below a predetermined point; full emergency braking power at any time during or following a service application, and maximum braking power more quickly than by the use of the triple valve.

Controller (Electric Motor Car). Figs. 2581, 2591, etc. A device for regulating the speed and direction of rotation of the electric motors.

Controller Pilot Valve. Fig. 1462. A valve, included in the Safety Control Equipment, which, when the motorman removes his hand from the controller handle for any reason, as by accident or through carelessness, operates through the coincident action of other devices to break the power circuit and cause an emergency application of the brakes.

Convertible Car. Figs 112-115, 123. Page 1253. A car so built that it may be converted without reconstruction, from one type to another, as stock to box or

center dump gondola to side dump gondola. See also CAR, M. C. B., Class SD.

This term is also applied to a type of street cars which may be used either as open or closed cars.

Conveyor Car. Figs. 131, 134. A freight car equipped with motors for moving freight under special conditions, as on a coal wharf.

Cooking Utensils. Figs. 1709, etc. For use on dining, café-parlor, buffet cars, etc.

Cope. The upper portion of a mold or flash used in making metal castings.

Coping (British). A bar of iron secured to the top of the sides and ends of a gondola car (open wagon), and protecting them from local distortion.

Corner Angle Post. A corner post in the body framing of a car which consists of an angle bar, sometimes in combination with a wooden post.

Corner Brace. A diagonal member in the underframe between the end sill and transverse floor member or bolster. See END SILL DIAGONAL BRACE.

Corner Brace or Corner Plate (Freight Car Bodies). 30, 58, Figs. 34, 35; Fig. 967. A wrought or cast iron angle plate or knee on the outside corner, to strengthen and protect the frame. There are usually three corner plates, upper, lower and middle. Very commonly a push pole pocket is combined with lower corner plate. Also used on the inside corners.

(Passenger Equipment Car End Framing.) An angle iron applied to the corner of the deck end plate to keep it from abrasion and strengthen it.

Corner Casting. Usually a CORNER PLATE or PUSH POLE POCKET.

Corner Handle. More commonly a HAND HOLD or GRAB IRON.

Corner Plate. See CORNER BRACE.

Corner Post. 22, Figs. 34, 35; 29, Fig. 80; 36, Fig. 260; 23, Fig. 348. The vertical member which forms the corner of the frame of a car body.

Corner Post Grab Iron. See GRAB IRONS.

Corner Post Knee Iron (Passenger Equipment Car End Framing). A metal angle brace used to connect the foot of the corner post to the side sill.

(Vestibule.) An iron angle brace for the outside corner post of a vestibule resting upon the platform end sill.

Corner Post Pocket. The pocket for the corner post. See POST POCKET.

Corner Seat. A seat for the corner of a car, the back of which is not reversible.

Corner Seat End. A seat end bracket secured to the wall of a passenger car for supporting the outer end of a CORNER SEAT.

Cornice. The moldings where the ceiling or headlining joins the sides and ends of the car inside.

Cornice Sub-Fascia or Panel. A board or panel directly below a cornice.

Corridor (Sleeping and Compartment Cars). A passage running at one side of a car affording access to the compartments. All sleeping, dining and private cars have corridors to pass the staterooms, smoking compartments, etc.

Corrugated Metal Car Roof (Freight Cars). A roof consisting of iron, steel or zinc plates usually covered with boards, and resting on roof strips on top of the rafters and carlines.

Corticine. A form of floor covering much like LINOLEUM.

Cotter Pin. Page 1151. A split pin placed in a hole through the end of a bolt, axle, or shaft, and the ends of the pin forced apart to prevent it being withdrawn or lost. Its purpose is to prevent the loss of nut, washer, or plate. See Split Key.

Counterbore. An enlargement, for a certain portion of its length, of a hole bored in any substance.

Counterbrace. In passenger equipment car framing, the timber framed into the top of the side sill near the needle beam and supporting the compression beam brace into which it is also framed.

Counterbrace Rod. An inclined rod which acts as a counterbrace.

Counterbrace Rod Plate Washers. Washers that rest upon the plate and receive the end of the counterbrace rod.

Coupler. 13, Fig. 80; 6, Fig. 173; Figs. 650-696, 2800-2802; Pages 1126-1127, 1137, 1139, 1182, 1190, 1210-1213, 1218, 1219. The term applied to the modern drawbar. The coupler proper is the head of the drawbar, which is so constructed as to automatically connect with or couple to the drawbar head on another car. The drawbar and its head, together with its knuckle and locking devices, is commonly termed coupler. See AUTOMATIC CAR COUPLER.

The term coupler or coupling is also commonly applied to the connector which is used on air brake and steam heat hose. See also AUTOMATIC CONNECTOR.

Coupler, Common Standard. The first report, looking toward the final adoption of a single standard coupler was that of a committee on composite design of coupler in the 1906 Proceedings, page 89.

See also COUPLER AUTOMATIC CAR and COUPLER TESTS.

Couplers, Adjusting Height of (M. C. B. Standard). In 1896 it was decided that in adjusting the height of couplers to meet the requirements of the United States law fixing the height from the top of rail to center of coupler for standard gage cars in interstate traffic, cars should be adjusted when empty, as far as possible. In order to justify a bill for work done under the Rules of Interchange, an empty car should be adjusted to 34½ inches, or within ¼ inch thereof, and when it is necessary to alter a loaded car it should be adjusted to 33½ inches, or within ¼ inch thereof, or as near as possible to such height as will bring it to 34½ inches when the car is unloaded.

In 1901 this was changed from Recommended Practice to Standard, as a result of letter ballot.

This standard conforms to the order of the Interstate Commerce Commission dated October 10, 1910.

Coupler, Area of Lock-Bearing Surface on Tail of Knuckle. Recommended Practice. In 1910 a Recommended Practice was adopted that the minimum effective area of lock-bearing surface on knuckle tail shall not be less than 4 square inches.

In 1916 the "D" coupler, as shown on M. C. B. Sheet 23-B, was adopted as Standard.

Coupler, Automatic. For M. C. B. Rules for interchange of Traffic with regard to couplers see INTERCHANGE OF TRAFFIC.

Coupler, Automatic Car, Uncoupling Arrangements for. See UNCOUPLING ARRANGEMENTS.

Coupler, Automatic. (M. C. B. Standard.) Sheet M. C. B. 23. Fig. 2985. Form adopted as Standard in 1887, see pages 199-208, 243 and 253. Further details adopted in 1889 and 1893. Action of the Association in 1889 permits the use of a coupler 28 inches long instead of 30 inches as shown, for use only on cars already in service and requiring such length coupler.

In 1909 a note was added that "The dimensions from the back of butt to inside face of knuckle be 30½ inches."

Coupler, Automatic, Contour Line and Limit Gages for. (M. C. B. Standard.) Sheets M. C. B. 23 and 24, Figs. 2989-2990 Standard contour line was announced by Executive Committee under instructions from the Association, April 8, 1888 Limit gages for preserving standard contour line adopted in 1891.

These gages, properly proven by master gages, may be procured from Pratt & Whitney Company, of Hartford, Conn. A duplicate set of master gages is held in the office of the Secretary for reference when desired.

In 1899 the contour lines showing the length of the guard arm were extended about 1 inch.

In 1899 the M. C. B. standard limit gage for new couplers was changed by moving the screw to a new position.

In 1902 the contour gage was strengthened by the use of a solid web in the weak part of the frame, and part of the outside flange increased to ¼ inch in thickness. The handhold was also reduced in size to give greater strength.

In 1903 the contour line of the M. C. B. coupler was changed.

In 1904 the coupler and knuckle limit gages were changed to conform to the contour lines adopted in 1903 and to have raised figures "1904" cast on them. See Letter Ballot, Proceedings, 1904.

In 1918 the No. 10 contour line was adopted and shown on Sheet 24.

In 1918 the coupler limit gage was changed to conform to the No. 10 contour and knuckle limit gage eliminated.

In 1918 complete gages to insure interchangeability of "D" coupler parts were adopted as Standard. Detail drawings of these gages placed on file with the Association.

Coupler Butt. (M. C. B. Standard.) In 1905 a butt 5 by 5½ by 9⅛ inches for friction draft gear was adopted as Recommended Practice. Advanced to Standard in 1907.

In 1907 the back wall of butt was changed to ¾ inch thick, owing to the fact that the tail pin had fallen into disuse.

The width of butt was changed to 5 inches on both sizes of coupler shanks to properly provide for securing yokes.

A dimension of not less than 1¼ inches was shown for the yoke gib shoulder of the 9⅛-inch butt to provide for the increased length of gib.

In 1909 a radius of 3/16 inch on the yoke gib shoulder of coupler butt was adopted.

In 1918 a 6 by 8 in. shank with butt 5¼ in. wide by 6 in. high was adopted for Standard "D" coupler.

Coupler Head. (M. C. B. Standard.) In 1899 the recommendation of the Coupler Committee that the horizontal plane containing the axis of the shank of the coupler bisect the vertical dimensions of the knuckle and end of guard arm was adopted as a standard of the Association.

In 1908 the following note was added to Sheet M. C. B. 11:

That all new types of couplers put on the market after January 1, 1909, have a dimension of 9¼ inches from back of coupler horn to inside face of knuckle, and that the face or front wall of coupler have a minimum thickness of 1¼ inches.

In 1916 the "D" coupler, as shown on M. C. B. Sheet 23 was adopted as Standard.

Coupler Head, Temporary Standard. Standard. In 1911, by special letter ballot, the length of coupler head from back of striking horn to coupling face of closed knuckle was fixed at 12¼ inches for the M. C. B. Temporary Standard Coupler for existing cars.

In 1916 the "D" coupler, as shown on M. C. B. Sheet 23 was adopted as Standard.

Coupler, Height of. See Height of Coupler.

Couplers, Knuckles, Locks and Other Parts, Specifications for Purchase and Acceptance of M. C. B. Standard "D," (Standard.) Sheet M. C. B. 23. Adopted as Standard in 1918.

1. *Scope.*—These specifications cover all cast steel for complete couplers and for repair parts.

I. MANUFACTURE

2. *Process.*—The steel shall be made by the open-hearth or electric-furnace process and in accordance with the best foundry methods.

3. *Heat Treatment.*—(a) Unless otherwise specified, all castings shall be allowed to become cold before the process of heat treatment (annealing). They shall then be uniformly heated to the proper temperature to refine the grain and cooled uniformly in the atmosphere.

(b) If the results of physical tests of any melt do not conform to the requirements specified, a manufacturer may re-treat such melt, but not more than two additional times. Tests after re-annealing shall be made as specified in Sections 7 and 8.

4. *Annealing Test Lugs and Physical Test Coupons.*—(a) For the purpose of determining the quality of annealing, annealings lugs shall be cast with and attached to each casting when presented for inspection. The location of the annealing lugs shall be as shown by Figures 1 and 2.

(b) A sufficient number of test coupons to provide a test for each melt shall be cast with and attached to the coupler bodies or knuckles when presented for inspection. The size of coupon shall be sufficient to insure a machined test piece as required in paragraph 11-c, and shall be cast on the coupler bodies or knuckles at a location optional with the manufacturer. The manufacturer shall keep a record of the coupler bodies and knuckles by serial or heat numbers which have been poured from a melt for the purpose of identifying each casting in that melt.

II. CHEMICAL PROPERTIES AND TESTS

5. *Chemical Composition.*—The steel shall conform to the following requirements as to chemical composition:

Carbon	0.20 to 0.35 per cent.
Manganese	not over 0.75 per cent.
Phosphorus	not over 0.05 per cent.
Sulphur	not over 0.05 per cent.

6. *Ladle Analysis.*—To determine whether the material conforms to the requirements specified in Section 5, an analysis shall be made by the manufacturer from a test ingot taken during the pouring of each melt. Drillings for analysis shall be taken not less than ¼ inch beneath the surface of the test ingot. A copy of this analysis shall be given to the purchaser.

7. *Check Analysis.*—Check analysis may be made by the purchaser from drillings taken from the test coupons described in Section 4, paragraph (b), which have satisfactorily passed the physical requirements. These drillings shall be taken not less than ¼ inch beneath the surface. The phosphorus and sulphur content thus determined shall not exceed that specified in Section 5 by more than 20 per cent.

III. PHYSICAL PROPERTIES AND TESTS

8. *Tension Tests.*—(a) The steel shall conform to the following minimum requirements as to tensile properties:

Tens. Str. lb. per sq. in.	60,000
Elastic Limit, lb. per sq. in.	0.45 Tens. Str.
Elongation in 2 in.—per cent	$\frac{1,400,000}{\text{Tens. Str.}}$ not under 20%
Reduction of area, per cent	30

(b) The elastic limit shall be determined by an extensometer.

9. *Annealing.*—To determine the quality of annealing, the inspector will have not less than two of the annealing test lugs, preferably those farthest away from each other, nicked and broken off from each bar and knuckle for the examination of the fracture. If, in his opinion, the annealing has not been properly done, he will require the castings to be re-annealed as prescribed in Section 3. If, after annealing or re-annealing, any casting is so much out of gage as to require heating in order to bring it within the gage limits, it shall be re-annealed before it shall be accepted. In event of failure of the inspector and manufacturer to agree upon the quality of annealing as determined by the fracture, the matter shall be arbitrated by polishing and etching a portion of the annealing lug to develop the structure and examining this under the microscope. If the structure is in accordance with Figure 3 the material will be considered to be properly annealed, but if the structure is similar to that of Figure 4 or 5 the manufacturer shall re-anneal the castings to produce a structure like Figure 3.

10. *Waiving Tests.*—Tests will be waived on orders for less than ten (10) complete couplers or less than one hundred (100) parts other than bars, in which event all castings shall preferably be from the same melt, and the manufacturer shall furnish the purchaser a copy of his record showing satisfactory chemical analysis and physical properties obtained from the melt of steel in question, and the annealing lug showing his proof of the appearance of the fracture of the annealing lugs.

11. *Test Specimen.*—(a) Test specimens shall be obtained as prescribed in Section 4.

(b) When sufficient coupons have not been cast, a test specimen may be cut from a finished casting at a location mutually agreed upon by the inspector and the manufacturer, and this casting replaced in the lot.

(c) Tension test specimens shall be machined to ½ inch in diameter with a 2-inch gage length, with either blank or threaded ends to suit holder.

12. *Number of Tests.*—At least one chemical and physical test shall be made from each melt of steel represented.

13. *Tests of Knuckle Pivot Pins.*—For each two lots of 100 couplers or less, otherwise accepted, one pivot pin shall be removed from a complete coupler and subjected to the requirements of the M. C. B. Specifications for heat treated knuckle pivot pins. If this pin fails to pass the specifications, all pins in this lot of couplers will be rejected. Pins thus removed from the assembled couplers shall be replaced by the manufacturer by an additional pin after the test in order to complete the coupler.

14. *Grouping.*—The manufacturer shall have the material grouped in lots of 100 complete couplers or 100 detail parts, and this will be an inspection lot. Where possible, care should be taken to put all couplers of the same melt number in the same lot. The manufacturer should endeavor to cast as many parts from one melt on a given order as is possible.

IV. VARIATION IN WEIGHT AND GAGE

15. *Weight.*—(a) One detail part of the lots as established by Section 14 shall be weighed and come within the limits as shown in Figure 6. Failure of any part to come within the minimum weight shall reject that detail and each such detail in the entire lot so represented shall then be weighed and every piece less than the minimum weight shall be rejected.

(b) When couplers are purchased complete and assembled, each assembled coupler shall be individually weighed and shall come within the limits as shown on Figure 6. Detail parts shall come within the limits as shown on Figure 6, one coupler being dismantled in each 100 and weighed.

(c) When castings are more than the allowable maximum weight as shown in Figure 6, and all other requirements are satisfactory, castings may be accepted at the maximum allowable weight, excess weight being at the expense of the manufacturer.

16. *Gage.*—(a) Castings shall conform to the prescribed limits and gages. Five per cent of each lot of 100 or less, but in all cases at least one of the complete couplers or separate parts in each, shall be completely gaged. Assembled couplers shall be dismantled before gaging.

(b) Failure of any part in the lot to come within the gages or limits shall be sufficient cause to reject the lot so represented. Failure of a lot to meet the gages will not be sufficient cause to reject a re-offering of the same lot on the same order after the manufacturer has adjusted these parts to the gages. After this adjustment by the manufacturer, the inspector will then gage ten couplers or pieces selected at random in the lot, and failure of any to meet the gages will reject the entire lot, which shall not again be offered.

(c) The inspector shall inspect and gage each coupler in a lot in order to determine if they comply to the contour gage.

V. WORKMANSHIP AND FINISH

17. *Workmanship.*—(a) The castings shall conform to the size and shape as shown on M. C. B. Standard drawings and shall be finished in a workmanlike manner.

(b) When assembled, knuckles and locking pins or blocks must work freely, but the lost motion between knuckles and locks must be such that the knuckle can not be pulled forward by hand beyond the proper con-

tour line, but ⅛ to ¼ inch lost motion in opposite direction is desirable.

(c) In order to determine that the requirements of paragraph (b) have been complied with, not less than ten (10) couplers out of each lot of 100 shall be tried. Failure of any one to properly operate will be sufficient cause for rejection of the lot, but this does not prohibit the manufacturer re-offering the lot on the same order for inspection after adjustment, providing it is shown that all other requirements of the specifications have been complied with.

18. *Finish.*—The castings shall be free from blow holes, sand pockets, shrinkage cracks and other injurious defects.

19. *Sand or Shot Blast.*—All castings shall be properly cleaned by sand or shot blast or other approved process. The inspector may require that any or all castings again be subjected to sand or shot blast or cleaning in order to better examine for checks and shrinkage cracks which in his opinion would be detrimental to the strength of the castings.

20. *Welding.*—Welding minor imperfections which do not impair the strength of the castings will be permitted when done under the jurisdiction of the inspector and by a practice approved by him. All castings shall be re-annealed after such welding.

21. *Painting.*—The castings as offered for inspection shall not be painted or covered with any substance that will hide defects, nor rusted to such an extent as to make defects invisible. If the castings are to be painted, it shall be so specified on the order, but this shall only be done after complete inspection and acceptance of the material by the inspector, and then with a quick-drying paint.

22. *Lubrication.*—Couplers when assembled shall be properly lubricated.

23. *Marking.*—(a) All parts shall have the manufacturers' name or identification mark, and when required, serial numbers, and such additional marking as shown on Figures 1, 2 and 7, cast legibly in letters or figures of size, manner and location as specified. Manufacturer to give purchaser list of serials in each melt. When melt numbers are used in place of serial numbers they shall be legibly stamped on each piece in the melt.

(b) The serial number for each manufacturer, when used, shall begin with 1 and continue consecutively throughout the month, when a new series shall be started. In all cases, however, a new serial shall start at the beginning of each month.

(c) After the material has been inspected and is ready to be shipped, the inspector shall stamp each casting with his private mark.

VI. INSPECTION AND REJECTION

24. *Inspection.*—(a) The inspector representing the purchaser shall have free entry, at all times while work on the contract of the purchaser is being performed, to all parts of the manufacturer's works which concern the manufacture, test and inspection of the material ordered. The manufacturer shall afford the inspector, free of cost, all reasonable facilities to satisfy himself that the material is being furnished in accordance with the specifications.

(b) The purchaser may make the chemical tests to govern the acceptance or rejection of the material in his own laboratory or elsewhere. Such chemical tests, however, shall be made at the expense of the purchaser.

(c) The physical tests may be made at the plant of the manufacturer, providing the purchaser is satisfied with the accuracy of the test machine and that the pulling speeds for determining the elastic limit and ultimate strength are in accordance with the recommended practice of the A. S. T. M. for 2-inch test piece.

(d) All tests and inspection shall be so conducted as not to interfere unnecessarily with the operation of the works.

(e) After the inspection and tests have been completed and before castings are loaded, at the option of the purchaser, all remaining annealing lugs shall be removed and surface where located put in a workmanlike condition.

25. *Rejections.*—(a) If any of the test coupons or annealing lugs selected to represent the melt do not conform to the requirements specified in Sections 7, 8 and 9, the lot will be rejected.

(b) The basis of acceptance of physical tests shall be upon test coupons showing clean fracture without blow holes or imperfections and that break within the middle third or gage length. In event the test coupon is imperfect or breaks outside of the middle third of the gage length, additional test coupons shall be furnished, but this shall be the only cause for rehearing for the physical tests, except as specified in paragraph 3 (b).

(c) All castings which show any injurious defects or do not conform to the weights of gages shall be rejected.

(d) From each bar or knuckle rejected by the inspector under these specifications, he shall cause to be chipped the M. C. B. acceptance mark shown on Figures 1 and 2.

LIMITING WEIGHTS—"D" COUPLER.

		Minimum, Pounds.	Maximum, Pounds.
Coupler bar—5-in. by 7-in. shank—9⅛-in. butt....		265	285
Coupler bar—5-in. by 7-in. shank—6½-in. butt....		259	279
Coupler bar—6-in. by 8-in. shank—6-in. butt......		271	291
Solid knuckle—9-in. face........................		97	103
Cored knuckles—9 in. face......................		90	96
Solid knuckle—11-in. face.......................		101	107
Cored knuckle—11-in. face.......................		94	100
Lock		13.5	15.5
Complete coupler—5-in. by 7-in. shank—6½-in. butt..	9-in. solid knuckle..	386	416
	9-in. cored knuckle..	379	409
Complete coupler—5-in. by 7-in. shank—9⅛-in. butt..	9-in. solid knuckle..	392	422
	9-in. cored knuckle..	385	415
Complete coupler—6-in. by 8-in. shank—6-in. butt....	9-in. solid knuckle..	398	428
	9-in. cored knuckle..	391	421
	11-in. solid knuckle..	402	432
	11-in. cored knuckle..	395	425

A topical discussion on this subject will be found in the M. C. B. Proceedings, 1907, page 331.

The coupler committee report for 1908 includes a description of an apparatus for making tests of the lateral stresses caused by the coupler coming in contact with the underframe in rounding curves; 1908 M. C. B. Proceedings, page 149.

The coupler committee report for 1909 includes the results of a series of tests in connection with the study of this question. This will be found on page 114 of the M. C. B. Proceedings for 1909.

A topical discussion on riveting yokes will be found in the 1905 Proceedings, page 65.

Coupler Horn and Buffer Beam, Spacing Between. Standard. In 1905, that the spacing between coupler

horn and buffer beam be 1¾ inches for all spring gear, and 2¾ inches for all friction gear, was adopted as Recommended Practice. Advanced to Standard in 1907.

Coupler Shank. (M. C. B. Standard.) Sheet M. C. B. 23-B. Fig. 2986. In 1901 a design of shank 5 by 7 inches back of the head was adopted as Standard.

In 1905 an additional dimension "Not less than 20¾ inches" was added to plan view of 5 by 7 inch coupler to definitely locate the point at which shank shall measure 7 inches. Also the note. "Tail end for Continuous Draft," under the drawing of slotted-tail coupler, was omitted as being unsuited for present approved practice.

In 1907 a note was added to the effect that there should be no projections on the bottom of the shank from the line of the horn back for 12 inches, to provide for proper movement of shank on carrier iron.

In 1911 the clear surface without projection on bottom of coupler shank was increased ½ inch forward toward head of coupler.

In 1916 the following shanks were adopted as Standard for the "D" coupler: Repair work—Standard 5 by 7 in. shank. New work—6 by 8 in. shank. In 1918 details for the 6 by 8 in. shank were adopted as Standard.

Coupler Carrier. See Drawbar Carry Iron.

Coupler Carry Iron. See Drawbar Carry Iron.

Coupler Centering Device. See Drawbar Centering Device.

Coupler, Type "D." (M. C. B. Standard.) Sheet M. C. B. 23 In 1916, by special letter ballot, the type "D" coupler shown on Sheet M. C. B. 23-B was adopted as Standard.

In 1918 the No. 10 contour line shown on Sheet M. C. B.—was adopted as Standard.

The design for the 6 by 8 in. shank shown on Sheet M. C. B.—was adopted as Standard.

Coupler, Electric. A device attached to the end of a car including insulated metallic contacts for the connection of electric circuits between cars, generally used for connection of trail car lighting, heating or signal circuits to the motor car. See Control System.

Coupler, Emergency. See Emergency Coupling Device.

Coupler Gage. See Automatic Car Coupler.

Coupler Horn. The projecting lug cast on the head of the coupler which bears on the face of the end sill or dead wood when the draft gear is closed solid. See Automatic Car Coupler.

Coupler Jumper. Fig. 2518. Two coupler plugs connected by an insulated flexible cable. See Control System.

Coupler Latch (Steam Coupler). A catch to lock the steam hose couplers together and prevent accidental parting in rounding sharp curves.

Coupler Knuckle. See Knuckle.

Coupler Knuckle Kicker. A knuckle opener.

Coupler Knuckle Lock (Automatic Couplers). Figs. 650, etc. The block which drops into position when the knuckle closes and holds it in place, preventing uncoupling.

Coupler Knuckle Opener (Automatic Couplers). Figs. 650, etc. The device which throws the knuckle open when the lock is lifted so that a coupling can be made. With couplers not having a knuckle opener it is necessary to go in between the cars and pull the knuckle open by hand after the lock has been lifted.

Coupler Knuckle Pin. See Knuckle Pin.

Coupler Lock Lifter. (Automatic Coupler). Figs. 650 etc. The part of the mechanism inside the coupler head in some types of M. C. B. couplers which is moved by the uncoupling rod and in moving lifts the knuckle lock so that the knuckle can open. Also designated as Coupler Lock Lift.

Coupler Lock Set (Automatic Couplers). Figs. 650, etc. A feature of most M. C. B. couplers whereby the knuckle lock when lifted is held in a raised position until the knuckle is opened, when it allows the lock to drop back into position for automatically coupling when the cars are brought together.

Coupler Locking Pin Trigger. Figs. 650, etc.

Coupler Pocket. Fig. 696. A casting having a rectangular pocket, to receive the coupler shank, which is bolted or riveted to the end sill, sometimes having a means of adjustment.

Coupler Plug. A movable coupler designed to engage and connect to a coupler socket. See Control System.

Coupler Release Rigging. See Uncoupling Lever.

Coupler Rightener. See Drawbar Centering Device.

Coupler Socket. Figs. 2627-2629. A fixed electric coupler. See Control System.

Coupler Striking Horn, Automatic Car (M. C. B. Standard). In 1899 the vertical height of the stop shoulder or horn of coupler was fixed at not less than 3½ inches.

In 1899 the recommendation of the Coupler Committee that the horn of the coupler be arranged to touch the striking plate before the back of the head of the coupler strikes the end of the draft timbers, was adopted as a standard of the Association.

Couplers, Side Clearance of. (M. C. B. Standard.) In 1889 the Association decided that the opening in carrier iron, where coupler enters, should be 5¾ inches vertically and 5½ inches horizontally.

Drawing revised in 1896.

The revision made in 1896 consisted in the elimination of the carrier iron from Sheet M. C. B. 11. Text, 1896 to 1911. Proceedings shows this as M. C. B. Sheet B. Should be M. C. B. Sheet 11, as per page 472, 1896 Proceedings.

In 1899 the play of the shank of the coupler in the carry arm was changed to not less than ½ inch on each side.

In 1905 the total coupler side clearance was increased to 2½ inches.

In 1907 was modified to read: "That the total side clearance of the coupler be not less than 2½ inches," and adopted as Standard. In 1909 was modified to read: "Total side clearance of coupler to be 2½ inches."

Couplers, M. C. B. Automatic, Specifications for (M. C. B. Standard.) In 1899 specifications and tests for M C. B. automatic couplers were adopted as Recommended Practice. In 1903 they were revised.

In 1905 they were revised and adopted as a Standard. Revised 1909.

In 1911 the word "Coupler" was defined to include the bar and contained parts within the head.

In 1911 the manufacturer's mark was required on the head of the knuckle pivot pin.

In 1912 the specifications were changed to permit of an underneath unlocking device operating with an upward movement.

In 1913 the guard-arm test was readopted as a Standard in place of the face test and specifications revised as to form only, as follows:

Specifications revised in 1915 to take care of the number of samples being reduced from 13 to 8, by increasing the lots from 100 to 200 couplers.

In 1915 paragraph 39 was modified.

In 1918 specifications for purchase and acceptance of "D" couplers and parts were adopted as Standard.

Coupler Tests. A report of the standing committee on this subject, Master Car Builders' Proceedings, 1900, page 185, contains drawings of the proposed testing machine.

The committee report in the 1901 Proceedings, page 147, relates largely to the perfecting by actual service of the details of the work reported at previous meetings. Changes of considerable importance were found necessary in the specifications of M. C. B. Couplers and minor changes were made in the drop testing machine and the coupler contour gage.

was submitted as to a separate knuckle test; M. C. B. Proceedings, 1904, page 86.

The report of the committee for 1905 is concerned with the correction of slight inaccuracies and omissions in the standards and recommended practices for the coupler and coupler yoke.

The report of the committee for 1907 includes data based on an examination of approximately 5,000 broken steel couplers and 3,000 broken steel knuckles, together with the locks or their substitutes of the more permanent types of couplers; 1907 M. C. B. Proceedings, page 192.

The reports of the coupler committee during recent years are most elaborate and finally resulted in the development of the type "D" standard coupler. These reports will be found in the 1910 Proceedings, page 369; 1911 Proceedings, page 176; 1912 Proceedings, page 306; 1913 Proceedings, page 127; 1914 Proceedings, page 198. A feature of the report in the 1915 Proceedings, page 147, is the result of elaborate road tests and observations of the service performance of couplers. The report in the 1916 Proceedings, page 212, is particularly noteworthy because of its extent and the fact that final recommendations were made as to the type "D" coupler.

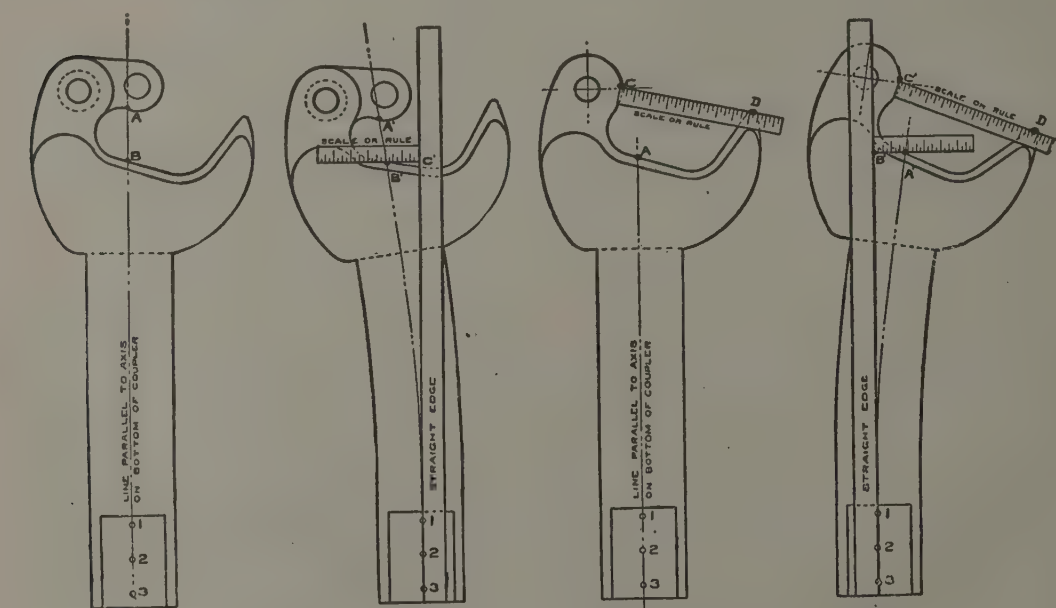


FIG. 1. BEFORE TEST

FIG. 2 AFTER TEST

METHOD OF MEASURING DEFLECTION IN TEST NO [illegible]
B' C' MEASURES AXIAL DEFLECTION AND MUST NOT EXCEED [illegible]
AB-A' B' MEASURES KNUCKLE CLOSURE AND MUST NOT EXCEED [illegible]

FIG. 3 BEFORE TEST

FIG. 4. AFTER TEST

METHOD OF MEASURING DEFLECTION IN TEST NO. [illegible]
A B' MEASURES AXIAL DEFLECTION AND MUST NOT EXCEED [illegible] FOR COUPLERS WITH 5x7 SHANK OR [illegible] FOR COUPLERS WITH [illegible] SHANK
C' D - CD MEASURES GUARD ARM DISTORTION AND MUST NOT EXCEED [illegible]

METHOD OF MEASURING COUPLER DEFLECTION AND DISTORTION. (SEE 1915 M. C. B. PROCEEDINGS.)

The committee report in the 1902 M. C. B. Proceedings, page 97, outlines the arrangement for locating the testing plant at Purdue University.

A description of the testing machine at Purdue University, with proposed coupler specifications, was included in a committee report in the 1903 M. C. B. Proceedings, page 190.

The drop testing machine at Purdue University was reported completed and ready for operation and data

Test No. 1, Striking Test on Closed Knuckle of Completed Coupler, Taking Sample for Test No. 1.—After the inspection by the manufacturer and the railroad inspector, as per sections 38 and 40, the latter shall select one complete coupler, taken at random from each of the lots as provided for in section 39 and subject to the following test:

Striking Test.—Blows to be struck directly on knuckle.

Three blows of 1,640 lb. falling 5 feet.
Three blows of 1,640 lb. falling 10 feet.

For measuring axial distortion and knuckle closure see Figs. 1 and 2.

Note.—The knuckle should be pulled out against lock by hand as far as it will go and not pushed in to the extent of play when making the original measurement of distance from face of bar to pulling face of knuckle.

Retest.—If the coupler fails to stand the prescribed tests, but, before failing, stands three blows at 5 feet and one blow at 10 feet, a retest will be admissible, and a second coupler shall be taken from the same lot from which the first coupler was taken and tested as per Section 11. If it stands the test, that lot of couplers shall be accepted as far as test No. 1 is concerned; otherwise that lot of couplers shall be rejected and another lot substituted and tested in the same way.

Taking Samples for Tests Nos. 2, 3 *and* 4.—From each 1,003 couplers accepted by test No. 1, three complete couplers shall be selected by the inspector, one of which shall be subjected to test No. 2, one to test No. 3 and one to test No. 4 hereafter specified.

Guard-arm Test.—Blows to be struck directly on guard arm.

Three blows of 1,640 lb. falling 3 feet.
Four blows of 1640 lb. falling 5 feet.

Jerk Test.—The weight shall strike the equalizer bar midway between the center line of coupler and the center line of the spring follower cap.

Three blows of 1,640 lb. falling 5 feet.
Three blows of 1,640 lb. falling 10 feet.

Test of Pivot Pins.—If the lot of 1,000 couplers is accepted on test No. 1, the inspector shall take at random from the accepted couplers five pivot pins, and from the extra six pivot pins one, making a total of six, which shall be subjected to the requirements of the specifications for knuckle pivot pins. If these pins pass the required inspection and test, the couplers complete may be accepted.

Coupler Wall, Area of Bearing Surface of Lock on. Recommended Practice. In 1910 a Recommended Practice was adopted that the effective area of bearing surface between the lock block and coupler wall shall be equal to or greater than the effective area of lock-block bearing on knuckle tail.

In 1916 the "D" coupler, as shown on M. C. B. Sheet 23-B, was adopted as Standard.

Couplers, Worn, Gages for. (M. C. B. Standard.) Sheet M. C. B. 16, Figs. 2946, 2948. In 1899 the Coupler Committee recommended a form of gage to define the contour lines more fully when worn. This gage was adopted as Recommended Practice.

In 1904 the Committee on M. C. B. Couplers recommended a modification of the wheel defect gage, which would make a more satisfactory worn limit coupler gage, which was adopted by letter ballot. See Proceedings, 1904; also Sheet A. Modified and adopted as Standard in 1905. Modified 1907.

In 1916 gage changed to permit gaging of worn collars on axles, and name changed.

Coupler Yoke. Figs. 721-743-A; Pages 1128, 1138, 1208, 1224, 1229, 1285, 1296. The yoke or strap that surrounds the draft gear and is riveted or keyed to the end of the coupler shank or drawbar. See Automatic Car Couplers (Miscellaneous M. C. B. Standards).

Coupler and Yoke, Gages for. (M. C. B. Standard.) Sheet M. C. B. 24. In 1909 gages to insure proper fitting were adopted for both the coupler and yoke. They are shown on Sheet M. C. B. 24. Gage No. 1 is used on 6½ in. butt couplers to gage rivet holes and lug for yoke fitting, also length and height of butt. Gage No. 2 is used on 9⅛ in. butt couplers. Gage No. 3 gages the width and height of shank and width of butt on both 5 by 5 in. and 5 by 7 in. shank couplers. Gage No. 4 gages the length of shank from back of striknig horn to back of butt on both 5 by 5 in. and 5 by 7 in. shank couplers. Gage No. 5 gages the rivet holes and the lips of all yokes.

In 1909 gages to insure proper fitting were adopted for both the coupler and yoke. They are shown on Sheet M. C. B. 24. Gage No. 1 is used on 6½ in. butt couplers to gage rivet holes and lug for yoke fitting, also length and height of butt. Gage No. 2 is used on 9⅛ in. butt couplers. Gage No. 3 gages the width and height of shank and width of butt on 5 by 7 in. shank couplers. Gage No. 4 gages the length of shank from the back of striking horn to back of butt on 5 by 7 in. shank couplers. Gage No. 5 gages the rivet holes and the lips on all yokes.

Coupler Yokes. (M. C. B. Standard.) Sheet M. C. B. 23-A. In 1905 coupler yokes were adopted as Recommended Practice.

In 1907 the opening between the gibs of the yoke for 9⅛-inch butt coupler was made 6¾ inches instead of 7¾ inches in order to increase the bearing of the present yoke on the coupler butt.

In 1909 a ⅛-inch radius was added to the inside of yoke lip. Advanced to Standard 1911.

In 1914 the rear of coupler yoke was changed, to be formed with ⅞-inch radius at inside corners and fitted with 1-inch filler block, wrought iron or steel, having 1-inch radius ends, and secured by one ¾-inch countersunk rivet.

Couplet (of Springs). Two Elliptic Springs placed side by side, to act as one spring. Three springs united in this way form a triplet, four a quadruplet, five a quintuplet, six a sextuplet.

Coupling. That which couples or connects, as a hook, chain or bar.

Coupling Chain. See Safety Chain.

Coupling Link. A wrought iron link or open bar by which freight cars are coupled together by coupling pins. Chain coupling links are used with draw hooks. In consequence of the danger to trainmen attending the use of coupling links, and legislation forbidding their use in Interstate traffic after January 1, 1898, automatic car couplers have almost entirely replaced them. See Automatic Car Coupler.

Coupling Pin. A round bar of iron with which a coupling link is connected to a drawbar. Now almost obsolete because of the use of automatic couplers.

Coupling Pin Chain. A small chain attached to the car by a suitable eye to prevent the coupling pin from being lost.

Cover. See Journal Box Cover, Manhole Cover, etc.

Cover Plate. In metal underframes for cars a plate which is riveted to the flanges of the center sills to

give them additional vertical strength as a box girder. The plate riveted to the top flanges is called a top cover plate and one riveted to the bottom flanges a bottom cover plate. See CENTER SILL BOTTOM COVER PLATE and CENTER SILL TOP COVER PLATE.

Cover Strip (Refrigerator Car). Metal plates covering a gutter in the floor.

A strip of metal, or sometimes wood, to cover a joint in the roof sheets.

Crabs or Tongs (Pile Driver and Wreck Crane). A pair of loose bent iron bars fastened at the top with a ring and intended to firmly clamp to the under side of the rail head when an upward pull is applied to the ring. They are used to anchor a pile driver car, steam shovel or wreck crane to the rails and prevent them from overturning when a heavy load is being lifted. Also called rail clips or rail clamps. See TONGS.

Crane. See WRECKING CRANE, LOCOMOTIVE CRANE, Pages 1134-5, 1220-1223, 1232-1233.

Crane Post. The post of a crane which corresponds to the mast of a derrick.

Crank. A device for causing rotation of an axis, or for versa.

Crank Shaft (Hand Cars). A short wrought iron shaft to which a crank of a hand car is attached, which is turned by suitable levers and is connected by gear wheels with one of the axles of the car.

Cricket Iron. A seat stand.

Cross Bar (Swing Link Hanger). The iron bar supporting the cross bar casting which carries the spring plank. Also called mandrel pin and lower swing hanger pin.

Cross Beam. A transverse floor member placed upon the sills to support the inclined floor of a coal or ore car.

Cross Bearer. 8, Figs. 34, 35; 8, Fig. 80; 11, Fig. 111; 6, Fig. 147; 5, Figs. 210, 211; 28, Fig. 260. A transverse member of the underframe, placed between the bolsters, acting as a tie between the various sills and helping to distribute the weight of the car. Cross bearers on steel cars are sometimes termed Needle Beams, but the term Cross Bearer is preferable. In steel car construction the term Cross Tie is commonly applied only to those members which tie the center and side sills together, the Cross Bearer usually having a filler between the center sills and thus extending across the car.

Cross Bearer or Cross Tie Cover Plate. 6, Fig. 348. The member which forms the top or bottom flange, to which the diaphragms are riveted in a built-up cross tie. The bottom cover plate is sometimes called Tie Plate.

Cross Bearer Center Filler. See CROSS BEARER DIAPHRAGM.

Cross Bearer Diaphragm or Cross Tie Diaphragm. 15, Fig. 348. The web plate or filling piece, outside the center sills, to which the cover or tie plates are riveted in a built-up Cross Tie.

Cross Tie. See CROSS BEARER.

Cross Tie Timber. See CROSS BEARER.

Cross Tie Timber Truss Rod. An iron truss rod under the cross tie timber, serving to strengthen it. See NEEDLE BEAM TRUSS ROD.

Cross Tie Timber Truss Rod Bearing. A Queen Post for the cross tie timber truss rod of a built-up Needle Beam.

Cross Timber Hopper Ends. In a wooden hopper car, a transverse floor timber framed between the intermediate sills, to which the lower end of the inclined floor is spiked and to which the outer hopper doors are hung. The ends of the draft timbers are bolted to it, and the short center-sills about it.

Crosshead (Air Brake Cylinder). A forked casting or forging attached to the end of a piston rod, to which the brake levers are connected.

Cup Holder. A stand or rack for holding a drinking cup. See TUMBLER HOLDER.

Cup Washer. A SOCKET WASHER.

Cupboard Bolt. See DOOR BOLT.

Cupboard Catch. Figs. 1798, etc. An indefinite term for a light spring catch nearly or quite flush with the surface to which it is attached. It has a beveled bolt which snaps shut. See FLUSH BOLT.

Cupola. 22, Fig. 260. A small cabin built on the roof of a caboose to afford a means of lookout for the train crew and also to facilitate passage from the caboose to the top of the train. Cupolas are also commonly used on dynamometer cars.

Cupola Hand Rail. 19, Fig. 260. A rail attached to a cupola to prevent trainmen from falling when entering or leaving through the cupola windows.

Cupola Inside Step. 25, Fig. 260. A step attached to the inside of a caboose to enable trainmen to enter and leave the cupola.

Cupola Marker Lamp. See CUPOLA SIGNAL LAMP.

Cupola Signal Lamp. 21, Fig. 260. A signal lamp mounted on the cupola of a caboose.

Current Director (Car Heating). A device for controlling the flow of steam or hot water in the pipes, working on the principle of an injector.

Curtain. Figs. 1894, etc.; Pages 1160, 1165. A piece of cloth or other material hung in front of or around any space or object, as a window or sleeping-car berth, and which may be contracted or spread at will. The term, however, is usually restricted to loosely hung drapery, suspended on a curtain rod by curtain hooks or rings, in distinction from a shade, which is flat and rolls up. Curtains in cars are chiefly used for sleeping-car berths. (Berth Curtains). Window curtains are used in dining, parlor and private cars. Except in the saloons, blinds have been abandoned, and window shades are in almost universal use on steam railroads. Blinds are still in general use in street cars. The protecting shield used over vestibule diaphragms is called a curtain. See VESTIBULE CURTAIN, WINDOW SHADE.

Curtain Fixtures. Figs. 1879, etc.; Pages 1160, 1165.

Curtain Hook (Sleeping Berths). See BERTH CURTAIN HOOK.

Curtain Rod. A bar to carry a curtain hung upon rings and sliding freely along the rod.

Curtain Rod Bushing. A socket or bushing for the end of a curtain rod where it abuts a wall or partition.

Curtain Rod Folding Bracket (Sleeping Car). A bracket for a curtain rod in a sleeping car which may be folded into the upper berth in such a manner that it is out of sight when the upper berth is shut up. See BERTH CURTAIN ROD BRACKET.

Cushion. Cushions used in passenger car upholstery are of the box type, being built upon and connected with a wooden framework (cushion frame). See CAR SEAT.

Cushion Frame. A wooden frame to which the seat springs and upholstery of a car seat are attached.

Cuspidor. Figs. 2006, 2007. A vessel to receive discharges of spittle, and having a wide rim so that if it is upset its contents will not be spilled.

Cut-Out. A switch or fuse in a branch electric circuit or loop, used to disconnect the branch circuit from the main circuit.

Cut-Out Cock. See BRAKE CUT-OUT COCK.

Cut-Out Valve (Car Heating). Page 1299. Used for controlling admission of steam to radiator pipes.

Cutting Out Brakes. See AIR BRAKES.

Cylinder. A chamber or vessel whose ends are circular, and with straight parallel sides, as the cylinder of a steam engine. See BRAKE CYLINDER.

A name sometimes given to the fire pot of a stove or heater.

A type of lock is called a cylinder lock, Fig. 1808.

Cylinder Head. A metal cover for the end of a cylinder, held on by cylinder bolts or cylinder studs. The cylinder head through which the piston passes is commonly termed the back cylinder head, and the other the front cylinder head, corresponding to locomotive practice. Brake cylinder heads are called Pressure and Non-Pressure Heads.

Cylinder Lever. Fig. 967. In passenger brake equipment, two levers which are connected by a rod attached near their centers. One end of one lever is attached to the crosshead of the brake cylinder, and the corrsponding end of the other is attached to a bracket on the brake cylinder head at the opposite end of the cylinder. The other ends of the levers are connected with the floating levers by rods.

In freight brake equipment there is no second cylinder lever, the term applying only to the lever which receives the braking force direct from the push rod.

Cylinder Lever Bracket (Air Brakes). A T-shaped piece of iron bolted to the front cylinder head, to which one of the brake levers is attached.

Cylinder Lever Guide. A guide or support for the cyllinder lever.

Cylinder Lever Support (Air Brakes). A wrought iron bar bolted to one of the center sills, on which the ends of the cylinder levers rest.

Cylinder Support. Fig. 968. A bracket attached to a brake cylinder for holding it in place on a car.

Cylindrical Gages. Gages made for measuring the size of cylinders and cylindrical holes, often called Whitworth gages. They consist of steel cylinders and rings hardened and ground very accurately to standard sizes. These fit into each other. The former is used for measuring the size of holes, and the latter for measuring the outside of cylindrical objects, and they are called internal and external cylindrical gages. They are generally used as standards alone, from which other tools and gages are made of the proper size.

D

Dairy Car. A refrigerator car used for carrying butter, cheese, milk and other dairy products.

Damper. A valve in the stove pipe or in the bottom of a stove for regulating the draft.

Day Coach. See PASSENGER CAR.

Dead Air Space (Insulation of Refrigerator Cars). Air spaces which have no communication with the outside air, so there can be no free circulation or change of air as there is in a free air space.

Dead Block. See DEAD WOOD.

Dead Lever (of Brake Gear). Fig. 967. The one of a pair of truck brake levers to which the brake connecting rod is not attached. The upper end of the dead lever is confined within a dead lever guide, or brake lever stop, which is provided with pins to adjust the end of the brake lever, and consequently the slack in the brakes, as the brake shoes wear. The lever to which the power is first applied through the brake connecting rod is termed the live lever.

Dead Lever Guide. Fig. 969; 95, Fig. 1003. An iron bar or loop attached to a truck or car frame which holds the upper end of a fixed or dead brake lever. It usually has holes in it in which a fulcrum pin is inserted. By moving the pin from one hole to another the lever is adjusted so as to take up the wear of the brake shoes. Also called BRAKE LEVER STOP.

Dead Lever Guide Lug. Fig. 971. A lug or bracket attached to a truck bolster to support the dead lever guide.

Dead Lock. A lock in which the bolt is thrown each way by the key, and not in one direction by a spring, as with a spring lock or night latch.

Dead Padlock. A padlock in which neither the lock, bolt, nor hasp has a spring, but the former is thrown each way by the key, and the hasp must be opened by the hand.

Dead Wood. 11, Fig. 147. A single wooden block or piece of timber attached to the end sill of freight cars to protect persons between the cars from injury, by preventing the cars from coming together in case the drawbar or its attachment should give way. See BUFFER BLOCK.

Deadening or **Deafening.** The filling placed between the floor and the deafening ceiling of a passenger car to serve as a non-conductor of heat and noise. Mineral wool is sometimes used for deadening, but commonly shavings, when anything at all is used. An intermediate floor (between the sills) and deafening ceiling (under the sills) is used in refrigerator cars.

Deafening Ceiling. Boarding on the under side of the sills of a passenger car to exclude or deaden the noise of the car.

Deafening Floor. See DEAFENING CEILING.

Deck. A term applied to the roof of a car which has a clere-story. The deck or upper deck is properly the clere-story, but the entire roof is commonly called the deck and subdivided into lower deck or main roof, and upper deck.

Deck Beam. A beam in the form of an inverted T with a bulb on the upper end, used in some forms of steel car construction.

Deck Bottom Rail. See DECK SILL.

Deck Bridging. Bridging or blocking used in the upper deck or clere-story.

Deck Caboose Lamp. See CUPOLA SIGNAL LAMP.

Deck Carline. See UPPER DECK CARLINE.

Deck Collar (Heaters). A sheet metal ring to line the smoke pipe opening through the roof.

Deck Eaves Molding or **Upper Deck Eaves Molding.** A molding under the outside edge of the upper deck.

Deck End Panel. A narrow panel in the end of the upper deck.

Deck End Plate. A member that fulfills the same office for a clere-story that the body end plate does for the body. See END PLATE.

Deck End Sill. A horizontal timber connecting the ends of the deck sills, and forming the base for the end of the upper deck.

Deck Inside Cornice. A molding which fills the interior angle where the upper deck joins the deck side.

Deck Lamp. Figs. 2274, etc. A lamp which is fastened to the deck or ceiling of a car.

Deck Plate. A plate used in constructing the roof or deck of a steel passenger equipment car. A longitudinal member of the roof frame at the top of the deck posts and upon which the ends of the upper deck carlines rest. It has the same relation to the deck sill as the side plate has to the side sill.

Deck Post. An upright member which connects the deck plate with the deck sill.

Deck Roof. The roof of the upper deck or clere-story, itself sometimes called the deck or upper deck. See DECK.

Deck Sash. Figs. 1865, 1867, etc. A glazed sash in the sides of the upper deck. See SASH.

Deck Sash Catch. See DECK SASH LATCH.

Deck Sash Flush Catch. A deck sash latch mortised into the sash rail flush with the sash.

Deck Sash Latch. A spring bolt attached to a deck sash, which engages with a deck sash latch keeper or strike plate.

Deck Sash Opener. Figs. 1968, 1970, etc. A lever attached to a revolving rod by which a deck sash is opened and held in any desired position. A great variety of forms exist. The pull hook, a rod with a hook at one end, which is used for opening the deck sash, is also called a deck cash opener.

Deck Sash, Outer. A deck sash which carries the screen, and prevents the admission of dust and cinders.

Deck Sash Pivot. Figs. 1951-1956, 1966, 1972. Roughly a metal stud or spindle attached to a suitable flange by which it is fastened to a deck sash, and on which the latter turns. See DECK SASH RATCHET CATCH.

Deck Sash Pivot Plate. A plate attached to the window casing, with a hole or eye in which a deck sash pivot works. Sometimes they are provided with springs to prevent the sash from rattling.

Deck Sash Pull. Fig. 1952. A ring attached to a deck sash to open and close it.

Deck Sash Quadrant. A curved bar or plate of metal used as a guide or stop to control the movement of a deck sash. See DECK SASH RATCHET CATCH.

Deck Sash Ratchet Catch. Figs. 1912, 1956, etc.; Page 1288. Usually combined with a deck sash pivot and stop. A ratchet makes it possible to hold the window open in any one of several positions.

Deck Sash Ratchet Plate. Fig. 1955. A part usually attached to the side of the car, but sometimes to the sash, carrying a ratchet in which the ratchet catch engages.

Deck Sash Spring Pivot. A Deck Sash Pivot provided with a spring to make the sash removable.

Deck Screen Bottom Rail. A rail running the entire length of the clere-story, and closing the space between the bottom of the screen and the roof.

Deck Screen Post. An upright stick forming the side pieces of a frame to hold a wire screen put on outside of the deck windows to exclude dust and cinders.

Deck Side. The entire part, consisting of a plate, rail, posts and panels, or sashes, which forms the side which occupies the vertical space between the lower and upper deck.

Deck Side Ventilator. This term is used to designate the sash or valves and their attachments for opening and closing the aperture.

Deck Sill. A longitudinal member of the roof frame at the top of the lower deck or main roof carlines and forming the lower sill of the deck or clere-story.

Deck Sill Facing. The facing or finishing material applied to the inner side of the deck sill.

Deck Sill Sub-Facing. A thin board sometimes used below the Deck Sill Facing.

Deck Soffit Board. A board on the under side of the overhanging cornice of an upper deck.

Deck Top Rail. A DECK PLATE.

Deck Ventilator. See DECK SIDE VENTILATOR. The deck sash are frequently hung and operated as deck side ventilators.

Deck Window. A window in the upper deck or clere-story. More commonly a deck sash.

Deck Window Screen. An outside sash with a screen over it to exclude dust and cinders.

Defect Card. See AIR BRAKE DEFECT CARD.

Deflector. See DUST DEFLECTOR.

Deflector Springs (of Ventilators). Springs controlling the movement of the deflectors.

Dental Lavatory. Figs. 1767, 1769, 1776. A basin with the necessary faucet, tumbler holder, etc., used in connection with cleansing the teeth.

Derrick Car. A strong platform car which carries a derrick crane which is used for removing wrecked cars and engines, erecting bridges, or handling any heavy objects. Also called wrecking car.

Designation of Brake Rods and Levers. See FOUNDATION BRAKE GEAR.

Detective Wire (for Car Seals). A flat twisted wire or other equivalent device to prevent the seal being stripped from the wire without destroying one or both.

Diagonal Brace. 54, Figs. 34, 35; 9, Fig. 80. See END SILL DIAGONAL BRACE.

Diagonal Floor Timber. A floor timber which is placed in a position diagonal to the sills.

Diameter Testing Gage (for Car Wheels). A gage for testing the diameter of wheels and axles. See WHEELS.

Diameter of Wheels. See WHEELS, DIAMETER OF.

Diamond Arch Bar Truck. Figs. 979, 985, 1018, 2797-2799, 2887. A car truck with iron side frames consisting of two or more Arch Bars, and a pedestal tie bar. The spaces between the arch bars are diamond shaped, hence the name. The journal boxes are rigidly bolted to the side frames. The cross members of the truck, bolster, spring plank, etc., are either of wood or metal, or of both wood and metal combined,

but the modern truck is almost always of metal throughout.

At the Master Car Builders' Convention (1884) it was voted that this form should be the type used in preparing designs for a standard freight car truck, to have a 5-ft. wheelbase, channel bar transoms, and either Swing or Rigid Bolster. For many years it was the type almost universally used, but latterly trucks with cast steel side frames have come into common use for freight service.

Diaphragm. Usually a thin wall or partition.

(Valves.) Some valves are regulated by diaphragms or diaphragm plates, to which are attached springs, nuts, stems, etc., whose names explain themselves. These diaphragms are commonly spring plates, which guide the rod and, assisted by spiral springs, cause the attached valves to seat or unseat at a fixed pressure.

(Of a Vestibule.) Figs. 557-570; Pages 1160, 1164. A device usually of some combination of rubber and canvas, arranged in folds and connecting the vestibule face plate with the vestibule to exclude the dust and cinders, and at the same time to allow the face plate free movement to adjust itself to the motion of the cars.

Diaphragm Face Plate. See Vestibule Face Plate.

Dining Car. Figs. 318-326, 331, 359-362, 364. A car operated in passenger trains and equipped with kitchen and utensils, dining tables, etc., for serving meals to passengers. See Car.

Dining Car Chair. Figs. 1701, 1703.

Dipper (Steam Shovel). Also called bucket or shovel. The heavy iron scoop or bucket which removes the earth or rock and transfers it to the cars.

Dipper Bail (Steam Shovel). The link fastened to the top of the dipper and to the dipper block.

Dipper Block (Steam Shovel). The block at the point of the boom around which the hoisting chain passes.

Dipper Teeth (Steam Shovel). Heavy iron cutters or teeth projecting from the dipper to break the earth.

Direct Steam Heating System. Figs. 2054, etc. A system of car heating in which the steam from the locomotive is carried directly to the radiators or heating pipes. The term is used to distinguish the system from those in which the steam is employed to heat the water which circulates in the radiators or heating pipes.

Dirt Collector. See Centrifugal Dirt Collector.

Discharge Pipe (Air Compressor). Also called reservoir pipe. A pipe by which the compressed air is conveyed from the air compressor to the main air reservoir.

Discharge Valve. Figs. 1417, 1455. (Of Car Signal Valve.) The valve in the attachment called the car signal valve. The whole device is also sometimes so called.

(Of Air Compressor.) The valve through which the air as compressed passes to the main reservoir.

Distance Block. A short, thick piece of wood placed between two or more objects to keep them apart, or to preserve a space between them, as floor timber distance block, truck bolster distance block, etc.

Distributing Table (Postal Car). Fig. 2911. A table upon which the mail bags are emptied of their contents, and from which they are distributed to the various boxes or pouches.

Distributing Table Hinge. Figs. 1993, 2911. A strap hinge for the table on which mail is sorted in postal cars.

Ditcher. A small steam shovel, usually mounted on a flat car, for digging the ditches in railroad cuts.

Dividing Attachment (Vacuum Brake). A device to regulate the application of the brakes to the locomotive or train, or both. See Ejector.

Division Arm (Twin Seats). The middle seat arm bebetween the two seats.

Dog. A general term in mechanics for all devices which bite or take hold of or give motion to other parts.

(For Pawl of Winding Shaft.) A disk or button eccentrically pivoted in such a way as to hold the ratchet wheel pawl of a winding shaft in its place. The pawl itself of a ratchet gear is also sometimes termed the dog in other forms of ratchet gear where no dog to hold the pawl is necessary. A brake pawl-dog is similar.

Dome. A spherical roof or covering. A vertical cylinder attached to the top of the tank on tank cars and to the top of steam boilers. See Tank Dome.

Dome Head (Tank Car). The top of a Tank Dome.

Dome Lamp Shade. A Lamp Shade of curved or spherical outline.

Door. A frame of boards or plates of metal for closing a doorway, as Box Car Door, Drop Door, Platform Trap Door, etc. See Door Frame for names of parts.

Door Back Stop. See Door Stop.

Door Bolt or **Bar.** An iron bar, actuated by a handle, which slides into a bracket or eye and locks the door. Used chiefly on the swing doors of refrigerator cars.

Figs. 1818-1820. A metal bar attached to a slide and fastened to a door so as to hold it shut from the inside. They are either round, or barrel, or square. A square neck door bolt is one with an angle or shoulder in it. Flush door bolts are gained in so as to be flush with the surface. A cupboard catch is a form of door bolt having a beveled latch and actuated by a spring; but bolts so formed are commonly termed latches. See also Barrel Door Bolt, Flush Bolt, Square Door Bolt.

Door Bolt Bracket. An iron eye attached to the body of the car into which the door bolt or bar is forced, to hold the door in a closed position. Used chiefly on freight cars which are equipped with swing side doors.

Door Bolt Keeper. See Keeper.

Door Bottom Rail. See Door Frame.

Door, Box Car, Seal Records of. (M. C. B. Recommended Practice.)

In 1913 the following recommendations were adopted:

End doors used for loading lumber in box cars are essential only on roads having long lumber loading in box cars as an essential feature of traffic.

End doors must be so constructed that when closed they lock automatically by means of a lock accessible from the inside of the car, thus avoiding the necessity of taking seal records.

Seal appliances now in use, and not accessible from the ground or from end ladders, should be revised so as to be accessible from the ground or end ladders, to promote the safety of employees.

Door Brace (Freight Car Doors). A diagonal piece of timber framed into the door frame to stiffen the door.

The report of the committee on car framing, roofs and doors, 1910 M. C. B. Proceedings, page 399, contains recommendations for the bracing of side doors.

Door Bracket. Fig. 855. See SIDE DOOR BOTTOM GUIDE.

Door Bumper. A door stop.

Door Butt. A BUTT HINGE.

Door Button. A small piece of wood or metal swiveled by a screw through the middle, and used as a fastening for a door or gate.

Door Cap (Freight Car Doors). A horizontal board across the top of the door.

Door Case. The frame which incloses or surrounds the sides and top of a door. The separate parts are the door jambs or door posts, door sill and door lintel.

Door Case Top Rail. A timber parallel with the Door Lintel.

Door Center Girth (Freight Car Doors). A horizontal board across the middle of the door. A middle door rail, except that it is not framed into the door, but simply nailed on.

Door Chain Bolt. A device which permits a door to be opened a short distance, yet not far enough to gain admission.

Door Check. Figs. 863, 865, 868. A pneumatic or hydraulic dash pot and spring attached with suitable levers to the top of a swinging door and to the door lintel. The spring tends to close the door, and the dash pot checks its motion sufficiently to prevent the door slamming shut.

Door Closer. A DOOR CHECK.

Door Control. Fig. 869. A push button switch for the control of magnetic air valves for pneumatic door operators.

Door and Step Controller. Fig. 1464. A pneumatically operated device, included in the Safety Car Control Equipment, which directly controls the opening and the closing of the car doors (as well as the raising and the lowering of the steps, if desired). Its operation is linked up with the brake valve in such a way that the door opening and closing follows in the natural order of operation.

Door, Door Jamb and All Other Inside Exposed Corners of Stock Cars, Rounding Corners (M. C. B. Recommended Practice). M. C. B. Sheet F. Fig. 3042.

In 1910 a Recommended Practice was adopted that doors, door jambs and all other inside exposed corners of stock cars be rounded to prevent injury to cattle.

Door Fixtures, End (M. C. B. Recommended Practice). Fig. 3040. In 1912 the box car side door fixtures were transferred to standard, the end door fixtures remaining as a recommended practice.

Door Fixtures, Box Car (M. C. B. Standard).

In 1897 a committee on this subject reported with details which were afterward adopted by letter ballot as Recommended Practice of the Association. See Sheet M. C. B.—F. Proceedings 1897, page 186.

In 1905 a committee appointed to consider this subject recommended the adoption of the standard width of 6 foot. The report was accepted, but no action was taken.

In 1908, the committee made a report and was continued to make a further study.

In 1910 the outside hung side door, shown on Sheet M. C. B.—F, and flush side door, shown on Sheet M. C. B.—F1, were adopted as Recommended Practice as representing the minimum requirements in door construction and details shown.

Also that the door hood coverings be omitted from new cars, and as much as possible in repairs to old cars.

In 1911 the location of center of hasp or sealing eye was made preferably 5 feet from top of rail and not more than 5 feet 9 inches from top of rail.

In 1912 the door hasp staple was increased from 5⅜ inches to 16 inches and provided with four bolt holes.

In 1912 the drawings and details were advanced to standard.

The design of car doors and fastenings is considered in the report of the committee on car construction in the M. C. B. Proceedings, 1914, page 392.

Door Frame. The structure in which the panels of a door are fitted. It is composed, as is also a window sash, of the stiles, or upright pieces at the sides; the mullions, or central upright pieces; the bottom rail; the lock or central rail, and the top rail. The Door Case surrounds it.

Door Friction Roller. See SLIDING DOOR FRICTION ROLLER.

Door Guards (Baggage and Freight Car Sliding Doors). Strips of wood which inclose the space occupied by the door when open to keep the freight from interfering with its movement.

Door Guide. See SIDE DOOR BOTTOM GUIDE.

Door Handle. 61, Figs. 34, 35. A handle, commonly of a D-shape, attached to a door as a means of opening and closing it.

Door Hanger. 60, Fig. 34; Figs. 864, 867. A device by which a sliding door is suspended at its top, and which slides on a track. Most modern freight car door hangers are fitted with rollers which run on a door track.

Door Hanger, Sliding. Figs. 849, 864, 867, 877. A device provided with rollers and traveling over a track to operate the sliding side or end door.

Door Hanger Sheave. See SHEAVE.

Door Hanger Roller. See DOOR HANGER.

Door Hasp. Figs. 851, 853. A metal clasp attached to a door, by which it is fastened to a staple on the body of the car. A pin or a car seal is passed through the staple after the hasp is placed over it. Used chiefly on freight car doors. Generally made of malleable iron and the pin attached so that it cannot be lost. Padlocks are rarely used on freight cars.

Door Hasp Holder. Fig. 972. A metal strap, usually malleable iron, bolted to a freight car side door, and having a hook or eye to which the hasp is attached.

Door Hasp Staple. Figs. 852, 1795. A ring or U-shaped staple over which the slotted part of the door hasp fits and through which the door pin is passed.

Door Head. A steel plate or combination of steel plates placed across the top of a door opening.

Door Hinge. See HINGE.

Door Holder. Figs. 872-874. A device for holding a door open or shut. Also called door stop, as it is also

intended to check the momentum of the door when swung open violently.

Door Holder Catch or **Door Holder Stop.** A metal bracket attached to the floor (floor stop) or side (partition stop) of a car, with which a door holder engages, to hold a door open.

Door Hook. Figs. 1796, 1801. A hook for holding a door open or shut.

Door Jamb. The side piece or post of a door case. Also called door post. Not to be confused with the stiles of the door itself. See DOOR POST.

Door Knob. Fig. 1803. A ball attached to the end of the spindle of a door latch to take hold of in moving the latch or opening the door. The knob is often made in various peculiar forms.

Door Latch. An attachment to hold the door shut. A door latch is often made in combination with a lock, having a separate bolt and key to secure or fasten the door from the outside. See VESTABULE DOOR LATCH, LATCH and LOCK.

Door Latch Bolt. See LATCH.

Door Latch Keeper. See KEEPER.

Door Latch Rose or **Escutcheon.** A plate fastened to a door as a guard or bearing for the latch spindle. A rose is frequently called a rosette. See ESCUTCHEON.

Door Latch Spindle. A small metal shaft to which the door handle or konb is attached, and by which the latch is turned.

Door Latch Spring. A spring which acts on the latch hook or bolt and causes it to engage with its keeper; usually made of a flat piece of steel.

Door Lintel. The horizontal part of a door casing above the door. See DOOR FRAME.

Door Lock. Figs. 840, 847, 848, 850; Pages 1141, 1162, 1200. A Latch is usually combined with a passenger car door lock. See LOCK.

Door Lock Bolt. See LOCK.

Door Lock Keeper or **Nosing.** See KEEPER.

Door Mullion. 3, Fig. 1602. A vertical bar of wood between the panels of a door. See DOOR FRAME, DOOR WINDOW MULLION.

Door Name Plate. A metal plate on the inside of a passenger car door with the name of the builder inscribed on it. The name is now more commonly painted on.

Door Notice Plate. See NOTICE PLATE.

Door Operating Gear. 17, Fig. 80; 9, Fig. 111; Figs. 96, 808-819; Page 1230. The mechanism used to open and close the type of doors commonly known as drop doors, which are used on hopper, gondola and other types of drop-bottom cars.

Figs. 868, 869. A power arrangement for controlling the opening and closing of sliding doors on suburban or street railway cars.

Door Panel. A piece of board whose edges are inserted into the groove of a thicker surrounding frame of a door. They are distinguished as lower, middle and upper. Any panel, but especially the lower, is sometimes cut up into two twin panels by a door mellion.

Door Pin (Freight Car Doors). A pin used to fasten a hasp to a staple.

Door Pin Chain. A metal chain by which a door pin is attached to a car.

Door Plate. A notice plate. See DOOR NAME PLATE.

Door Post or Door Jamb. 23, Figs. 34, 35; 37, Fig. 260; 24, Fig. 348. A vertical post which forms the side of a doorway.

Door Post Plate. A metal plate laid over the door post to protect it from damage.

Door Post Pocket. The pocket for the door post. See POST POCKET.

Door Protection Plate. A plate placed at the side of a doorway to act as a reinforcing member in case of shocks, as when trunks, etc., are thrown against the frame.

Door Pull. See DOOR HANDLE.

Door Rail. A horizontal member or bar of the framing of a door. The upper one is called the top rail; the lower one, the bottom rail; and the middle, lock rail.

Door Rail Bracket (Car Doors). A bracket to carry a top door rail, serving as a guide for the door. See DOOR TRACK BRACKET.

Door Roller. Fig. 866. Also called door sheave. The term door roller is applied to a flat tread wheel pivoted in a bracket and attached to the bottom of a door to roll upon a flat surface rather than a narrow track.

Door Sash. A wooden frame containing one or more panes of glass, placed in a door. In some cases one of these sashes is made to slide, so that it can be opened for ventilation. They are distinguished as lower and upper door sash.

Door Sash Bolt. A metal pin attached to a sliding door sash to hold it in any desired position.

Door Sheave or Sliding Door Sheave. A small wheel on which a sliding door rolls. It is usually placed at the top of the door, and sometimes at the bottom also. It is carried in a door sheave holder. A grooved casting called a door shoe or door slide is sometimes used as a substitute on freight car doors, especially when the load does not rest upon the lower door track. See DOOR ROLLER.

Door Shoe. See DOOR SHEAVE.

Door Sill. A cross piece attached to the floor on the under side of a door opening.

Door Slide. See DOOR SHEAVE.

Door, Sliding. See SLIDING DOOR.

Door Specifications for Outside Hung Side Doors for New Box Cars. (M. C. B. Recommended Practice.)

In 1915 the following specifications for box car outside hung side doors for new cars were adopted as Recommended Practice.

1. Means must be provided for continuous weatherproofing and fireproofing around the top, bottom, front and back edges of door when closed.

2. Top of door must be continuously supported against outward pressure, and this support must also form the weatherproofing.

3. Closed door stop must be of metal, preferably continuous from top to bottom of door. If continuous door stop does not support the door against outward pressure, such support must be provided by not less than two brackets with lips, equivalent to brackets shown on Sheets M. C. B. 30, and located as shown thereon.

4. Metal open door stops are recommended, one or more in number, equivalent in strength to design shown on Revised Sheet M. C. B. 30, securely bolted

to the belt rails or framing of the car with at least two ½-in. bolts or their equivalent. If wood open door stop is used, it should extend the entire height of the door and be reinforced by clip washers or through bolts to prevent splitting.

5. Bottom of door must be supported against outward pressure at not less than two points for any position of the door.

If individual bottom door guides, fastened to car body, are used, they must be at least four in number, one located adjacent to each door post, one in the middle of the doorway, and one between the back door post and the open door stop, approximately as shown on Revised Sheet M. C. B. 30, and similar in design, with particular reference to height of lip, which should be not less than 1¾ in.

6. If door hangers are fastened to door with bolts, the design of door fastenings must be such that with hangers broken or removed the door can not be removed from the car, except by removal of either track, door guides, or door stops. When substantial hangers are riveted to steel doors, or to steel frames of wooden doors, with not less than four ⅜-in. rivets or their equivalent, this provision need not apply.

7. When hangers or rollers are fastened directly to sheathing of wooden doors, bolts must be not less than ⅜ in. in diameter at least four in number for each hanger and spaced not less than 4 in. apart horizontally and 5 in. vertically, hangers preferably located so bolts will pass through two or more boards.

8. Door track may be located either above or below the door opening and the door supported so that under any service conditions there will be no binding of the door from vertical interference with door guides or track. The upper door track, if used, must be continuous in one piece, strong enough so that it will not sag, and securely fastened to car; proper flashing, if necessary, to be provided over door track.

If door is supported at bottom, means for keeping the supports in alignment must be provided.

9. For wooden doors, the door-hasp fastener must be at least 24 in. long, fastened with not less than five ⅜-in. bolts, with nuts on the inside of the door. The door-hasp fastener must be of such design that the hasp can not be removed without removing the bolts from the fastener. The door-hasp fastener must be secured to the steel frame of the door by at least one bolt or rivet.

For steel doors, the door-hasp fastener must be riveted to the door.

10. Proper clearance must be provided so that ⅜ in. bulging of the side of car will not interfere with the free movement of the door. Door mechanism must be so designed that in a closed position the door is drawn reasonably tight against side of car. It should be possible for one man to open or close the door readily from the ground without tools.

11. All of the above recommendations apply particularly to cars with 6-ft. door openings and single outside hung side doors, and in all cases where a particular construction is described, or specific dimensions are given, their equivalent will be acceptable.

Door Spindle. The bar passing through the door which carries the door knobs.

Door Spring. An attachment to make doors self-closing.

Door Stile. One of the two upright pieces on the outer edges of a DOOR FRAME.

Door Starter. Fig. 820. A device for helping to start a door to open.

Door Stop. Page 1141. A peg or block against which a passenger car door strikes when opened, often provided with a rubber cushion, especially for swinging doors. Door holders, which both stop the door and retain it, are often called door stops, as Fig. 820.

Freight Car Sliding Doors. 59, Fig. 34; Fig. 972. A block of wood or an iron casting placed on the side of the car to limit the distance that the door can be moved. A Combined Stop and Lock is a door stop with an attachment for locking the door.

Door Threshold Plate. A plate on the threshold of the door.

Door Track. 34, Figs. 34, 35. A guide which supports a sliding door, and upon which it moves, or by which it is held in its place. They are either top door tracks or bottom door tracks. The former usually carry the weight of freight car doors, which are hung thereon by door hangers. The lower track serves only as a guide for the door shoes.

Door Track Bracket. A bracket for securing a side-door track to the car. See also DOOR RAIL BRACKET.

Door Track Support. Fig. 970. See DOOR TRACK BRACKET.

Door Window Mullion. A middle upright bar in the door window frame. See DOOR FRAME.

Doorway. The passage or opening formed by a door casing, which is closed by a door.

Dope. A mixture of waste and oil, placed in journal boxes to lubricate the journals. See JOURNAL PACKING.

Double Board Roof. The upper layer of grooved boards is sometimes laid with the grooves under, so as to form a kind of tube between the two layers. See ROOF.

Double Body Bolster. Figs. 505, 507, 511, 528, 531, 1158. See BODY BOLSTER.

Double Chair. Fig. 1702. A twin car seat.

Double Check Valve (Air Brakes). Fig. 1453.

Double Coil Draft Spring. See DRAFT SPRING.

Double Coil Jet System (Car Heating). A system of car heating which combines the drum or jacket features with the jet or commingler system of injecting steam into the hot water circulation. The steam is first sent through the inner or seam coil of the double coil in the heater, and then through an annulus, into the circulating pipe. The jet is so directed as to add the circulation in the pipes. It is claimed to be noiseless.

Double Coil Nest Spring. A spiral spring with another within it.

Double Deck (Stock Car). Figs. 193-197. A second floor in a stock car half way between the ordinary floor and the roof, to increase the carrying capacity of the car for small live stock, such as pigs, etc. See UPPER FLOOR, and CAR.

(Automobile Car.) A similar arrangement fitted in an automobile car.

Double Door. A door made in two parts. These are sometimes fastened together by hinges, so as to fold back on each other, and sometimes each part is hinged

to one of the door posts. Sliding doors are also sometimes made in two parts.

(Fruit Car.) Doors in pairs, one inside the other, as in refrigerator cars, etc., are also called double doors.

Double Lip Retaining Ring (Steel Tired Wheels). One of the common methods of attaching a steel tire to the body of the wheel.

Double Pipe Clip. An iron band made with two bends for holding two pipes (as heater pipes) in their place. See CLIP.

Double Pressure Retaining Valve. See PRESSURE RETAINING VALVE.

Double Track Snow Plow. Fig. 447. A snow plow for use on railroads having two or more tracks, and so constructed that it throws the snow to one side only.

Double Transom Truck. A four-wheel passenger truck with two bolsters, designed to give the same easy-riding qualities as the six-wheel truck.

Double Washer. A washer that serves two bolts.

Double Web Bolster. A single bolster consisting of two beams. The term is not a desirable one, as it is likely to be confused with Double Body Bolster.

Dovetail. A flaring tenon adapted to fit into a mortise having receding sides so as to prevent the withdrawal of the tenon in the directions to which it will be exposed to strain.

Draft Arm. See DRAFT SILL.

Draft Beam. A substitute for draft timbers and stops, being cast in one piece and bolted on the inside of the center sills.

Draft Casting. 11, Fig. 34; 5, Fig. 80; 15, Fig. 111. One of a set of castings riveted or bolted to the draft sills and transmitting to them the stresses received from the draft gear. The latter lies between the draft sills and the ends of its follower plates bear against shoulders on the castings. See FRONT AND BACK STOP.

Draft Door (Baker Heater). A door in the smoke flue base, automatically opened and closed by the fire regulator, by which the fire is regulated.

Draft Gear. 55, Figs. 34, 35; Figs. 744-797, 2671-2674; Pages 1133, 1154, 1182, 1197, 1224, 1278, 1290, 1291, 1301, 1309. A term used to designate the apparatus which connects the coupler or drawbar with the car sills. It receives and dissipates the shocks received by the coupler, thus tending to prevent their damaging the car. See FRICTION DRAFT GEAR, TANDEM SPRING DRAFT GEAR, TWIN SPRING DRAFT GEAR.

(Passenger Equipment Car.) See THREE-STEM EQUIPMENT.

The report in the 1901 M. C. B. Proceedings, page 265, discusses the question of making car design favorable to the draft gear, designs of draft gear, wooden draft timbers and metal beams, springs, etc. An appendix includes drawings of different types of draft gear in use and reports of tests made by different roads.

The report in the 1902 M. C. B. Proceedings, page 143, includes complete reports of tests of 10 different draft gears at the Purdue University testing plant.

The committee reported in the 1903 Proceedings, page 94, that steps were being taken to secure data as to the service results from different types of draft gears.

The committee recommended in the 1904 Proceedings, page 129, a standard spacing for center sills, stops for metal sills, distance from horn of coupler to facing of buffer beam, distance between stops and designs for followers and yoke. This was referred to the committee on standards.

A topical discussion on the advisability of a stronger draft gear for passenger cars will be found in the 1904 M. C. B. Proceedings, page 257.

The report in the 1910 Proceedings, page 371, presents the details of a draft gear testing machine to provide applications similar to those encountered in service.

The strength requirements for the draft gear on cars for interchange is considered in the 1914 M. C. B. Proceedings, page 396.

A report of a committee on draft equipment in the 1915 M. C. B. Proceedings, page 443, discusses the result of a circular of inquiry to find out the general practices as to draft equipment and its weaknesses.

A report of a special committee on draft gear in the 1916 M. C. B. Proceedings, page 326, concerns the minimum end force that can be put on the underframe of freight cars without overstraining them. See also Impact Tests.

Draft Gear Carry Iron. A plate which extends underneath the draft sills and supports the draft gear. See DRAWBAR CARRY IRON.

Draft Gear Cheek Casting. See DRAFT CASTING.

Draft Gear Followers. See FOLLOWERS.

Draft Gear Tie Rod. A rod which connects an end sill or platform end sill with a body bolster or other cross timber to tie them together. The term is sometimes applied to the draft rods of continuous draft gear.

Draft Key. Fig. 748, etc. A key used with some forms of draft gear.

Draft Lug Angle. 44, Fig. 348. An angle riveted to the bottom of the center sill at the draft gear, to which the lower part of the draft casting is fastened.

Draft Plate. See DRAFT CASTING.

Draft Regulator. See FIRE REGULATOR.

Draft Rod (Continuous Draft Gear). A rod which unites two drawbars at opposite ends of a car, and relieves the draft timber attachments from tensile stress.

Draft Sill. 1, Fig. 80; Figs. 711-720; Pages 1127, 1133, 1182, 1297. In wooden cars commonly designated as Draft Timber. The center sills which transmit the draft stresses from end to end of the car are sometimes termed the draft sills. When metal draft members are used the term draft sill is almost universally applied. See SILL SPLITING.

Draft Sill Tie Plate. Fig. 970. A plate riveted to the draft sills to help in holding them rigid.

Draft Spring. A spring attached to a coupler or drawbar to give elasticity. They are usually so arranged by means of follower plates at each end as to resist either tension or compression.

Draft Spring Pocket. A drawbar spring pocket.

Draft Spring Stop. A metal sleeve or thimble in the center of a spiral draft spring to resist excessive compression. Not to be confused with a drawbar stop.

Draft Spring Thimble. A projection riveted to the follower plates and fitting inside the draft spring to hold it in place.

Draft Timber. A pair of timbers, carrying the drawbar attachments, placed below the center sills, and usually extending from the platform end timber of passenger equipment cars, or the end sill of freight cars, to the body bolster.

Draft Timber Bolt. A bolt used to secure a draft sill to a center sill.

Draft Timber Pocket. A casting attached to the body bolster or center sills of a car to receive the end of a draft timber.

Draft Timber Tie Bar. A transverse iron bar attached to the under sides of a pair of draft timbers to tie them together.

Drain Cock. See Reservoir Drain Cock.

Drain Cup or Drip Cup (Air Brake). A globular receptacle under a triple valve to collect water of condensation.

(Refrigerators and Ice Cars.) Figs. 213, 229. A metal cup through which the drippings from the ice pass, but which is so arranged as to prevent the entrance of air to the car.

Draining. See Air Brakes.

Drain Valve (Car Heating). A valve for draining off the water condensed in the steam pipes where an automatic trap is not used.

Draw Head. The head of an M. C. B. automatic coupler, exclusive of the knuckle, knuckle pin and lock.

Draw Spring. See Draft Spring.

Draw Timbers. See Draft Timbers.

Drawbar. 9, Figs. 34, 35; 16, Fig. 111; 6, Fig. 173. Used synonymously with Coupler. It has been used indiscriminately to designate both the old link and pin drawbar and the modern automatic car coupler. There has been in the past an effort to confine the name drawbar to the old link and pin type, but in the proceedings of the M. C. B. Association, in speaking of the height of drawbars, the term is applied to the M. C. B. standard automatic coupler. See Automatic Car Coupler.

Drawbar Carry Iron. 10, Figs. 34, 35; 22, Fig. 80; 28, Fig. 348; Figs. 702, 703, 706-710A; Pages 1154, 1182. A U-shaped strap fastened to the under side of the end sill and supporting the outer end of the drawbar. Often contracted to carry iron or carrier iron. Also called stirrup.

Drawbar Centering Device. Figs. 538, 542-544, 697-705; Pages 1182, 1301. A device for maintaining the drawbar normally in the center line of draft, but allowing it to move to either side when the car is rounding a curve and is coupled to another car.

Drawbar Safety Lug. See Coupler Horn.

Drawbar Stirrup. See Drawbar Carry Iron.

Drawbar Stop. See Draft Casting.

Drawer Pull. A wooden or metal attachment on a drawer to take hold of in pulling it out.

Drawing Room. A small room or compartment in a drawing-room car. See Stateroom.

Drawing Room Car. A term at one time applied to parlor cars, but now usually restricted to certain types of sleeping cars which have one or more separate compartments or drawing rooms containing a double-berth section and a sofa or lounge, in addition to which they are usually supplied with a private toilet. Such a car is termed a Drawing Room Sleeping Car. See Parlor Car.

Draw-Off Cock (Baker Heater). A cock for emptying the pipes.

Dressing Room. Another name for a saloon, particularly one provided with wash bowl and toilet facilities.

Drier, Japan, Specifications for (M. C. B. Recommended Practice).

In 1916 the following Specifications were adopted for Japan Drier:

1. *Scope.*—These specifications cover hardener and drier or japan to be used in making paint for freight equipment cars.

I. PHYSICAL PROPERTIES AND TESTS

2. *Drying Test.*—(a) Turpentine. When equal parts by weight of the japan and of pure turpentine (M. C. B. Specifications for Turpentine) are thoroughly mixed and poured over a slab of glass, which is then placed nearly vertically at a temperature of 100° F. with free access of air, but not exposed to draught, the coating shall be hard and dry, neither brittle nor sticky, in not exceeding twelve minutes.

(b) Linseed Oil. When 15 per cent of japan and 85 per cent of pure raw linseed oil (M. C. B. Specifications for Linseed Oil) by weight are thoroughly mixed and poured over a slab of glass which is then placed nearly vertical at a temperature of from 65 to 85° F. with free access of air, but not exposed to draught, the coating shall dry throughout, neither brittle, nor sticky, within four hours.

3. *Curdling Test.*—When thoroughly mixed with pure raw linseed oil at the ordinary temperature in proportion of 5 per cent by weight of japan to 95 per cent by weight of raw linseed oil, no curdling shall result, nor any marked separation or settling on standing.

4. *Residue Test.*—When five cubic centimeters of the japan are poured into 95 cubic centimeters of pure turpentine at the ordinary temperature and thoroughly shaken, a clear solution shall result, without residue, on standing one hour.

II. PACKING AND MARKING

5. *Packing.*—Japan drier shall be put up in moisture-proof barrels, cans or packages, according to the railroad company's requirements.

6. *Marking.*—The manufacturer shall mark the japan drier packages according to the railroad company's requirements.

III. INSPECTION AND REJECTION

7. *Inspection.*—(a) The inspector representing the purchaser shall have free entry, at all times while work on the contract of the purchaser is being performed, to all parts of the manufacturer's works which concern the manufacture of the material ordered. The manufacturer shall afford the inspector, free of cost, all reasonable facilities to satisfy him that the material is being furnished in accordance with these specifications.

(b) The purchaser may make the tests and inspection to govern the acceptance or rejection of the material in his own laboratory or elsewhere. Such tests and inspection shall be made at the expense of the purchaser.

(c) All tests and inspection shall be so conducted as not to interfere unnecessarily with the operation of the works.

8. *Rejection.*—Material represented by samples which fail to conform to the requirements of these specifications or which contain more than 55 per cent volatile material, or contains less than 25 per cent turpentine in the volatile material, will be rejected.

9. *Rehearing.*—Samples tested in accordance with this specification, which represent rejected material, shall be preserved for fourteen days from the date of test report. In case of dissatisfaction with results of tests, the manufacturer may make claim for a rehearing within that time.

Drinking Cup Vendor. Fig. 1750.

Drinking Fountain. Figs. 1750, etc. See WATER COOLER.

Drip Coupling or Basin Coupling (Wash Basin). The connection of the waste pipe or drip pipe with the basin.

Drip Cup (Air Brake). A receptacle inserted in the brake pipe to receive water condensing therein. A drain cup.

Drip Pan (Refrigerator Car). Figs. 213, 229, 895. A dish or pan at one corner or end of the car for receiving the water from the melting ice, usually permitting it to escape by a trap.

Drip Tray. An enameled piece of iron placed directly under the seat of a closet, and over the bowl.

Drip Valve. Figs. 2069, 2095. See also RESERVOIR DRAIN COCK.

Drip Valve, Automatic. Used in connection with an automatic connector.

Driving Chain (Steam Shovel). A pitch chain, used to make the steam shovel self-propelling, by engaging with the pitch gear attached to one of the axles.

Drop (of Lamp). The drop of a center lamp is its extreme length, measured from the ceiling to the lowest part of the lamp.

Drop Bottom. See DROP DOOR.

Drop Bottom Car. Figs. 107, 111-133, 185, 2763-2766; Page 1172. A car with a level floor or bottom, equipped with a number of drop doors, for discharging the load. See also CAR and HOPPER BOTTOM GONDOLA CAR.

Drop Brake Shaft. Figs. 1536, 1547, 1554, 1566, 1571, etc. A brake shaft which is normally in a vertical position, but can be dropped to a horizontal position and still remain operative should conditions of lading require this to be done.

Drop Door. S. Fig. 111; Figs. 808-819. A door at the bottom of a drop bottom or hopper bottom car for unloading it quickly by allowing the load to fall through the opening. Drop doors are usually in pairs, and are supported by a chain wound upon a winding shaft or by a lever arrangement. Frequently a drop door beam extends across the car above the winding shaft to assist in supporting it and to stiffen the car.

Drop Door Beam. See DROP DOOR.

Drop Door Chain. A chain attached to a drop door and usually connecting it with a winding shaft for the purpose of controlling the door. Also sometimes termed hopper chain.

Drop Door Chain Ring. An iron ring to which are fastened the single chain passing around the door winding shaft and the two chains which are attached to eye bolts in each of the double drop doors.

Drop Door Eye Bolt. An iron bolt with an eye in the upper end which is fastened to a drop door near the edge away from the hinge and to which is secured the drop door chain.

Drop Door-Gear. See DOOR OPERATING APPARATUS.

Drop Door Hinge. A hinge on which a drop door swings; usually made of flat bar iron, bent to form an eye, through which a hinge pin passes.

Drop End Door. Fig. 837. Used on gondola cars. The entire end is arranged to swing down at right angles to its normal position, for loading long material.

Drop End Gondola Car. Figs. 108, 110, 2809, 2812. A gondola car with the ends in the form of doors, which can be dropped when the car is used for shipping long material which extends over more than one car. See also CAR.

Drop Forging. One made by a die under a power hammer.

Drop Suspension (Electric Lighting.) A drop or bent frame is used, attached to the truck frame. As the belt or chain is adjusted by sliding the generator, this is of the sliding type suspension. See SUSPENSION.

Drop Table. A table hinged to the wall so as to drop against it out of the way when desired.

Drop Test Machine (M. C. B. Standard). Fig. 3002.

In 1900 the drop-testing machine was modified and a further modification made in 1901. For details, see illustrations in report of committee, pages 147 to 154, Proceedings 1901. Further modification in 1903. See report of Coupler Committee, Proceedings 1903 and 1904. Modified in 1911 and advanced to Standard.

Dropper Bar. A special rolled steel bar.

Drum. A cylinder over which a belt or band passes.

A chamber of a cylindrical form used in heaters, stoves and flues. It is hollow and thin, and generally forms a mere casing, but in some cases, as steam drums, is adapted to stand considerable pressure.

(Hoisting Gear.) The main cylinder upon which the hoisting rope is coiled. The spur wheel is carried on the same shaft.

Drum Cover (Baker Heater). A sheet iron covering for the circulating drum on the outside of the car.

Drum Shaft (of a Derrick or Crane). The shaft on which the winding drum is carried.

Drum Support (Baker Heater). A bracket on the roof to hold the circulating drum.

Drum System of Car Heating. Fig. 2054, etc. This method of heating employs a hot water circulation within the car, to which a Baker or other similar heater is attached. To provide a means for maintaining heat in the car when steam from the locomotive is used, a drum is employed to transfer the heat of the steam to the water of circulation. Simple forms of drums consist simply of a cylinder or pipe within another pipe of larger cross section, provision being made for the unequal expansion of the pipes, and outlet and inlet openings being provided for the circulation of the steam and water.

Another type is the coil drum or coil jacket, which generally consists of a large steel pipe or casting capped at both ends. In this drum is placed a coil of copper pipe which coil is made a part of the hot water circuit within the car. Steam from the locomotive is admitted to this drum around the copper

coil, through which heat is imparted to the water of circulation. That part of the circuit above this drum becoming relatively lighter than the water of the circuit, a movement of the circulating medium is produced, creating a steady flow up through the coil. The amount of heat communicated to the circulating medium depends upon the surface of the coil and upon its conductive power to heat. A pressure of from 10 to 20 pounds of steam is carried in the drum.

Dry Closet. Figs. 1783, etc. A closet, so called in distinction from a water closet, which is not flushed with water.

Duck. A cotton fabric, lighter and finer than canvas, for use in car upholstery.

Dummy End (Passenger Equipment). Fig. 268, etc. A term applied to the end construction commonly used on baggage, express and postal cars, which have no external platform or vestibule.

Dummy Hose Coupling. Fig. 1367, etc. A casting of the same shape as a hose coupling, into which the coupling may be hooked and prevent dirt and debris getting in the brake pipe, as well as to prevent the coupling being damaged when hanging down.

Dump Car. Figs. 134-142, 2793-2796, 2817, 2819; Pages 1123, 1150, 1189, 1209, 1214, 1215, 1304, 1305, 1318, 1319. A car from which the load is discharged either through doors or by tipping the car body. See also CAR, CENTER DUMP CAR and SIDE DUMP CAR.

Dumping Apparatus (Drop Bottom, Hopper Ballast Cars, etc.) Figs. 808-819. Car Dumping Machines.

Dumping Machine, Car. Page 1222. A machine usually built in a coal pier by means of which loaded cars are raised and turned partly over, thus discharging the coal into a conveyor car or directly into a chute by which it is placed in the vessel.

Dumping Tray (Postal Car). Fig. 1911. A tray used in a postal car for handling mail.

Duplex Air Gage (Air Brake). Fig. 1387. A gage to register simultaneously on the same dial the main reservoir pressure and brake pipe pressure. For this purpose a red hand for the reservoir and black hand for brake pipe pressures are provided.

Dust Arrester (of Pintsch Gas Pressure Regulator). A cavity closed at each end by a perforated plate to prevent dust entering to clog the regulating valve.

Dust Deflector (Windows). Fig. 1919. A device for deflecting dust and cinders and preventing them from entering the car, particularly through the windows.

Dust Guard. Figs. 1033-1035, 1065, 1069; Pages 1287, 1302. A thin piece of wood, leather, felt, asbestos or other material inserted in the dust guard chamber at the back of a journal box, and fitting closely around the dust guard bearing of the axle. It is to exclude dust and prevent the escape of oil and waste. Sometimes called axle packing or box packing. See also DUST DEFLECTOR, JOURNAL BOX AND DETAILS.

Dust Guard (M. C. B. Standard). Sheet M. C. B. 15. Fig. 2945.

In 1909 standard dimensions for dust guards were adopted for the four standard journal boxes. See Sheet M. C. B. 15.

In 1913 dimensions for dust guards for 6 by 11 inch journal box were adopted as Recommended Practice.

In 1914 dust guards for 6 by 11 inch journal box were advanced to Standard and shown on Sheet M. C. B. 15.

In 1916 the reinforcement shown on drawing of 6 by 11 inch dust guard was eliminated, and note added reading "Dust guards to be made of wood."

Dutchman. A block or wedge of wood driven into a crevice to hide the consequences of bad fitting in construction. A kind of shim. Also a piece of metal placed under the opening in a pipe clamp to prevent the cutting of the hose when the clamp is tightened.

Dynamo (Electric Lighting). A generator of electric current. See GENERATOR.

Dynamometer. See DYNAMOMETER CAR.

Dynamometer Car. Fig.s 371, 401-418. A car equipped with apparatus for measuring and recording drawbar pull, horse power, train line pressure, and other data connected with locomotive performance and train haul conditions.

(Weighing Head. Figs. 403, 411, 412.) An apparatus attached by means of interlocking yokes to the car coupler, thus transmitting the draw bar pull and buffing stress to the measuring and recording mechanism.

(Recording Table. Figs. 406, 409, 410.) A table on which is mounted the various recording devices which are connected to the weighing head, steam and air lines, integrator and to other parts in the locomotive cab.

(Integrator. Fig. 413.) A horizontally mounted rotating disc consisting of a compound carriage or multiplying device which computes and records.

The description of a dynamometer for determining the lateral stresses exerted by the coupler on the underframe when cars are passing around a curve will be found in the 1908 M. C. B. Proceedings, page 149.

E

Ear Bail (Lanterns). An attachment formed of wire connected with the wire guard, to which the bail is attached, instead of to the body of the lantern.

Eaves Molding (Freight Cars). A plain strip sometimes used outside the fascia.

(Passenger Equipment Cars.) An ornamental finish to the lower edge of the lower deck or main roof outside of and above the fascia. A similar deck eaves molding is used for the upper deck.

Eccentric Pivot Plate (for Seat Arms). A seat arm pivot plate, made eccentric only to get room for screw holes.

Egg Poacher. Fig. 1709. For use on parlor and buffet cars.

Egg-Shaped Stove. A stove resembling an egg in form. It is commonly known simply as a cast iron stove, and is very largely used for cabooses, etc., where appearance is not important.

Ejector. An appliance for operating a vacuum brake by exhausting or "ejecting" air. It consists essentially of a pipe placed in the center of a surrounding shell or casing, with an annular opening between the pipe and the casing. When the current of steam is admitted at the lower end and escapes at the upper end, the air in the casing is drawn out through the annular opening by the current of the escaping steam. The space is connected by a pipe with the appliances on the cars for operating the brakes. Suitable valves are also used in connection with the ejector to shut off and admit steam and air. A muffler is used to render noiseless the escaping steam. It consists simply of

a box of small round balls, like shot, through which the steam must pass to escape. In the latest type a combination ejector is used having two ejector pipes, one a small one, which is kept in action continuously to maintain the vacuum in the brake pipe, and a large one for use in quickly releasing the brakes after a stop.

Elbow. A short L-shaped tube for uniting the ends of two pipes, generally at right angles to each other.

Electric Car. An ELECTRIC MOTOR CAR.

Electric Cell Filler. Fig. 2523. A device for supplying storage battery cells with water.

Electric Compressor Governor. See AIR COMPRESSOR GOVERNOR.

Electric Fan. Figs. 2200, 2201; Pages 1179, 1259.

Electric Heater. Figs. 2116-2161. Heaters used on electrically operated cars, where electric current is available for their operation. Usually placed under the seats. Heat is developed by passing current through resistance coils and is controlled by regulating switches. (Figs. 2119-2158.)

Electric Lamps. Figs. 2375, etc.; Pages 1256-1259.

Electric Lighting. Figs. 2375, etc.; Pages 1167, 1168, 1256-1259, 1294, 1295.

(Storage System.) In this system each car is provided with a storage battery, which must be charged at terminals during the layover period.

(Head-End System.) The head-end system consists essentially of a steam-driven generator located in the baggage car or on the locomotive. Proper controlling apparatus is provided and train lines are run from the generator through the entire length of the train, flexible connections being used between cars. It comprises the following apparatus: A generator, usually steam turbine-driven, placed in the baggage car or on the locomotive, and furnished with steam from the locomotive; the necessary indicating, regulating and controlling apparatus placed near the generator and in an accessible position; train line wires of the proper size on each car and running the entire length of the train, flexible connections being made between cars, in the vestibule; batteries, consisting of a suitable number of cells connected in series and placed in battery boxes attached to the under side of the cars; lamp regulators are sometimes installed in the cars to compensate for the line drop and to maintain constant voltage at the lamps.

(Axle Generator System.) The axle generator systems used in this country comprise the following principal parts: An axle-driven generator mounted on the car truck. (Abroad where rigid trucks are used the axle generator is frequently secured to the under side of the car body.) A suspension by which the axle generator is supported from the truck frame. A drive connecting the armature shaft to the axle. A regulator for controlling the voltage and output of the generator at all train speeds. An automatic switch designed to open on reverse current for the purpose of preventing discharge of the battery through the generator. A regulator for controlling the voltage impressed on the lamp circuits. A battery of a suitable number of cells to supply current when generator current is not available.

For the successful operation of the system, the following requirements must be met: The polarity of the generator terminals must remain unchanged with a movement of the car in either direction. At all train speeds from the cutting-in speed of the generator to the maximum, the generator output and voltage must be maintained within the desired working limits. The generator must be automatically connected and disconnected from the battery circuit as the train speed rises above or falls below the critical speed. The lights may be burned at any time and the transfer of this load from the battery to the generator and vice versa must result in no appreciable change in the candle power of the lamps. The voltage impressed on the lamp circuit must be maintained within such limits as will give satisfactory illumination and reasonable life of lamps.

Electric Lighting (M. C. B. Recommended Practice). Figs. U to U-7. Figs. 3050, 3064-3071.

In 1912 the following specifications were adopted for electric lighting of passenger equipment cars. Revised 1913.

In 1914 safety hangers for battery box trays were added, dynamo pulley fit for axle and electric light bulb G 18½ were changed. Revised 1915. Revised and rearranged in 1916. Revised in 1917. A part of these specifications were adopted as Standard in 1917.

In 1918 sizes of ball bearings for axle generators, were adopted as Recommended Practice.

2. *Descriptive Notices.* That each electrically lighted car in steam service shall be provided with a notice located in or near the switchboard locker as follows:

A. B. & C. Railroad

Description of Electric Light Equipment.

This car is lighted by ....V.... System

	Gen.	Gen. Reg.	Lamp Reg.
Make	....	....	....
Type	....	....	....
Set for volts—max.	....	....	....
Set for V floating	....	....	....
Set for amps. battery	....	....	....
Set for amps.—max.	....	....	....

Pulleys.—Axle ....in. dia. ....in. face; ....in depth of flange.

Armature ....in. dia. ....in. face.

Belt.—Length ....ft. ....in. Width ....in.

Battery.—No. cells on car ......; No. sets in parallel ......

Amp. hr. capacity each set at 8 hr. rate ......

Charging current each set ...... normal, ... max.

Lamps.—Voltage.

Load.—Lights (including fans) ...... amps.

Battery ...... amps.

Total .... amps.

Train Line Wires.—No. ...... (2 or 3). Size ...... A. W. G.

3. *Clearances.*—(a) The axle-generator suspension shall be so designed that with car on level track the clearances shall be as great as possible, but not less than those specified below:

(b) From any part of the generator or suspension to the rail....................................6 in.

(c) On truck-suspended generators, from any part of the generator or suspension to the car body or any part attached thereto.................3½ in.

(d) With all parts of the car and axle generator, affecting the clearances, in the same condition as when new, with the minimum belt tension to drive load and with the generator in any service position

with respect to the suspension and with the truck in any service position with respect to the car body, the clearance from any part of the belt to

	End Sill. Over.	End Sill. Under.	Brk. Beam. Over.	Brk. Beam. Under.	To Any Other Part Car Body or Truck.
Trk. Sprtd. .	1 "	1½"	2½"	1"	½"
Body Sprtd. .	1½"	1½"	3 "	1"	1 "

(e) With any or all parts of car and axle generator worn to the allowable limits and other conditions the same as in paragraph (d), from the belt to any part of the truck or car body......................½ in.

NOTE.—As the question of obtaining the above clearances is essentially a problem of car and truck design, it is recommended that all car designers pay special attention to this feature. The chairman of this committee has been instructed to take this matter up with the other M. C. B. committees interested.

II. GENERATOR

4. *Suspensions.*—(a) In axle-generator suspensions, all supporting parts subject to wear shall have the wearing surfaces bushed.

(b) All axle generators provided with safety chains or an equivalent construction which will safely support the generator in case of failure of the suspension.

(c) In truck-supported axle generator suspensions, if side arms be used, the end to be secured to the truck frame shall extend under the transom and be secured to the side frame near the transom, and shall be securely attached to the end sill by a U bolt not less than ¾ in. in diameter, or a construction equivalent in strength.

7. *Armature Pulley.*—(a) The armature pulley shall be flanged and crowned, with a 7-in. face and a diameter of preferably 8 in. or 11 in.

(b) On all ball-bearing axle generators having armature pulleys 8 in. in diameter or larger, the armature pulley shall be in accordance with the dimensions as shown on Sheet U-7.

(c) On all sleeve-bearing axle generators having armature pulleys 8 in. in diameter or larger, the armature pulley shall be in accordance with the dimensions as shown on Sheet U-7.

(d) On all axle generators having armature shafts less than 1½ in. in diameter at inner end of pulley seat, the armature pulley shall be in accordance with dimensions shown on Sheet U-7.

8. *Armature Pulley Seat.*—(a) On all ball-bearing axle generators having armature pulleys 8 in. in diameter or larger, the pulley end of the armature shaft, the nut, key and cotter pin shall be in accordance with the dimensions as shown on Sheet U-7.

(b) On all sleeve bearing axle generators having armature pulleys 8 in. in diameter or larger, the pulley end of the armature shaft, the nut, key and cotter pin shall be in accordance with the dimensions as shown on Sheet U-11.

(c) On all axle generators having armature shafts less than 1½ in. in diameter at end of pulley seat, the pulley end of armature shaft, the nut, key and cotter pin shall be in accordance with the dimensions shown on Sheet U-11.

11. *Ventilation of Battery Boxes.*—(a) Each battery box shall be provided with adequate ventilation as follows:

(b) Inlet openings located on the longitudinal center line of the floor of the battery box, having a combined area of approximately 6 sq. in. for each 22⅝-in. compartment.

(c) Outlet openings located near the top of the battery box, having a combined area of approximately 6 sq. in. for each 22⅝-in. compartment.

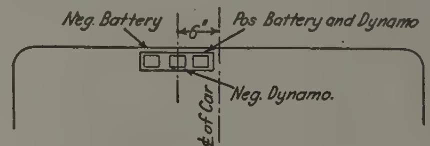
15. *Fuses for Batteries, Etc.*—(a) That each electrically lighted car equipped with battery box or boxes shall be provided with suitable metal fuse boxes, said boxes to be mounted close to the positive and negative terminals of each set of batteries, as shown on Sheet U-4 and Sheet U-3.

(c) The fuse block shall be provided with contacts:

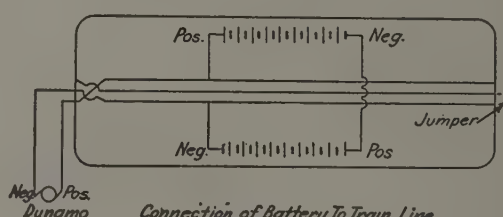
(1) To receive a link fuse, as shown on Sheet U-5, or

(2) To receive a standard N. E. Code 150-ampere cartridge fuse, or

(3) A fuse holder to receive a link fuse, as shown on Sheet U-5 (designed to replace the N. E. Code cartridge fuse).



Location of Connector and Arrangement of Terminals When Facing Car.
Fig 1.



Connection of Battery To Train Line
Fig.2.

17. Train *Lines and Connectors.*—(a) Cars operated in head-end system trains shall be equipped with three train line wires of No. 4/10 A. W. G.

(b) Cars not operated in head-end system trains may be equipped with two train line wires of No. 2 A. W. G.

(c) All cars equipped with train lines shall have the wires terminate in train line receptacles so designed that a standard train line connector, as shown on Sheet U, may be used.

(d) If only two wires are used, they shall be connected to the outside terminals, and the train line receptable on each end of the car shall be stenciled:

"NOT FOR USE ON HEAD-END SYSTEM"

(e) Where three train line wires are used, they be transposed, as shown on Sheet U.

(f) Where two train line wires are used, they shall be transposed, as shown on Sheet U.

(g) Train line connections in each car shall be made across battery and generator circuit.

18. *Generator Leads.*—The electrical connections between the axle generator and permanent wiring on the car shall be made in such a manner that the leads can not be transposed.

19. *Ball Bearings.*—Ball bearings used shall be of the sizes shown in the following table.

Truck	Body					Franklin Railway Supply Co.
	Width of Belt Required to Transmit Necessary Power.					
	5 In.		4 In.		3In.	T-35
Both Ends	Pulley	Commutator	Pulley	Commutator	Both Ends	Both Ends
412	412	*412 †409	409	*409 †407	407	404

*Preferred. †Alternate.

IV. LAMLPS.

22. *Lamps.*—Standard lamps for car-lighting service shall be in accordance with the dimensions as shown on Sheet U-9.

V. AXLES

23. *Dimensions at Pulley Fit.*—The dimensions of axles at the point of pulley fit shall be in accordance with dimensions shown on Sheet U-11.

Train Lighting. Standard.—In 1912 specifications were adopted for electric lighting of passenger equipment cars. Revised and modified in 1913, 1914, 1915 and 1916. In 1917 the following part of these specifications was adopted as Standard:

I. GENERAL

1. *System Voltages.*—(a) In electrically lighted cars the following voltages should be used:

(b) Sixty volts (nominal) for straight storage and head-end systems.

(c) Thirty volts (nominal) for straight storage and axle-generator systems. (Individual cars.)

5. *Mounting.*—When facing the end of the truck on which the axle pulley is mounted, the generator pulley or sprocket shall preferably be on the right of the generator.

6. *Axle Pulley and Bushing.*—(a) A straight pulley seat shall be provided for the axle pulley.

(b) If a bushing be used, it shall preferably be secured to the axle independently of the pulley and have an external diameter throughout its length of 7½ in. and be not less than 8½ in. long.

(c) The hub of the axle pulley shall have a uniform internal diameter of 7½ in.; the length of the hub shall be 6½ in.

(d) The face of the axle pulley shall be not less than 9 in. if flangeless, and not less than 8 in. if flanged.

(e) The diameter of the axle pulley shall be as large as the construction of the car will permit, preferably 21 in. or 17 in.

9. *Size of Ball-bearings.*—On all truck-supported, ball-bearing axle generators the bearing shall be the size known commercially as No. 412.

10. *Design of Battery Boxes.*—(a) Battery boxes shall have interior dimensions at least as great as below.

Height in clear, 21½ in.

Depth, front to back, 2 ft. 1 in.

Length of compartment to hold two standard double compartment trays, 22⅝ in.

Length of compartment to hold four standard double compartment trays, 3 ft. 9¼ in.

(b) Battery boxes with two compartments, each 22⅝ in. long, or with one compartment 3ft. 9¼ in. long, shall be designed to carry a battery weight of not less than 1600 lb.

(c) Battery boxes with four compartments, each 22⅝ in. long, or with one compartment 3 ft. 9¼ in. long, shall be designed to carry a battery weight of not less than 3200 lb.

(d) That in all battery-box designs two angle irons or straps shall extend longitudinally under the battery box located so that in case of a defective battery-box floor the trays will be supported by the said angle irons or straps. The angle irons or straps shall be attached to the car body independently of the battery box and shall be of sufficient strength in all parts to safely support the weight of battery as given in paragraphs 10 (b) and (c); plus the weight of the battery box. The angle irons or straps shall be so installed that they can be readily inspected. A construction equal to the above in strength and safety will be allowed.

12. *Trays.*—Storage batteries for car-lighting service shall be assembled in trays whose maximum dimensions shall not exceed those given on Sheet U-4 when used in battery box having minimum dimensions given in paragraph 10 (a).

13. *Connections.*—(a) That where two or more cells are assembled in one tray, the connections and arrangements of battery terminals shall be as shown on Sheet U-4.

(b) The connections between the terminals of the battery and car wiring shall be made with a connection as shown on Sheet U-4, Fig. 7.

(c) When the Westinghouse type connector is used to connect battery to car wiring, it shall be installed as follows: At the positive terminal of the battery the male end of the connector shall be attached to the positive battery terminal lead and the female end to the car wiring. At the negative terminal of the battery the reverse connections shall be made.

(d) That each set of batteries shall be connected

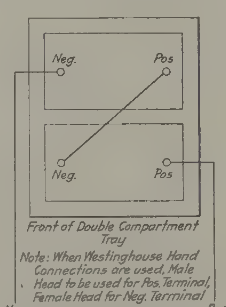


Fig. 3.
Connection and arrangement of Terminals in Double Compartment Tray.

so that, facing the battery box, the positive terminal is at the right, as shown on Sheet U-4, Fig. 7.

14. *Charging Receptacles for Batteries.*—(a) That each electrically lighted car equipped with batteries shall be provided with two charging receptables, as shown on Sheet U-2, so as to receive plug shown on Sheet U-2.

(b) These receptacles shall have swivel supports, as shown on Sheet U-1.

(c) These swivel supports shall be installed one on each side of the car, as shown on Sheet U-4 and Sheet U-3.

(d) The outer annular contact shall be connected to the positive terminal of the battery, as shown on Sheet U-4 and Sheet U-2.

III. WIRING

16. *Terminals, Arrangements and Identification.*—(a) The terminal connections of the generating, regulating and controlling apparatus shall be marked for identification and polarity.

(b) The positive terminals shall be at the right, when facing the board (if terminals are arranged horizontally) and at the top (if arranged vertically).

19. *Switchboards.*—(a) That each electrically lighted car shall be provided with a switchboard, upon

which shall be mounted the necessary switches, fuse contacts and terminal connections.

(b) The switches and terminal connections shall be so arranged as to disconnect (when opened), and the fuses to protect the following parts, if same be used:

(1) Train line. (2) Battery. (3) Axle generator. (4) Main light switch or fuses. (5) Circuit for lamps, fans, etc.

(c) Each of the above switches or fuse contacts shall be plainly marked, designating the part controlled or protected.

(d) The terminals for the axle generator at the generator regulator panel shall be arranged so that, when open, they shall disconnect the positive and negative armatures and one side of the field circuit.

20. *Fuses for Wiring, Etc.*—(a) The switchboards or regulator panels of electrically lighted cars shall be provided with fuses for the protection of the parts given below:

(1) *Train Line.*—Contacts for use with open link fuses shall be provided substantially as shown on Sheet U-5, the stud or screw to be ¼ in. in diameter, with twenty threads per in. set on 2½-in. centers.

(2) *Battery.*—Use of fuse optional. If fuse be used, the fuse and the fuse contacts shall be the same as for train line.

(3) *Main Light Switch.*—Use of fuse optional. If fuse be used, the fuse and fuse contacts shall be the same as for train line.

(4) *Circuits.*—For the distribution circuits to the lamps, fans, etc., the fuse and fuse receptacle shall be of the Edison screw-shell type, as shown on Sheet U-5.

(5) *Axle Generator.*—The positive armature to have fuse contacts suitable for a 150-ampere knife-blade N. E. Code fuse, with 4-in. clearance space between contacts, as shown on Sheet U-5.

(6) The use of a fuse in the field circuit is optional. If used, the contacts shall be suitable for a 0 to 30 ampere, ferrule type, N. E. Code fuse, with 1 in. clear space between contacts, as shown on Sheet U-5.

(b) All fuses on cars shall be used in the location and shall conform to the dimensions as shown on Sheets D, F, G and H.

(c) The capacity of the fuses used in the above contacts shall be such as to protect the apparatus in question.

21. *Installation of Conduit and Wire.*—The following rules shall be used for car wiring:

(a) *Conduit.*—All conduit shall conform to the requirements of the National Electrical Code, except that minimum size of ⅜ in. may be used. It shall, whenever possible, be run on the interior of the car, but not exposed to view. Ends of conduit shall be cut square and the interior reamed smooth, the contour of the material from the inner to the outer wall at the ends being approximately a quarter circle. Conduits shall not "butt" in couplings. Where threads on conduit are exposed, they shall preferably be red or white leaded and painted. The conduit shall be of such a size and so arranged that the wires may be pulled in after the car is completed and pulled out for repairs without it being necessary to remove the interior finish of car. Conduit less than ⅜ in. shall not be used. Conduit and fittings shall be firmly and securely attached to the car body. The conduit system shall be so installed as to form a good, continuous electrical conductor, and shall be grounded to the framework of the car. On steel or steel-underframe cars the supports of the conduit system will be considered as constituting an adequate ground. On wooden cars the conduit system shall be grounded by means of a copper wire of not less than No. 6 A. W. G., securely attached to the conduit and to some portion of the steelwork of the car that has an electrical connection with the rail, so as to form a good electrical connection at the points of attachment. The connections of the ground wire shall be exposed to view and easily accessible.

(b) *Fuse, Junction Boxes, Etc.*—Fuse, junction, outlet, connection and pull boxes exposed to the weather shall be of cast iron. The wall thickness at the bosses for the conduit shall be such as to ensure at least five threads of the conduit are engaged and that the interior of the boss be rounded off so as to provide the equivalent of an outlet bushing. "Knock-out" boxes or pressed or formed steel boxes may be used when not exposed to the weather, and, when used, lock-nuts shall be used on the conduit on both sides of the box wall and an outlet bushing on the end of the conduit. Pull boxes shall be installed where, on account of the length of run or number of bends, it would otherwise be difficult to pull in the wires. Fuse boxes for the main battery fuses shall be installed as close to the terminals of the battery, both positive and negative, as possible. All boxes shall be so installed as to render the covers of same readily accessible. The covers of boxes exposed to the weather shall be applied in such a manner as to render the box "weather-proof."

(c) *Wire.*—All wires shall be insulated with Grade "A" (30 per cent Para rubber) insulation, if mineral base compound be used, according to the specification of the Association of Railway Electrical Engineers, or equivalent, and shall be double braided, or if a wax base compound be used, it shall be of a corresponding quality. No wire smaller than No. 14 A. W. G. shall be used, except for fixture work, where No. 18 A. W. G. is permissible. All wires shall be run in metal conduit. No wire shall carry, under normal operating conditions, a current in excess of the values permitted by the National Electric Code for the size of wire in question. Train line wires on cars intended for service on head-end system shall be No. 4/0 A. W. G. Train line wires on cars not intended for service on head-end system shall be No. 2 A. W. G. All wires of No. 8 or larger shall be stranded. Train line connections between car shall be as follows:

Head-End System.—No. 2/0 A. W. G., 833 strands or more, 5-64 in. insulation and one braid.

Not for Head-End System.—No. 2 A. W. G., 133 strands or more, 4-64 in. insulation and one waterproof braid. The leads from the generator to the terminal connector on the car body shall be as follows:

Armature Leads.—No. 4 A. W. G., 61 strands, 4-64 in. insulation, one weatherproof braid.

Field Leads.—No. 8 A. W. G., 19 strands, 3-64 in. insulation, two weatherproof braids.

(d) *Joints and Splices.*—The insulation shall be removed from the wire in such a manner that the wire shall not be cut, scored or nicked. All joints and splices shall be so made as to be both mechanically and electrically secure without the use of solder. All

joints and splices shall be soldered; the soldering flux shall be free from acid. All wires joined or spliced shall be installed in such a manner that the joint or splices come in a junction box or fitting. Slack shall be left in wires at junction boxes and other outlets. Care should be taken that no sharp end of wire or solder is left to pierce the insulation and cause a ground. The joint or splice shall be covered with a rubber tape to the thickness of the original insulation, and this covered with friction tape to the overall diameter of the complete insulated wire.

Electric Light Wiring. Figs. 1829, 1830, 2575-2580; Pages 1066-1069. A system or arrangement of insulated copper wires forming a circuit between the generator and the lighting devices. On locomotives and other places where it is necessary to protect the wires from injuries they are enclosed in conduits or otherwise protected.

Electric Motor. See MOTOR, ELECTRIC.

Electric Motor Car. Figs. 385-388, 394, 395. A car which is propelled by electric motors. See MOTOR CAR and CAR.

Electric Motor Car Equipment. Figs. 2581, etc. See Fig. 2586 for arrangement of apparatus.

Electric Shovel. A power shovel operated by electric power.

Electric Train Line Coupler (Electric Lighting). A device somewhat like a steam or air brake hose coupler which is used to connect the electric light circuits on adjoining cars.

Electric Wiring. Pages 1155-1159, 1207. The arrangement of wires by which the electric current is conducted to the various outlets for lamps, dynamos, or other devices operated by electricity.

Electro-Pneumatic Brake. Figs. 1377, 1465, etc. For long high speed electric trains, such as used in subway service. In addition to the functions performed by a quick action automatic air brake means are provided for applying and releasing the brakes on each car through the action of electro-penumatic valves energized by current taken from contacts on the motorman's brake valve and continuous train wires. Brakes on long trains can be applied instantaneously and simultaneously with this device, eliminating any tendency to surging. See AIR BRAKE.

Electro-Pneumatic Car Discharge Valve. Fig. 1455. A valve used with the train-signal equipment on cars employed interchangeably in electric road and steam-road service and requiring electro-pneumatic operation in electric road service and pneumatic operation in steam road service.

Electro-Pneumatic Compressor Switch. A device used in conjunction with the electric compressor governor in the governor synchronizing system for insuring uniform compressor labor. Its operation is controlled by the governor and its function is to automatically open or close the circuit to the motor-driven air compressor when the pressure in the main reservoir line falls below a predetermined minimum or rises to a predetermined maximum, respectively, which pressures are determined by the setting of the governor. See AIR COMPRESSOR.

Electro-Pneumatic Signal System. Fig. 1421. An electrically operated train air-signal system, adapted to either single cars or trains which may or may not carry trailers, and providing means for signalling to the motorman from any part of the train and in as rapid succession as desired, the signals being sharp, distinct and coincident with the pulling of the signal cord. The system is so designed that, if desired, the whistle on each end of every car in the train may be sounded from a signal given from any part of the train. The equipment includes a conductor's signal switch, combined magnet and bracket, signal whistle, jumper and receptacle, cut-out cocks, fuses, snap switches, etc. For cars which operate in both steam road and electric road service, an electro-pneumatic car discharge valve is used, electric operation being used in electric road service and pneumatic operation in steam road service.

Electrode. A term sometimes used to designate the individual elements or plates of a storage battery.

Electrolier. A chandelier of electric lights.

Elevated Car. An electric motor car for use on elevated railways in large cities.

Ell. A short term for elbow.

Elliptic Spring. Figs. 1178, etc.; Pages 1175, 1239, 1248, 1249, 1282, 1292. A spring of elliptical form made of two sets of parallel steel plates of constantly decreasing length. Such springs are generally used for bolster springs for passenger cars.

The set of elliptic springs is the total amount of bend or compression of which the spring is capable. Elliptic springs in service are termed double or duplicate, triplets or triplicate, quadruple, quintuple, sextuple, etc., according to the number of springs used side by side and connected by a single eye bolt, so as to constitute practically one spring.

Emergency Application. See Air Brakes.

Emergency Coupler Knuckle. Figs. 671-673; Page 1227. A knuckle which is designed for use in case of damage to the knuckle of automatic couplers.

Emergency Coupling Device. A short shank coupler which can be chained in place if the standard coupler is pulled out or broken.

Emergency Head Back-Up Connection. A device for application to an automatic connector in order that a back-up cock, brake or signal hose may be coupled to it.

Emergency Valve (Air Brake). 10, Fig. 1382a; Fig. 1456. A valve used for making emergency applications of the brakes with the straight air system. See TRIPLE VALVE.

Emergency Valve Nut (Triple Valve). 28, Fig. 1382A.

Emergency Valve Piston (Triple Valve). 8, Fig. 1382A.

Emergency Valve Seat (Triple Valve). 9, Fig. 1382A.

Emigrant Sleeping Car. A plainly finished sleeping car for the use of emigrants. See SLEEPING CAR

Empire Deck. A form of roof used in passenger car construction in which both the lower deck and upper deck are curved.. Double deck sash, usually half elliptic, are used and the upper deck is vaulted over each deck window. See VAULTED DECK WINDOW.

Empty and Load Brake Equipment (Freight). Figs. 1371, etc. This equipment not only operates to materially increase the total braking power controlling train units on grades, but gives a practically uniform braking power on car units—whether empty or loaded—in any service. In addition to the standard brake cylinder, auxiliary reservoir, and other details now used with the standard freight brake, this equipment comprises: (1) An extra brake cylinder, called the

"load" cylinder, with notched push rod and enclosed locking mechanism, which operates when the equipment is set in load position; (2) suitable connections, levers, etc., to form the connection and required multiplication of power from the "load" cylinder to the "empty" cylinder lever system; (3) a triple valve, slightly modified, to handle the extra volumes and cylinder; (4) a change-over valve, whereby the equipment may be placed in either the empty or load position, as desired; (5) additional reservoir capacity to furnish the air supply for the "load" brake. See AIR BRAKE.

A topical discussion on the desirability of adjusting brake pressure to light and loaded cars will be found in the 1906 M. C. B. Proceedings, page 450.

A topical discussion on the advisability of increasing the train line pressure on loaded cars will be found in the M. C. B. Proceedings, 1901, page 338.

End Axle Guard. The axle guard at the end of a six-wheel truck, to support the outer axle in case of breakage. See AXLE GUARD.

End Belt Rail. See BELT RAIL.

End Brace. 18, Fig. 35; 21, Fig. 210. See BRACE. See BOX CAR END, DESIGN AND STRENGTH.

End Brace Pocket. See POST POCKET.

End Brace Rod. See BRACE ROD.

End Carline. A carline at the end of a car body. See CARLINE.

End Chute Plank. The planking of an inclined floor of a car which discharges its load longitudinally from the end toward the middle of a car.

End Compression Beam (Passenger Equipment Car Framing). A timber directly above the sills over the body bolster against which the compression beam brace and the end counterbrace abut. The compression beam proper is situated at the middle of the car, directly under the window sills. The end compression beam is sometimes omitted.

End Counterbrace (Passenger Equipment Car Framing). More commonly counterbrace. A brace in the side of a car body, between its ends and the body bolster. See COUNTERBRACE.

End Door. 38, Fig. 260; Figs. 831, 834, 836, 871-887. A door in the end of a car.

In box cars this door, when used, is small and generally about half way up to the roof. It is used for loading and unloading long material, which cannot be handled through the side doors. See DOOR FIXTURES, END.

On some classes of automobile cars one end of the car is arranged in the form of a double swing door.

The necessity for seal records on box car end doors is considered in the report of the committee on car construction in the 1913 M. C. B. Proceedings, page 616.

The term is used in connection with passenger cars to differentiate from the vestibule side door.

End Fascia. 42, Fig. 35. A plain board on the end of a car covering the upper ends of the sheathing boards and extending to the roof line.

End Frame. Figs. 298, 300, 301, 498-507; Pages 1147, 1226, 1246. The frame which forms the end of a car body. It includes the posts, braces, belt rail and end plate. See BODY FRAMING and FRAME.

End Girth. See BELT RAIL.

End Girth Tie Rod. An end belt rail tie rod.

End Grab Iron. See GRAB IRON.

End Hook (Signal Cord). A hook sometimes used on the ends of passenger equipment cars, high up under the platform roof, for fastening the end of the signal cord.

End Panel. A panel at the end and on the outside of a passenger equipment car below the window.

End Piece (Wooden Truck Frame), 17, Fig. 1003. A transverse timber or bar by which the ends of the two-wheel pieces of a truck frame are tied together. A crooked end piece is one cut away on top to clear the draft gear. The inside end piece is the one nearest the center of the car, in distinction from the outside end piece. They are frequently designated as the front and back end pieces.

End Piece Corner Plate (Passenger Equipment Trucks). 130, Fig. 1003. A plate or casting used to connect the wheel and end pieces and stiffen the truck frame.

End Piece Plate. A plate used to stiffen the end piece of a wooden passenger equipment truck.

End Plank (Gondola Car). The planks in the end of the car body. They often form a door, which is hinged to the car floor so as to drop down upon it, and is called a drop end or drop end door.

End Plate. 26, Fig. 34; 37, Fig. 348. A member across the end and connecting the tops of the end posts of a car body and fastened at the ends to the two side plates. It is usually made of the proper form to serve as an end carline.

End Play (Of an Axle). The movement, or space left for movement, endwise.

(Of a Truck Bolster.) Usually called lateral motion. See SWING BOLSTER.

End Post. 21, Fig. 35; 22, Fig. 210; 37, Fig 260. The vertical members in the end body framing between the corner posts.

(Hopper Cars.) A vertical support for the overhang of the hopper floor, resting on the end sill. Ladder rounds are usually secured to the two end posts in the center.

End Post Pocket. A pocket for the end posts. See POST POCKET.

End Rafter. A term sometimes erroneously applied to an end carline.

End Rail. See WAINSCOT RAIL (Lower and Upper).

End Sheet. 19, Fig. 80; 5, Fig. 111. A plate used in closing the end of steel car.

End Sill. 2, Figs. 34, 35; 4, Figs. 80, 173; 3, Figs. 111, 210; 8, Fig. 147; Fig. 506. The transverse member of the underframe of a car framed across the ends of all the longitudinal sills. In wooden underframe cars a heavy timber, approximately square in cross-section and in steel underframe cars a rolled or cast section, or a pressed plate. In passenger cars the end sill comes directly under the end door, the platform, with its various parts, usually being a separate construction.

End Sill Angle. Figs. 967, 969. A commercial angle used on an end sill which is built up of several members.

End Sill Brackets (of Steel Frame Cars). Angle plates used to connect the longitudinal sills and the end sill. In bridge building such plates are termed brackets. When of triangular section they are termed gussets.

End Sill Diagonal Brace. 54, Figs. 34, 35; 9, Fig. 80; A horizontal brace extending from the end sill diagonally back to or beyond the bolster.

End Sill Flitch Plates. The iron or steel plates sandwiched between the wood members of a composite end sill.

End Sill Plate. Fig. 967. A plate extending the full length and width of a built-up end sill, and riveted to the other members.

An iron or steel plate bolted on the face of the end sill of some passenger cars to give added strength.

End Sill and Plate Tie Rod. A tie rod joining the end sill with the end plate.

End Sill Stiffening Angle (Anti-Telescoping Device). An angle riveted or bolted to the end sill stiffening plate and to the end sill on the inside. The inner body truss rods pass through it, the end sill and the truss rod washer plate.

End Sill Tie Rod. An iron rod passing through the end sill and the bolster to tie the two together.

End Slope. The sloping floor from the end of a hopper car to the hopper door. See Hopper Slope Sheet.

End Stiffener. 6, Fig. 111. A reinforcing member extending across the end of a freight car to prevent it from bulging or breaking out due to shifting of the load or end shocks. An end tie band is a member of this kind, but with the ends bent and fastened to the side of the car, thus tying the end of the car securely.

End Stud. See Stud.

End Tie Band. See End Stiffener.

End Timber. See Buffer Beam, End Sill, Platform End Sill.

End Train Pipe Valve (Steam Heating). Figs. 2071; etc. Page 1184. A valve in the train steam pipe at the end of the car by which the entire car may be cut out. Usually operated by an extension handle extending up to the platform or out to the side of the car.

End Truss Plank. See Truss Plank.

End Ventilator. An aperture for the admission or escape of air at the end of a car. See Ventilator.

End Window Panel. A panel at the end and on the outside of a passenger car alongside the window, in distinction from the end panel proper, which is below the window. See Panel.

Equalizer. A short term for Equalizing Bar.

(Vestibule.) A bar in the hood of a platform which equalizes the pressure of the two upper face plate springs and keeps the opposing face plates in contact, so as to maintain frictional contact and exclude dust and smoke.

Equalizer Connecting Chain (Vestibule). Three links of a chain connecting the upper ends of the vertical equalizing levers with the end of the horizontal equalizing lever.

Equalizer Spring. 79, Fig. 1003. A spring which rests on an equalizing bar and carries part of the weight of a car. Single or double coil spiral or helical springs are generally used for this purpose.

Equalizer Spring Block (Passenger Equipment Tracks). 76, Fig. 1010. A casting bolted to the wheel piece and resting on the equalizer spring cap.

Equalizer Spring Cap. 72, Fig. 1003. A casting which fits over the top of the equalizer spring and transmits to it the weight received from the wheel piece.

Equalizer Spring Seat. 73, Fig. 1003. A casting which rests on an equalizing bar and supports the spring.

Equalizing Bar (Passenger Equipment Trucks). 71, Fig. 1003. Commonly abbreviated into equalizer. A wrought iron bar which bears on top of the journal boxes and extends longitudinally from one to the other. Equalizer springs rest on it between the two boxes. It is used to transfer part of the weight on one axle to the other, and thus equalize it on both; hence its name.

Equalizing Bar Pedestal (Four-Wheel Caboose Cars). A casting serving to give a fulcrum to the center of a lever, called an equalizing lever, which distributes the weight of the car evenly on the two axles.

Equalizing Bar Seat. The surface in top of a journal box on which an equalizer rests. See Equalizing Bar.

Equalizing Brake Lever. A floating brake lever is also called an equalizing lever. See Brake Lever.

Equalizing Lever Set. Fig. 1458. An arrangement of cylinder levers and connections for double-truck cars, so designed as to insure proper equalization of braking force on both trucks with either the hand or air brake.

Erecting Crane. Page 1202. Similar to a locomotive crane but usually having no means of propulsion and used for handling material within the radius of its boom.

Escutcheon. A plate or guard for a keyhole of a lock.

Examination of Car Inspectors, Rules for. Recommended Practice.

A topical discussion on "Cannot the General Work of Car Inspectors Be Improved by Giving Some Attention to the Eyesight, Hearing, Etc., of the Men?" will be found in the M. C. B. Proceedings, 1901, page 342.

In 1902 the following rules for examination of car inspectors were adopted as a Recommended Practice of the Association:

REQUIREMENTS.

One year at oiling cars.

Two years at car repairing.

Age limit for new men, thirty years.

Age limit for promoted men, forty years.

Vision, 20-20 in one eye and not less than 20-40 in the other, without glasses.

Method of Testing.—Acuity of Vision.—The test card should be hung in a good light and the party to be examined should, if possible, be seated with his back to the window. Each eye should be examined separately, using, for the purpose of excluding one eye, a folded handkerchief. The lowest line that can be read should be determined by exposing only one letter at a time through a hole cut in a strip of cardboard. In making out the report in each case, the visual acuity of each eye should be denoted by a fraction of which the numerator represents the number of feet at which the applicant is seated from the card, while the denominator represents the number of feet at which the lowest line which he can read should be read. Thus, if at 20 feet he reads the line marked 20 feet, his vision—20-20 or 1, which is the normal standard. If at the same distance he only can read the line marked 70 feet, his vision—20-70. If at 20 feet he reads the 15foot line, the vision—20-15, or more than normal. If a room 20 feet long cannot be used, a testing distance of 15 or 10 feet should be employed, in which case normal vision would be represented by 15-15 or 10-10 respectively, and lower grades of vision by such fractions as 15-20, 10-70 and so on.

Field of Vision.—Test should be made by having the applicant and examiner stand about three feet

apart, each with one eye shut, looking each other steadily in the eye. The examiner should then bring his hand in from the edge of the field toward the center of the space between them, until the applicant sees it coming. This should be done from different directions, up, down and from each side. The applicant should see the hand coming about as soon as the examiner does. If not, this should be noted on the report.

Hearing.—Test should be made in a quiet room. First, the examiner should hold the watch opposite the ear to be examined not less than 48 inches distant, then gradually approach the ear until the applicant hears the tick, the stop being used to satisfy the examiner that the applicant is not deceiving. The distance at which the applicant hears the watch should be noted in inches. The normal ear should hear the tick of the watch at 48 inches. Then the hearing power will be denoted by a fraction whose numerator represents the number of inches at which the watch is heard. Thus, if he hears the watch at 48 inches, his hearing—48-48, or normal. If he hears it at only 10 inches distant, his hearing—10-48, and so on.

Color.—The committee does not think it essential that inspectors should be rejected on account of imperfect color sense. It is, however, believed that inspectors should be tested as to their color sense so that they, as well as their employer, may know their condition in this respect.

Education.—The applicant should be able to write a legible hand in English, and also to read manuscript matter as well as printed matter.

Car Knowledge.—The inspectors should be able to name each part of the cars in general use, in preference using M. C. B. dictionary terms.

M. C. B. Rules.—Inspectors must pass a satisfactory examination on M. C. B. Rules, answering seventy-five per cent of the questions submitted. These questions should be of about the following character:

1. What are the Master Car Builders' Rules?
2. What is the object of the M. C. B. Rules?
3. What is the underlying idea or principle of these rules?
4. When is a company, operating the cars of another company, responsible for defects of such cars?
5. When a company is thus responsible, what should it do?
6. What care should be given to foreign cars by the company hauling them?
7. What cars must be accepted in interchange?
8. What is a defect card and how is it used?
9. Under what conditions is a road obliged to accept a car which is carded for defects for which the owner is not responsible?
10. What are the defects of wheels and axles for which owners and delivering companies are responsible?
11. Describe the form and use of the M. C. B. wheel gages.
12. What are the rules which apply to the cleaning of triple valves and cylinders?
13. What does the limit of height of drawbars mean?
14. When a company is obliged to make improper repairs, what must it do to call attention to such repairs?
15. What does the term unfair usage mean?
16. What are the rules regarding splicing sills?
17. What is the purpose of the repair card?
18. How do these rules apply to switching roads?
19. Are switching roads allowed to render bills against owners direct for repairs of any other than those named in Section 23 of Rule 5?

Exhaust Muffler (Traction Air Brake). A device for subduing the sound of air discharging to the atmosphere during operation of the brakes.

Expanded Metal. A perforated metal screen which is made by slotting a sheet of iron or steel and then drawing it out so that the slots form diamond-shaped holes in the plate. It is largely used in composite concrete construction as a binder and for lockers and window guards.

Expander Ring (Air Brake Cylinder). Fig. 1507.

Express Car. Figs. 283-286, 291, 292. A car operated in passenger trains for carrying express freight. See CAR.

Extensible Trap Door. A trap door with an extension device to prevent passengers stepping between a car and the station platform.

Extension Bracket. See RUNNING BOARD BRACKET.

Extension Reach (Logging Cars). The reach is a long bar connecting the two trucks. The extension reach is adjustable. See LOGGING TRUCK.

Extension Reach End (Logging Cars). A strap for the end of the extension reach.

External Cylinder Gage. A steel ring with a cylindrical hole, which is very accurately made of a precise size, and used as a standard of measurement for the diameters of solid cylindrical objects.

External Screw Gage. A steel ring with a very accurate screw thread in the inside for testing screw threads. See INTERNAL SCREW GAGE.

Extra Transom (Passenger Equipment Trucks). 20a, Figs. 991, 1010. An extra or auxiliary member placed alongside the transom to further strengthen the truck frame.

Extra Transom Tie Rod. 23a, Fig. 1003.

Eye. A small hole or aperture. See EYE BOLT.

Eye Bolt. "A bolt having an eye or loop at one end for the reception of a ring, hook or rope, as may be required.

Eye Bolt Link Hanger. A special form of Swing Hanger having a very short link attached to an eye bolt passing through the transoms.

Eyelet. A short metallic tube, the ends of which are flanged over against the object through which it passes. Used as a bushing or reinforcement for holes. In metallic eyelets of the usual form the two halves which when compressed together form the eyelet are known as grommets. See CARPET EYELETS.

(Window Shade.) A slot in the window shade leather to fit over the sash lift to hold the shade fast.

Eyelet Nail. A wire nail with turned knob for use with carpet eyelets.

F

Fabrikoid. An artificial leather made by coating a cloth fabric with a secret compound which gives it the texture and appearance of leather.

Face (of Rim of Car Wheel). The vertical surface of the outside of the rim.

Face Plate (Steel Tired Wheels). The plates connect-

ing the tire and hub. They are distinguished as front and back face plates.

See VESTIBULE FACE PLATE.

Face Plate Buffer. A buffer plate to which a vestibule face plate is attached. See VESTIBULE FACE PLATE.

Face Plate Buffing Stem (Vestibule). See FACE PLATE PISTON.

Face Plate Piston (Vestibule). A face plate buffing stem corresponding to the side buffer stem, beneath the platform floor. The end is contained in a face plate piston guide.

Fall (Hoisting Tackle). That part of the rope to which power is applied.

Fall and Tackle. Another name for Block and Tackle.

Fan. Figs. 2200, 2201; Page 1179. A device rotated by electric power or other means, used in passenger train cars for the purpose of ventilation.

Fascia. 42, 43, Figs. 34, 35; 11, Fig. 260. A plain board running the length or width of the car, directly under the roof. Is designated as side fascia and end fascia, depending on location. In passenger equipment cars the eaves molding is placed on the upper edge of the fascia.

Fastener. That which fastens or secures one thing to another.

Faucet. Figs. 1724, 1726, 1734-1737, 1755, etc.; Page 1118. A synonymous term with Cock, for fuller definition See PUSH BUTTON FAUCET, BIBB COCK, TELEGRAPH COCK.

Faucet Alcove. A water alcove.

Feed Door (Baker Heater). A door for closing the aperture, giving access to the fire pot or (in base burners) the magazine.

Feed Tube (Oil Lamp). The tube connecting the reservoir with the burner. The standard by which the entire lamp is supported passes through it.

Feed Valve. Fig. 1437. Also called slide valve feed valve.

(Traction Air Brake.) A valve which automatically maintains the pressure of air supplied through the brake valve to the automatic brake system. It may be attached either to the brake valve or placed in the piping between the main reservoir and the brake valve.

(Train Air Signal.) See REDUCING VALVE.

Felt Edge (Car Seats). A device for building up the edges of car seat cushions. It is simply a roll of felt stitched in such a manner as to fit over a cleat: and when tacked down it forms an even elastic face to the cushion.

Female Center Plate. The body and truck center plates are sometimes called male and female plates, respectively. See CENTER PLATE.

Female Gage. An external gage. See EXTERNAL CYLINDER GAGE.

Fender Board. A board at the end of passenger car steps to prevent mud and dirt from being thrown on them by the wheels. More commonly, string board. The splash board, if used, goes on the back side of the steps.

Feralun. A metal cast with one or more incorporated wear, heat and acid-resistant strata, exposed as one or several faces, or embodied at a desired depth. A srtatum may be so exposed as to give a gritty surface of extreme durability and any desired degree of roughness for an anti-slip surface. See SAFETY TREAD.

Ferry Push Car. A very long platform car used for pushing or pulling other cars on or off a ferry boat when the latter is approached by an incline too steep for locomotives, so that the latter can push or pull the cars without running on the incline.

Field Coils. Coils of insulated copper wire or ribbon surrounding the iron poles of a motor field magnet. Standard motors have four poles. Current passing through these coils produces the magnetic flux in which the armature rotates.

Filler Block. A block fitted into the space between the tank head and the end sill of a tank car to prevent the tanks moving on the frame. See TANK HEAD BLOCK.

Filler Cover. Fig. 1730. The cover for the opening to the water tank supply on cars.

Fillet. A small light molding, more generally termed a bead. A rounded corner left on the inside of the angle where two surfaces join.

Filling Cock (Car Heating). Figs. 2082, 2157. A cock used for supplying water to the hot water circulation heating system. In some cases has a funnel attachment.

Filling Device (Car Heating). Figs. 2082, 2157. Used in connection with hot water heating systems.

Filling Funnel (Baker Heater). A funnel attached to the combination cock for filling the circulating drum with brine.

Filling Piece. Any piece of timber or metal used to close a gap.

Filling Spider. See BODY BOLSTER FILLER.

Filling Valve (Pintsch System). Fig. 2249. This valve is a soft metallic seated valve of peculiar construction. Is handled with key, and is a left-handed valve. One is placed on each side of a car, bolted to an iron bracket. The pipe connection is made to a connection piece which is slipped through the bracket from the outside and screwed to the pipe. The filling valve is then bolted back against this flange connection piece, a lead and rubber gasket forming the tight joint. The valve has a sheet iron cover secured to it by four screws.

Filling Valve Cover. Fig. 2247.

Filter. Fig. 1759. A vessel so constructed that water or other liquids must pass through a filtering device, usually containing charcoal, sand, small gravel, etc., thus removing the impurities.

Finger Guard (Brake Beams). Fig. 1340. A projecting rod or finger which prevents the brake beam from being excessively displaced laterally by bearing on the inside of the wheel. A wheel guard.

Finishing Varnish (Painting). An elastic (oily) varnish applied in two coats. See PAINTING.

Fire Extinguisher. Figs. 2024-2026. Usually a small receptacle carried in a corner of passenger cars, and containing some chemical which will extinguish fire.

Fire Regulator and Pressure Indicator (Baker Heater). This device is attached to the hot water circulating pipes at a point a little above the coils, and is somewhat like the old ball and lever safety valve, the ball or weight in this case being the draft door. The fire regulator bowl consists of two concave plates bolted together, with a corrugated steel diaphragm and two copper duplicates, top and bottom, between (for preservation). On this set of diaphragms rests a piston connected with a lever, on one end of which hangs the counter draft damper in the base of the smoke flue. On the front end of this lever is the spiral ad-

justing spring, and the figures denoting the pressure within the heater. The "adjusting spring" is to be hooked into the hole at the figures denoting the pressure and consequent temperature desired.

First Class Car. The ordinary American day coach used by the great bulk of short trip passengers. So called to distinguish it, on the one hand, from those of an inferior grade, as emigrant and (rarely) second-class cars, and on the other hand from sleeping and parlor cars, in which an extra charge, in addition to the ordinary fare, is made. Second-class cars are used in Canada.

Fish Car. Figs. 245-248. A car of similar construction to other passenger train cars equipped with water tanks for the transportation of live fish and also providing quarters for the operators in charge of car and special equipment.

Fixed Brake Lever. More commonly, Dead Lever.

Flag Holder (for Corner Post of Passenger Car). A cast or malleable iron receptacle for a signal flag staff.

Flag and Lamp Socket. See Signal Lamp Socket.

Flange. A projecting rim for attaching a part to any surface by screws or bolts.

(Of a Car Wheel.) A projecting edge or rim on the periphery for keeping it on the rail. See Wheels, and Interchange of Traffic.

Flange Brake Shoes. Brake Shoes so constructed that they bear on both the tread and flange of a wheel.

Flange Fittings (Pintsch System). Special fittings required for the Pintsch system are all flanged and made of brass, the flanges held together by screws. The joints are made tight by the use of special lead and rubber washers.

Flange for Steel and Steel-Tired Wheels. See Wheel Tread and Flange for Steel and Steel-Tired Wheels.

Flange Thickness Gages. See Wheel Flange Thickness Gages.

Flange and Wheel Tread, Form of. See Wheel Tread and Flange, Form of.

Flanges, Wheel, Distance Between the Backs of. See Wheel Flanges, distance between backs of.

Flanger. Figs. 442-445, 447. A form of plow, sometimes placed under a special car, called a flanger car, but usually under a snow plow, for clearing ice and snow from the inside of the rails to provide a clear passage for the wheel flanges. Flangers are also frequently attached to locomotives, either on or just behind the pilot.

Flashing (Plumbing). A lap joint used in sheet metal roofing, where the edges of the sheets meet on a projecting ridge. A strip of lead leading the drip of a wall into a gutter. Hence, extended to mean any strip of sheet metal of an L section used to make a water-tight joint.

Flat Car. Figs. 143-164, 2768-2771, 2813-2815, 2821-2825; 2876; Pages 1145, 1318. A freight car having a floor laid over the sills, and without any housing or body above. See Car and Well Car.

Flexible Car Roof. Figs. 937-941, 946. A roof designed to accommodate itself to the weaving or distortion of the car frame.

Flexible Joint. See Flexible Metallic Joint.

Flexible Metallic Joint. Figs. 2034, 2037-2039, 2047. A metallic joint so designed as to provide for flexibility. For a swing joint, see Figs. 2039, 2047.

Flexible Truck. A truck with a more or less flexible connection between bolster and side frame.

Flitch Plate. An iron or steel plate sandwiched between pieces of wood and bolted together to give the member which they comprise greater strength. Also called sandwich plates.

Floating Connecting Rod (Foundation Brake Gear). A rod which connects a cylinder lever with a floating lever.

Floating Lever. A lever, one end of which is fastened to the fulcrum bracket, the other end connected to the live truck lever, and the middle to the cylinder lever, to which latter is connected the push rod.

Floating Lever Bracket. Fig. 1337. A bracket bolted to the underframe of a car to carry the floating lever of the brake gear.

Floating Lever Hanger. A square bracket or hanger supporting the floating lever.

Floor. 14, Figs. 34, 35; 12, 13, Fig. 348; Pages 1198, 1288. The boards, plates, or other material which cover the sills of a car. In passenger cars the floor consists of two, and sometimes three, courses of boards, called respectively the flooring, intermediate floor and deafening ceiling, the latter being on the under side of the sills. With the introduction of steel passenger cars has come the use of floors of concrete and other mixtures (see Figs. 1614, 1618-1623). An intermediate or upper floor, more commonly called the double deck, is used in stock cars for carrying sheep and hogs. See Floor Nailing Strip, Floor Support.

Floor Beam. 56, Fig. 34; 14, Fig. 348. A beam for supporting the nailing strips or floor stringers in a steel car, and also acting to a certain extent as a tie between the side and center sills.

Floor Chute. See Hopper Tube.

Floor Mat. Fig. 2010. A texture or structure of hemp, cocoa fiber, rattan, india rubber, wood or other material, laid on the floor of a car for passengers to clean their shoes on.

Floor Nailing Strip. 14, Fig. 147. A strip of wood placed between the sills, to which the floor boards are nailed. See Nailing Strip.

Floor Nailing Strip Stiffener. A metal reinforcing strip on a floor railing strip.

Floor Pipe. See Hopper Tube.

Floor Plate. See Center Pin Floor Plate.

Floor, Refrigerator Cars, Height of. See Refrigerator Cars, Floors and Ice Tanks.

Floor Stop (for Door Holder). A catch for a door holder attached to the floor, in distinction from a partition stop attached to the wall or partition. See Door Holder.

Floor Stringer. See Stringer.

Floor Strip. The strips that make the grated floor of a street car.

Flooring Support. See Floor Beam.

Flooring. Pages 1164, 1198, 1288. See Siding, Flooring, Roofing and Lining.

Flow Meter. Page 1177. A device similar to a pressure gage which indicates, and in some types, also records, the flow of steam, water, air or gas.

Flush Bolt. A bolt attached to a slide which is let into a door, sash or window, so as to be flush with its surface. A spring flush bolt is commonly called a cupboard catch.

Flush Bolt Keeper. A plate which is attached to a door, sash or window frame, and has a suitable hole, in which a flush bolt engages.

Flush Door (Box Cars). Figs. 828-830; M. C. B. 30-A; Figs. 3018-3020. A door which is flush with the side of the car when closed.

Flush Handle. A handle for a lock or latch which is placed in a recess, as of a door, sash or berth, and which does not project beyond the surface of the object to which it is attached.

Flush Sash Lift. A metal sash lift with a recess which is let into a sash so as to be flush with its surface.

Folding Door. A door made in two or more sections hinged together to close by folding up.

Folding Lavatory. Figs. 1747, 1757, 1770. A wash stand for the staterooms of sleeping, private and business cars, which can be folded out of the way and out of sight.

Folding Platform Tail Gate. See Tail Gate.

Folding Table Leg. See Table.

Folding Wash Stand. See Folding Lavatory.

Followers. (M. C. B. Standard.) In 1905, that flat followers be made of wrought iron or open-hearth steel 1⅝ inches thick for tandem spring gear and 2¼ inches thick for twin spring and friction gear was adopted as Recommended Practice. Advanced to Standard in 1907.

Follower Block. A special form of draft gear follower plate.

Follower Bolt. A piston follower bolt See Piston.

Follower, Draft Gear (M. C. B. Standard). Decided in 1905 that flat followers made of wrought iron or open-hearth steel 1⅝ in. thick for tendem spring gear and 2¼ inches thick for twin spring and friction gear be adopted as recommended practice. Advanced to Standard in 1907.

Follower Lug. See Check Casting.

Follower Plate. Plates which bear against each end of a draft spring and transmit the tension and compression on the drawbar to the draft springs and to the draft timbers.

Follower Plate Support. A support or guide placed across the center or draft sills for the draft gear followers.

Follower Stop. See Cheek Casting.

Foot Board (Freight Cars). See Brake Step.

Foot Plate (Three Stem Coupler). A cast iron wearing plate on the upper side of the passenger platform end sill. In platforms with vestibules a sliding foot plate is attached to the buffer plate and works or slides back and forth in a foot plate housing.

Foot Plate Housing. See Foot Plate.

Foot Rail. A horizontal wooden bar underneath a car seat for the passengers who occupy the next seat to rest their feet on. A foot rest. See Foot Rest.

Foot Rest. A movable support for the feet of passengers, commonly two horizontal wooden bars underneath a car seat, and attached to two iron rockers, called foot rest carriers, pivoted in the ecnter so that it can be adjusted to a comfortable position for the passengers occupying the next seat, or moved out of the way if desired. Another style is an adjustable foot rest sliding in a grooved channel. A portable stuffed carpet foot rest is usually termed an ottoman or hassock.

Forefoot Sheave (Steam Shovel). A fixed pulley located below the floor under the boom foot sheave about which the hoisting chain runs before being carried to the hoisting drum.

Foreign Car. Any car not belonging to the particular railway on which it is running. See Interchange of Traffic.

Foundation Brake Gear. The levers, rods, brake beams, etc., by which the piston rod of the brake cylinder is connected to the brake shoes in such a manner that when air pressure forces the piston out the brake shoes are forced against the wheels.

Foundation Brake Gear, High Speed, for Passenger Service (M. C. B. Recommended Practice). Figs. 3047-3049.

In 1903 the schedules for high speed foundation brake gear, as shown on Sheets M. C. B.—J, K & L, were adopted as Recommended Practice. Fig. B. C. 7—A was modified in 1907. In 1912 the drawings were revised to permit the hand and power brake to work in harmony. In preparing these schedules the following fundamentals of design were adopted:

FUNDAMENTALS

Following are the fundamentals of the design:

Braking power to be 90 per cent of the light weight of the car.

Equalized pressure in brake cylinder, sixty pounds per square inch.

Maximum pressure in brake cylinder, eighty-five pounds per square inch.

Maximum stress in levers, 23,000 pounds per square inch.

Maximum stress in rods, except jaws, fifteen thousand pounds per square inch; no rod to be less than ⅞ inch in diameter.

Maximum stress in jaws, ten thousand pounds per square inch.

Maximum shear on pins, ten thousand pounds per square inch.

Diameter of pins to provide a bearing value not to exceed 23,000 pounds per square inch.

The reduction of stresses in rods, levers and jaws due to friction of the foundation brake, and the reduction of braking power due to the same cause and to the action of release springs should be neglected, because it is considered to be too difficult to determine their value even with a fair degree of accuracy.

SIX-WHEEL TRUCKS

The committee submits Plate K, schedule "A-1," herewith for cars weighing 80,000 to 100,000 pounds and having six-wheel trucks, and schedule "A" for cars weighing 100,000 to 137,000 pounds and having six-wheel trucks; the difference between these schedules is that a sixteen-inch brake cylinder is to be used for schedule "A" and a fourteen-inch brake cylinder is to be used for schedule "A-1," otherwise they are the same. The location of the fulcrum hole in the cylinder lever is made to vary by quarters of the inch to suit the weight of the cars, but only one fulcrum hole shall be drilled in each lever.

With schedule "A" there should be used a brake suitable for a load of 28,000 pounds, and with schedule "A-1" there should be used a brake beam suitable for a load of 22,000 pounds imposed at the middle of the beam.

FOUR-WHEEL TRUCKS

Plate L, schedule "B-1," submitted herewith, is for cars weighing 50,000 to 70,000 pounds and having four-wheel trucks, and schedule "B" is for cars weighing from 70,000 to 90,000 pounds and having four-wheel trucks, the differences between the two being that a fourteen-inch brake cylinder is to be used with schedule "B," cars weighing 70,000 to 90,000 pounds, and a twelve-inch brake cylinder is to be used with schedule "B-1," cars weighing 50,000 to 70,000 pounds; also that with schedule "B" there should be used a brake beam suitable for a load at the middle of 28,000 pounds, the same as for schedule "A," and with schedule "B-1" there should be used a brake beam suitable for a load at the middle of 22,000 pounds, the same as for schedule "A-1."

The proper braking power for the weight of car is obtained by the location of fulcrum hole in the cylinder lever.

Plate M, schedule "C," was designed for cars weighing 50,000 pounds and less and equipped with four-wheel trucks. A ten-inch brake cylinder is to be used with this schedule and a brake beam suitable for a load at the middle of 15,200 pounds.

DESIGNATION OF RODS AND LEVERS

On the drawings, the location of levers and rods are designated by letters, the first letter in the designation distinguishes between body and truck. The second letter distinguishes between the levers and the connections. The figure following the second letter is the distinctive number for the lever or connection; and following this figure is the schedule letter to which the lever or connection belongs. Thus B-C2-B means body connection number two (second from cylinder piston rod), of schedule "B"; also T-L2-B would mean truck lever number two for schedule "B."

STENCILING LIGHT WEIGHT OF CAR

The light weight of car should be stenciled on each car. The cross frame tie, when exposed, furnishes a convenient place on which to show the weight, but when this place is not available some other means should be provided. In addition to this the length of the cylinder end of the cylinder lever should be shown so that no calculation would be necessary to determine the proper cylinder lever for the car.

MARKING LEVERS

It may be found desirable by some railroad companies to mark each lever in a manner to indicate the schedule to which each belongs and the location of each in the brake rigging, and if this is done it is suggested that the marking be the same as indicated on the drawings.

TABLE I.

Schedule Designation.	Light Weights of Cars. (Lbs.)	Type of Truck.	Size of Brake Cylinder.	Maximum Load at Middle of Brake Beam.
A	100,000 to 137,000	6-wheel	16 inches	28,000 lbs.
A-1	80,000 to 100,000	6-wheel	14 inches	22,000 lbs.
B	70,000 to 90,000	4-wheel	14 inches	28,000 lbs.
B-1	50,000 to 70,000	4-wheel	12 inches	22,000 lbs.
C..............	50 000 and less	4-wheel	10 inches	15,200 lbs.

There have been brought together in Table I the distinctive data of each schedule so that by referring to the table there can be found quickly the correct schedule for any particular car.

Fount. The oil receptacle of a lamp.

Frame. A structure composed of a number of members designed and arranged to withstand the stresses set up in the particular part of a car for which it is intended. See UNDERFRAME, etc.

Free Air Space (Refrigerator Car Insulation). An air space which has free communication with the outside air so that the air can circulate through it.

Freight Car. Figs. 1267, 2739-2796; Page 1247. A general term used to designate all kinds of cars which carry goods, merchandise, produce, mineral, etc., to distinguish them from those which carry passengers. See CAR.

Freight Car Lock. A LOCK for fastening the doors of freight cars.

Freight Car Repairs. See REPAIRS.

Freight Equipment Cars, Marking on. See MARKING ON FREIGHT EQUIPMENT CARS.

Freight Truck. A freight car truck.

Fresnel Lens. A lens formed of concentric rings of glass or other transparent substance, one or both sides of which are bounded by spherical surfaces.

Friction Block. A casting attached to the truck bolster as a guide and to prevent wear between the bolster and transom.

Friction Buffer. A buffer in which shocks are absorbed by friction. See BUFFER.

Friction Draft Gear. Figs. 749, 751-756, 784, etc.; Pages 1133, 1182, 1224, 1278, 1290, 1291, 1301, 1309. Any form of draft gear which makes use of friction for absorbing and dissipating the energy of buffing and tension shocks transmitted through the couplers. See DRAFT GEAR.

A topical discussion on "To What Extent Does Friction Draft eGar Reduce Repairs, Expenses, Etc.?" will be found in the 1904 M. C. B. Proceedings, page 241.

The report in the 1908 M. C. B. Proceedings, page 143, includes an investigation as to the most desirable capacity of friction draft gears, the travel, and the value of the friction draft gear under service conditions.

Friction Draft Spring. A special spring, the design of which is such as to increase its capacity by friction between the coils. See SPRING DAMPENER.

Friction Plate. A plate to prevent wear, as a plate screwed to the wall to protect the wood work from chafing by the seat back arms when the seat back is tilted. See BOLSTER CHAFING PLATE.

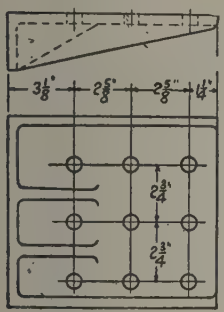
Friction Roller. A wheel or pulley interposed between a sliding object and the surface on which it slides to diminish the friction.

Frieze. A kind of plush or cloth used in upholstering. Commonly used for covering car seats.

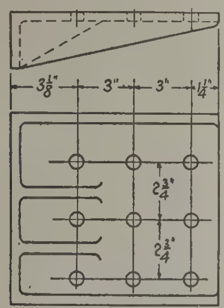
Frog Wing Gage. See GUARD RAIL and FROG WING GAGE.

Fruit Car. A box car equipped with some means of ventilation, for carrying produce which does not require refrigeration. Used commonly for fruit. See VENTILATED BOX CAR.

Front and Back Stop. Standard. In 1905, that front and back stops with rivet holes 15/16 inch in diameter be spaced, as shown below, were adopted as Recommended Practice. Advanced to Standard in 1907.



Holes cored 15/16"
Drawing A.



Holes cored 15/16"
Drawing B.

Frying Pan. Fig. 1712. For use on parlor and buffet cars.

Fuel Instruction Car. Figs. 368, 426. A car equipped for instructing railway employees in the economical use of fuel.

Fulcrum. In mechanics, that by which a lever is sustained, or the point about which it moves. See Brake Lever Fulcrum.

Fulcrum Hanger Bar. A support for the brake lever fulcrum of a six-wheel truck.

Funnel. A vessel for conveying fluids into close vessels; a kind of inverted hollow cone with a pipe; a tunnel. See Filling Funnel.

Furniture Car. A large box car, particularly designed for carrying furniture or other light freight which is bulky. See Car.

Furring. 23, Figs. 210, 211. Pieces of wood placed in a wall or between sills to which to nail sheathing or flooring. The term is also applied to angle blocks glued or nailed in the inside angles of wood work, where strength and stiffness are required. See Blocking and Nailing Strip.

Furring Brace Blocks. Blocks of triangular cross section glued in the angles between the sheathing and furring to give it greater stiffness.

Fuse. A wire strip or bar of fusible metal or alloy placed in series with an electric circuit and designed to melt and open the circuit when the current exceeds a predetermined value. It performs a function similar to that of a circuit breaker.

Fuse Box. Fig. 2625. A support for fuses, containing contacts for readily attaching the same, and usually provided with magnetic blow-out.

Fusee. The cone or conical part of a watch or clock, round which is wound the chain or cord. It is a very ancient mechanical contrivance, and is made of a cone form in order to equalize the power of the spring, the leverage of the cord increasing as the resistance of the spring increases and vice versa. See Berth Spring Fusee.

Also a term applied to a signaling device used, after being lighted, to drop from the rear of trains to warn following trains and prevent rear end collisions.

Fusee Carrying Case. Page 1185.

G

Gage. A tool or instrument used as a standard of measurement of pressure or size. See Cylindrical Gage, Duplex Air Gage, Pressure Gage, Steam Gage, etc.

(Back-Up Air Brake.) An air gage to guide the brakeman in setting the brakes with the back-up brake apparatus. See Air Gage.

(Of Wheels, Track, etc.) Page 1244. The distance in the clear between the heads of the rails of a railway; 4 ft. 8½ in. is the standard gage; if greater than this by more than ½ in., a broad gage; if smaller, a narrow gage. Wide gage usually means a minor and irregular or exceptional enlargement of a given fixed gage, in distinction from tight gage, a corresponding contraction. See Wheels and Track, etc.

Gage, Guard-Rail and Frog Wing. See Guard-Rail and Frog Wing Gage.

Gages, Journal Bearing and Wedge. See Journal Bearing and Wedge Gages.

Gages, Limit, for Inspecting Second-Hand Wheels. See Wheels, Limit Gages for Inspection.

Gage for Measuring Thickness of Rim of Steel Wheels. See Wheels, Steel, Gage for Measuring Thickness of Rim.

Gage, Plane, for Solid Steel Wheels. See Wheels, Solid Steel, Plane Gage for.

Gages for Round Iron. See Limit Gages for Round Iron.

Gage, Rotundity. See Wheels, Solid Steel, Rotundity Gage for.

Gage, Wheel-Check. See Wheel-Check Gage.

Gage, Wheel Defect. See Wheel Defect Gage.

Gages, Wheel Flange Thickness. See Wheel Flange Thickness Gages.

Gain. In architecture, a beveling shoulder, a lapping of timbers, or the cut that is made for receiving a timber. In car work the term generally means a notching of one piece of timber into another.

Galvanized Iron. Sheet iron covered with sal ammoniac, after first being cleaned in a bath of dilute acid and then coated with zinc by immersing it in a bath of the molten metal. An amalgam of 11.5 zinc and 1 mercury is sometimes used. It is usually made in sheets about 2 feet wide by 6 to 9 feet long, and its thickness is measured by its number, wire gage (W. G.). See Kalamined Iron.

Gas Arm. A Gas Way Tube.

Gas Broiler and Utensils. Fig. 1709, etc. A small cook stove heated by gas for use on parlor and sleeping cars in preparing light meals.

Gas Burners. The jet piece of a gas lighting apparatus, at which the gas issues and combustion takes place.

Gas Holder. Fig. 2248.

Gas Lamps. Figs. 2251-2343; Page 1162.

Gas Pipe. See Pipe.

Gas Plate. See Fig. 2922, and U. S. Postal Car specification for standard gas plate for postal car use.

Gasket. A thin sheet of rubber, cloth or sheet metal put in a joint between two pieces of metal to prevent leakage.

Gasolene Motor Car and Gas-Electric Motor Car. See Motor Car.

Gate. See Platform Gate.

(Of a Casting Mold.) The opening through which the melted metal is poured.

Gauze. See Wire Gauze.

Gear. In mechanics the term is used to designate a combination of appliances for effecting some result, as valve gear. See Brake Gear, Draft Gear, etc.
Wheels are said to be in gear when they have cogs interlocking or intermeshed.

Geared Brake. Figs. 1551, 1552. A hand brake operated by means of gears.

Gear Case (Electric Motor). Fig. 2588. A case enclosing the gear and pinion of a railway motor to exclude dirt and water.

Gear Wheel. A cogged or toothed wheel. A spur wheel.

General Service Car. Figs. 182, 185, 2760, 2865, 2867; Pages 1172, 1228, 1245. A car suitable for carrying a variety of classes of freight. See also Car, M. C. B. Classes X M and S D Convertible Car.

Generator (Electric Lighting). Figs. 2471, etc.; Pages 1167, 1177, 1183, 1294, 1295. A machine for generating an electric current, driven by a belt, chain or gear from an axle or by an engine or steam turbine mounted in a baggage car or on a locomotive. See Electric Lighting, Axle Generator.

Generator Apartment. An apartment in a passenger equipment car in which the electric lighting generator is located.

Generator Coils. Wrought iron pipe coiled into a spiral shape and put into the fire pot of a heater, to heat the water they contain and create a circulation through the hot water pipes of the car. Among the different types is the expanding generator coil in which the diameter of the pipe increases as the heated water ascends in it.

Generator Regulator. Fig. 2571, etc. An automatic device for controlling the action or output of the axle driven generator. As it is desirable to arrange the generator to become operative or generate its full voltage at a low speed, provision must be made for taking care of the output of the generator when it runs at very high speed. Generator regulators are generally designed to control the field of the axle generator, weakening it at high speeds and strengthening it at low speeds. They are made in various ways, the three principal types being rheostatic type, contacting type and counter electro motive force type. The rheostatic type consists of a rheostat of some form in the shunt field circuit of the generator. The resistance of this rheostat is generally varied by means of some motive power device, such as a solenoid or small motor. The action of the motive power device is controlled by the electrical conditions that obtain in the system. The contacting type employs a fixed resistance in the field circuit of the generator, which is intermittently cut in and out, depending upon the conditions. In fact, such a regulator acts substantially like a rheostatic device and accomplishes the same purpose. The counter electro motive force type consists of a small motor-driven generator which generates counter electro motive force or back pressure in the field circuit of the main generator. The counter electro motive force is controlled in the same manner as the operating device of the rheostatic or contacting types of regulator and it accomplishes the same end. See Electric Lighting.

Gib and Key. A fastening to connect a bar and strap together by a slot common to both, in which a gib with a beveled back is first inserted and then driven fast by a taper key.

Gib Nut. See Nut Lock.

Gimlet Pointed Screw. A common wood screw, which has its screw cut to a point like a gimlet, so that it can force its own way into wood.

Girder. The term girder is restricted to beams subject to transverse strain, and exerting a vertical pressure merely on their points of support. The term is almost synonymous with truss. Thus engineers speak of a "Howe truss," a "Pratt truss," a "Warren girder" and a "lattice girder." The distinction is that a truss consists of separate parts held together by pins, or even simply by pressure, which may be taken down and re-erected; whereas a girder is a single solid structure, either all one solid ipece (rolled girder), or of plates riveted together (plate girder), or of combined plates and riveted lattice work (latice girder).

Girth. See Belt Rail.

Girth Tie Rod. A Belt Rail Tie Rod.

Gland. A stuffing box, as of a piston rod, valve rod, etc.

Glass Water Gage. A gage consisting essentially of a vertical glass tube connected at the top and bottom with a boiler so as to indicate the height of water therein.

Glideover Seat. See Walkover Seat.

Globe (of Pintsch Gas Lamp). Fig. 2239, etc.; Fig. 2347, etc. A globe of hemispherical form, admitting air only from the top. It is almost a universal type of car lamp globe in Europe.
A glass bowl.

Globe Holder. A device for holding a globe on a lamp. Usually it consists of a metal ring at the base of the globe, on which the latter rests, and to which it is fastened with springs, screws, or by the pressure of the globe chimney on top, when the latter is adjustable.

Glue Size. One pound of glue in a gallon of water. Double size has about twice this quantity of glue. Patent size is a kind of gelatine.

Gondola Car. Figs. 98-133, 163, 2752-2766, 2772, 2848, 2862-2871, 2808-2812; Pages 1144-5, 1172-3, 1197, 1214, 1214, 1228, 1245, 1281. A car with sides and ends, but without a top covering, for the transportation of freight in bulk. Gondola cars are sometimes distinguished as high side, low side, drop bottom and hopper bottom. The floor or bottom is level. See also Car, Hopper Bottom Gondola Car and Drop Bottom Car.

Governor (Air Brake). See Air Compressor Governor.

Grab Handle. Figs. 635, 646, 647, 649. A Grab Iron.

Grab Iron. 32, Figs. 34, 35; 23, Fig. 80; 9 and 10, Fig. 260; Page 1285. Also termed hand holds and grab handles. They are attached to freight cars for the use of trainmen in boarding the cars, and are often more definitely specified as roof, side or end grab irons. They are attached to the ends of passenger equipment cars, both for the use of trainmen and for passengers while boarding a train. See Safety Appliances. Similar parts on passenger cars are called Hand Rails.

Graduated Spring. A form of compound spring in which only a certain number of the individual spirals come into action with a light load, and the others only under a heavy load. Another method of accomplishing the same end, graduating the resistance of the

spring to the load placed upon it, is the use of the keg-shaped or spool-shaped spring. Under a load the part of larger diameter closes first and that of smaller diameter is much stiffer. Graduated springs have been constructed by combining rubber and spiral springs, but they are now out of use. Graduated springs have been superseded by single and double nest coil springs of equal length, and few, if any, are being applied.

Graduating Nut (Triple Valve). 20, Fig. 1382A.

Graduating Sleeve (Triple Valve). 21, Fig. 1382A. See GRADUATING SPRING.

Graduating Spring (Triple Valve). 22, Fig. 1382A. A spiral spring which acts against a collar on the graduating stem to restrain the triple valve piston from moving beyond service position when a gradual brake pipe reduction is made, but which is compressed by the piston when a sudden brake pipe reduction is made.

Graduating Valve (Triple Valve). 7, Fig. 1382A. A device attached to the piston stem by a pin and whose movements are controlled by the piston. Its office is to open and close the service port in the slide valve, feeding air from the auxiliary reservoir to the brake cylinder when a service application of the brakes is made.

(Car Heating.) Figs. 2155, etc. Used for regulating the steam supply.

Graduating Valve Spring (Triple Valve). 35, Fig. 1382A.

Grain Door. Figs. 809-810. A close fitting movable door on the inside of a box car by which the lower part of the door opening is closed when the car is loaded with grain, to prevent the latter from leaking out. Such doors are usually made so that they can be thrown over on one side of the doorway or be suspended from the roof, and thus be out of the way when they are not used. Very few cars, however, are fitted with such doors, and ordinarily a temporary arrangement is used which is nailed in place. A burlap covering is sometimes used to insure the grain from leaking out at the joints.

Grain Door Rod. An iron rod attached to the door posts on the inside of a box car, to which a grain door is fastened or hinged. The door and rod are generally arranged so that the former can be moved to one side and out of the way when the car is not loaded with grain.

Grain Shoe. 24, Figs. 34, 35. A strip of wood or other material used to prevent leakage of grain from freight cars.

Grated Door. A door consisting of a wooden frame with iron or wooden bars, used on cars for carrying fruit, live stock, etc.

Grating. 16, Figs. 210, 211. A perforated or slatted covering for an opening. On the floor of refrigerator cars, to raise lading above the floor and prevent its coming in contact with water, etc.

Gravel Car. A car for carrying gravel; usually either a dump car or a flat car, the latter most used. See BALLAST CAR, CONTRACTOR'S CAR.

Gravity Relief Trap (Steam Coupler). An auxiliary trap, automatic in its action, which is closed by the escape of steam and held closed by the steam pressure. When the pressure is removed the weight of the valve stem tips the valve and allows the escape of the water of condensation. The pressure under which it closes is dependent on the weight of the valve stem.

Gravity Side Bearing. A side bearing which is returned to its normal position by gravity.

Grease Box. A JOURNAL BOX.

Grille (Interior Decoration). Fig. 2005. Fret work for decoration. Used in the place of panels, over doorways and in bulkheads and sometimes employed as brackets.

Grommet. Fig. 2009. The separate parts of any metallic eyelet are known as grommets. The two grommets, when compressed together (with a setting die), form the eyelet.

Ground Glass. Glass the surface of which has been roughened by mechanical or chemical process so as to break up the light passing through it and destroy its transparency. Several processes exist: by the wheel, sand blast, rotating with pebbles, or by fluoric acid.

Group Spring. A spiral car spring formed of a number of separate springs, single or nested united by a common pair of spring plates.

Guard. See DUST GUARD, etc.

(For Lanterns.) The exterior wire cover surrounding the globe and protecting it from accident.

Guard Arm. (M. C. B. Standard.) In 1899 the vertical dimensions of the end of guard arm was fixed at 7½ inches as a minimum.

In 1916 the "D" coupler, as shown on M. C. B. Sheet 23 was adopted as Standard.

Guard Lining Strips. Horizontal bars or strips placed in a car to keep freight from a door, ice box, ventilator, etc.

Guard Posts (Fruit Car). A row of posts standing inside of the ventilators and serving as a fender for the load packed within so as to prevent obstruction to the ventilators.

Guard Rail and Frog Wing Gage. Sheet M. C. B. 16. Fig. 2948.

The guard-rail and frog wing gage were adopted as standard in 1894, to define the dimensions of track to which M. C. B. standard wheel and flange gages have been made to conform. Modified 1907. Modified 1909.

Gudgeon. The bearing portion of a shaft, particularly an upright wooden shaft. The crosshead or wrist pin of a steam engine is sometimes called a gudgeon pin.

Guide. See DEAD LEVER GUIDE, etc.

Guide Bar. See BOLSTER GUIDE BAR or COLUMN.

Guide Casting. A strip or plate of metal screwed to the wall or arm rest of a seat for the striker arms to rub against to save the wood. Also called FRICTION PLATE.

Guide Rail. A door track.

Gurring Piece (Snow Plow). Probably from gurr, a fort, hence a piece built out to protect or fortify a structure. In a snow plow, timbers bolted to the posts to build out and give shape to the sides.

Gusset Plate. 30, Fig. 80; 38 and 40, Fig. 348. A flat plate used to fasten two parts of a metal underframe together by riveting through each member and the plate, or to stiffen a joint between two pieces which are fastened together by angle plates, in which case the

gusset plate is riveted to the flanges of the adjoining pieces.

Guy. A rope used as a stay.

Guy Rings (of a Derrick or Crane). Rings attached to the head block at the top of the mast to which guy ropes may be attached.

H.

Hair Felt (Refrigerator Car Insulation). A heavy non-conductor of heat made of hair, placed between the inner and outer linings to prevent absorption of heat.

Half Elliptic Spring. See Elliptic Spring.

Hammer (Pile Driver). The heavy weight by which piles are driven. It falls between the leaders and is provided with a hammer eye or clevis, to which the shears of the hoisting rope or hammer rope are attached. Also called a Tup.

Hammock (Sleeping Car Berth). 5, Figs. 1626, 1627. A light hammock of twine hung lengthwise across a sleeping car berth to hold day wearing apparel.

Hand Brake. 44 and 51, Figs. 34, 35; Figs. 625-630, 1532-1570; Pages 1225, 1227, 1250. The name applied to the brake apparatus with which all cars are equipped, which permits of the brakes being applied by hand. When cars are being switched in yards they are frequently in motion when no locomotive is coupled to them and a hand brake is necessary so that the trainmen may control them. See Brake Shaft, Brake Chain, etc., and Safety Appliances.

Hand Brake Chain. Fig. 967. One of the hand brake connections. See Brake Chain, Brake Shaft Chain.

Hand Brake Chain Carrier. A guide for the hand brake chain, riveted to the underframe.

Hand Brake Connections. Fig. 967. The rods and chains connecting the hand brake shaft with the brake levers.

Hand Brake Guide. See Brake Rod Guide.

Hand Brake Pawl. See Brake Pawl.

Hand Brake Rod Guide. See Lower Brake Shaft Bearing.

Hand Brake Shaft. See Brake Shaft.

Hand Brake Wheel. 44, Figs. 34, 35; 15, Fig. 80; 8, Fig. 260; Figs. 1546, 1564, 1567. A wheel attached to the upper end of the brake shaft, by which the latter is turned to apply the brakes by hand.

Hand Car. Fig. 2642, etc. A small and light car arranged with cranks or levers and gearing so that it can be propelled by hand by persons riding on the car. They are commonly used by section or track repair gangs.

Hand Car Truss Rod. A transverse or longitudinal rod by which the floor frame of a hand car is trussed.

Hand Hold. 32, Figs. 34, 35. (Interstate Commerce Commission and M. C. B. Standard). See Safety Appliances, also Grab Iron.

Handhole. Figs. 912, 913. A small opening in a tank or other vessel provided with air and water tight seal which may be removed and the hand inserted for making repairs or other purposes.

Hand Rail. Fig. 635. A bar or rail to be grasped with the hand as a help in boarding and alighting from cars, and also to prevent trainmen from being thrown from cars, due to their motion or sudden shocks.

Hand Rail Post (Tank Car). A support for the Hand Rail.

Handle Latch Spring (Motorman's Air Brake Valve). A spring carrying a latch or dog to hold the handle in any desired position.

Hanger. That by which a thing is suspended. "A means for supporting shafting of machinery." See Berth Curtain Rod Hanger, Brake Beam Adjusting Hanger, etc.

Hanger Link. A Swing Hanger.

Hanging Boards or Meat Timbers (Refrigerator Car). Transverse bars, resting usually on bogus plates, to which the load of meat is suspended from hooks.

Hard Hair. A quality of curled hair which is very stiff or rigid.

Hash Browner. Fig. 1710. A cooking utensil used on dining and buffet cars.

Hasp. A bar which fits over a staple and is fastened thereon by passing the shackle of a padlock through the staple, or by a pin. The other end of the hasp is attached by a pin or another staple to the door. See Door Hasp.

Hat Hook. Figs. 1997-2002. A metal hook on which to hang hats.

Hat Rack. A basket rack.

Hatch. 8, Figs. 210, 211. The opening and also its cover through which ice is placed in refrigerator cars.

Head Block (of a Derrick or Crane). The casting carried at the top of the mast to which the boom rods, tension rods, guy rings, etc., are attached. It usually revolves upon a head block pin. See also Tank Head Block.

Head Board. 4, Figs. 1626, 1627; Fig. 1640. A light partition which separates one berth in a sleeping car from that next to it. It is stowed away by day in the pocket between the upper berth, when closed up, and the roof. It is secured in place at the back and front by head board bolts entering at the back into a bushing, fixed to the stop of the stationary seat back; and along the upper inside edge by a head board coupling, entering into a head board coupling keeper. The head board bolt for the front corner of the head board is of peculiar construction, designed to avoid all interruption of a flush surface by day, while still giving a secure attachment.

Head Board Bolt. See Head Board.

Head Board Bolt Bushing. See Head Board.

Head Board Coupling. A metal hasp and keeper by which a head board is fastened to the side of the car.

Head Board Fastener. Fig. 1631.

Head Board Plates. Fig. 1632. Reinforcing plates for a wooden head board.

Head Board Pocket. A pocket formed at the bottom of the head board by pulling out the head rest of a sleeping car seat. It is used for holding wearing apparel while the lower berth is in use.

Head End System. A system of electrically lighting a complete railway train from a single generating plant, located either on the locomotive, tender or on one of the cars of the train. Head end generators may be steam or axle-driven. If located on the locomotive, they are driven by steam. If located on the tender or on one of the cars, they may be axle-driven or steam-driven. The head end generator is connected

to the train line system of the train by a suitable set of connections, and current is supplied to each car through the taps to the train lines. In this system it is not essential to equip each car with a storage battery, although it is generally advisable, for when so equipped the train can be broken up and separated into its units without destroying the continuity of the light on any car. See ELECTRIC LIGHTING.

Head Lining. 20, Figs. 1626, 1627. A lining with which the ceilings of passenger cars are covered.

Head Lining Nail. A nail with a large button-shaped head especially made for fastening head linings to the ceilings of wooden passenger cars.

Head Rest. The padded upper part of a seat back, against which the passenger's head rests. Also called Head Roll.

Head Roll (of a Seat). See HEAD REST.

Headlight (Motor Cars). Fig. 2639.

Headstock (British). American equivalent, end sill.

Heat Guard. A sheet metal covering for the woodwork of a passenger car, to protect it from the heat of a stove.

Heater. Any apparatus for warming a car, room, or building by convection; that is, by conveying hot water, steam, or warmed air into or through the apartments. The term generally refers to any arrangements for warming apartments other than stoves, which heat by direct radiation. See CAR HEATER, HEATING APPARATUS.

Heaters of various types are often applied to refrigerator cars during cold weather, when it is desired to transport perishable products. See HEATER CAR.

(For Lamps or Lanterns.) A metallic attachment passing around and above the flame or otherwise immediately adjacent to it, by which heat is conveyed to the oil in the reservoir below, to prevent freezing, or, in some cases to assist combustion by heating or volatilizing the oil.

Heater Box. Figs. 237, 899. A box applied to refrigerator cars and containing the burners for heating during cold weather while transporting perishable products.

Heater Car. Figs. 206, 237-240, 898-908. A car, equipped with heating apparatus, for carrying fruits, vegetables, and other perishable products during cold weather. Refrigerator cars are frequently converted to heater cars by adding heating apparatus.

Heater Car Details. Figs. 883-908.

Heater Coil. A GENERATOR COIL.

Heater Pipe Casing. A wooden or iron shelf over a heater pipe in a passenger car to prevent the feet of passengers from coming in contact with the hot pipes. The casing also forms a foot rest.

Heater Room. A small closet, cased with sheet metal interior heat guards, to contain the heater and prevent all direct radiation.

Heater Switch. See ELECTRIC HEATER.

Heating Apparatus (Passenger Train Cars). See Figs. 2049-2183. See DIRECT STEAM HEATING SYSTEM; DRUM SYSTEM OF CAR HEATING; PRESSURE AND VAPOR HEATING SYSTEM; HOT WATER CIRCULATION HEATING SYSTEM.

Heating Passenger Cars. A report of a committee on the ventilating and heating of coaches and sleeping cars will be found in the 1900 M. C. B. Proceedings, page 338.

Height of Couplers. Standard. The standard height of couplers for passenger equipment cars is 35 inches from top of rail when car is light. Adopted in 1890; see Proceedings 1890 and 1893.

In 1911 the order of the Interstate Commerce Commission, dated October 10, 1910, regarding the standard height of couplers, was adopted, reading as follows:

The maximum height of drawbars for freight cars, measured perpendicularly from the level of top of rails to the center of drawbars for standard-gage railroads, shall be 34½ inches, and the minimum height of drawbars for freight cars on such standard-gage railroads, measured in the same manner, shall be 31½ inches, and on narrow-gage railroads the maximum height of drawbars for freight cars, measured from the level of tops of rails to the center of drawbars, shall be 26 inches, and the minimum height of drawbars for freight cars on such narrow-gage railroads, measured in the same manner, shall be 23 inches, and on 2-foot gage railroads the maximum height of drawbars for freight cars, measured from the level of the tops of rails to center of drawbars, shall be 17½ inches, and the minimum height of drawbars for freight cars on such 2-foot gage railroads, measured in the same manner, shall be 14½ inches.

In 1916 the height of couplers for passenger equipment was changed from 35 inches to 34½ inches.

Helical Spring. Figs. 1189-1198; Pages 1175, 1239, 1248, 1249, 1283, 1292. A spring made of bar steel bent in the form of a helix. A coil or spiral spring.

High Back Seat. A class of seats with extra high back and frequently a head roll or head rest. See SEAT.

High Side Gondola Car. A gondola car with extra high sides and ends, for carrying coal or minerals.

High Speed Brake. Fig. 1372, etc. The principles involved in the high speed brake were demonstrated by a series of experiments known as the Westinghouse-Galton tests. These showed that a greater pressure not only could be safely applied to the wheels by the brake shoes at high speeds, but also that such considerably greater brake shoe pressure must be applied to the wheels at high speeds in order to then resist the motion of the train as effectively as it is resisted with a more moderate brake shoe pressure at low speeds. This was accomplished by the use of a higher brake pipe air pressure with the standard quick action apparatus, with only the addition of a high speed reducing valve attached directly to the brake cylinders. The purpose of this device was to limit the brake cylinder pressure obtainable during a service application of the brakes to what was considered safe and necessary, but when an emergency application of the brakes was made, to permit the brake cylinder pressure to rise to a considerably higher value than the maximum permitted in a service application, and then to cause a gradual reduction of brake cylinder pressure so as to proportion, as far as possible, the blow-down of brake cylinder pressure to the reduction in speed as the stopping point is approached. See AIR BRAKE.

The M. C. B. committee on this subject presented a brief progress report in 1906 as noted on page 410 of the Proceedings for that year.

High Speed Foundation Brake Gear. See FOUNDATION BRAKE GEAR (M. C. B. Recommended Practice).

High Window. A term sometimes applied to the small windows, located high in the side of a car, commonly used in saloons and dining car kitchens.

Hinge. Figs. 1983-1996. A hook or joint on which a door, gate, etc., turns. It is provided with a tube-like knuckle through which the Hinge Pin passes. See DROP DOOR HINGE, SOFA HINGE, etc.

The common door hinge is usually a butt or butt hinge, the varieties of which are the acorn butt, a large ornamental hinge, the Blake butt and the hopper butt, so called from its pointed form. The parliament hinge is a sort of T-shaped butt hinge to afford more room for screws. It is little used except for ornamental purposes. The strap hinge is a common form of rough hinge for heavy doors, but it is sometimes made very elaborate and ornamental. A T-hinge is a combination of the butt and strap hinge, one-half being of each form. Butt hinges are either fast joint, loose joint or loose pin. A double acting hinge is one which permits the door to swing either way.

Hinge Pin. The pin passing through the knuckle of a hinge and holding the two parts together.

Hog Chain (Shipbuilding). A chain in the nature of a tension rod passing from the stern of a vessel, and over posts nearer amidships; designed to prevent the vessel from dropping at the ends.

Hence applied to a certain form of trusses in car construction. A hog chain is an inverted truss rod, and usually so called when applied in connection with and in similar form to a body truss rod, the object of a truss rod being to prevent a beam from sinking in the middle, and of a hog chain to prevent sinking at the ends when supported at the middle. Also called an overhang truss rod.

Hog Chain Queen Post. A strut over which a hog chain passes.

Hog Chain Rod (of a Passenger Equipment Car). More properly a continuous counterbrace rod or an overhang truss rod.

Hoisting Block (of a Derrick or Crane). The main block at the lower end of the hoisting chains carrying the sheave hook, or hoisting hook, to which the load is attached.

Hoisting Block Clevis. A clevis carried at the top of a hoisting block to which the fixed end of the hoisting chain is attached. In some cases it is attached to a clevis at the upper end of the boom. See CLEVIS.

Hoisting Chain (of a Derrick, Steam Shovel or Crane). The chain attached to the hoisting drum at one end and to the hoisting block or boom clevis at the other, by which the loads are raised.

Hoisting Chain Sheave. A pulley placed in some wrecking cars at the foot of the mast, when the hoisting gear is at some distance from it. The term is equally applicable to the mast sheave and boom sheave at the top of those parts of a derrick, but the latter are generally otherwise distinguished.

Hoisting Drum (Steam Shovel). The barrel about which is wound the chain cable attached to the dipper block.

Hoisting Engine (Steam Shovel). The engine geared to the hoisting drum.

Hoisting Gear (Steam Shovel). The gear wheel on the hoisting drum.

Hoisting Hook. See HOISTING BLOCK.

Holder (Pintsch Gas). Fig. 2248. A tank, hung below a passenger equipment car, to hold a supply of gas for lighting.

Holder Valve (Pintsch System). Fig. 2249. A valve which controls the supply of gas from the holders to the pipes.

Holding Test. See AIR BRAKES.

Hollow Piston Rod (Freight Brakes). A brake cylinder piston rod which is hollow to receive the PUSH ROD.

Hood (Heater). More properly a ventilator or wind scoop. A horizontal tube or covering on the outside of a car, and on top of the cold air pipe, so as to give the latter a T-shape. The air is admitted to the pipe through the ends of the hood, which are covered with wire netting to exclude cinders. It has a valve which is moved by the current of air so as to admit it which ever way the car runs. See PLATFORM HOOD, VENTILATOR HOOD.

Hook Bolt. A bolt having a hook at one end.

Hoop (for Oil Lamps). A ferrule with an interior thread into which the burner screws.

Hopper. (Passenger Cars). Fig. 1780, etc. A closet hopper, water, or soil hopper.

(Freight Cars.) See HOPPER BOTTOM CAR.

Hopper Bottom Gondola Car. Pages 1172, 1173. A gondola car having a level floor or bottom and one or more hoppers equipped with drop doors for discharging the load. See also DROP BOTTOM CAR.

Hopper Car. 2858-2860, Figs. 44-97, 2765, 2767, 2789, 2790, 2847; Pages 1172, 1173, 1230, 1245, 1251, 1254, 1280. A car with the floor sloping from the ends and sides to one or more hoppers, which will discharge its entire load by gravity through the hopper doors. See CAR.

Hopper Carry Iron. A HOPPER SUPPORTING STRAP.

Hopper Chain. See DROP CHAIN.

Hopper Deflector. See HOPPER VENTILATOR.

Hopper Door. 16, Fig. 80. A door at the bottom of the slope or hopper of a hopper car which when opened permits the load to discharge. See also DROP DOOR.

Hopper Door Locking Pawl. Page 1314. In a hopper door gear, the catch which when thrown into engagement with the toggle arms, prevents the arms from moving from the closed position and opening the hopper doors.

Hopper Door Operating Shaft, End for. (M. C. B. Standard). Fig. 3001. In 1913 a 2-inch square end for hopper door operating shaft was adopted as Recommended Practice. In 1914 advanced to Standard.

Hopper Door Toggle Arm (Hopper Cars). A link in drop door mechanism which is fastened to the door and forces it shut when the toggle link is forced down.

Hopper Door Toggle Link (Hopper Cars). The arm in drop door mechanism which forces down the toggle arms when the winding shaft is revolved and closes the doors.

Hopper Ore Car. See ORE CAR.

Hopper Plates. The metal sheets constituting the bottom of a hopper bottom car. Also termed inclined

floor or hopper slope. The term hopper plate is generally confined to the metal lining plate used in wooden hopper cars. See HOPPER SLOPE SHEET.

Hopper Siding. The planking that forms the side of a box hopper.

Hopper Slope Sheet. 18, Fig. 80. A metal sheet used in the sloped floor of a hopper car.

Hopper Stayrods. Inclined rods passing through the center sill of a wooden car and to the hopper supporting strap at the hinged end of the doors to prevent the hopper from sagging in the middle.

Hopper Support (Hopper Cars). An angle riveted to the ridge of the hopper at the center and the top of the side sheet, forming a support for the hopper. It serves the same purpose as the Hopper Supporting Strap in a wooden car.

Hopper Supporting Strap. A heavy U-shaped iron strap bent to the shape of the hopper of a wooden gondola car, and with the ends bolted to the side sills. Its office is to support the hopper, and it is usually applied at the end of the inclined floor, and in the middle of the hopper at which point the doors are hinged.

Hopper Tube. The tube or chute leading from the hopper of a closet.

Hopper Ventilator or **Hopper Deflector.** Fig. 2910. A device for exhausting air from the closet hopper to the outside of the car.

Horizontal Brake Shaft. See BRAKE SHAFT.

Horse Car. Figs. 202-205. A car, usually of the passenger equipment type, fitted with stalls, and water and feed facilities, for carrying horses. See CAR.

Horse Car Door. Specially designed to suit the conditions, and larger than standard side doors.

Hose. Flexible tubing for conveying water, air, or other fluids. For metal hose see Figs. 508, 2045-2048. See also AIR BRAKE and METAL HOSE.

Hose Bracket. See BRAKE HOSE BRACKET.

Hose Chain. A light chain to hold up the steam hose when uncoupled and prevent its dropping to the track.

Hose Clamp. Figs. 1523, 1524. A clamp to bind the hose to the hose nipple and coupling. Sometimes called a hose band.

Hose Couplings. See AIR BRAKE HOSE COUPLINGS.

Hose Nipple. See BRAKE HOSE NIPPLE.

Hose Protector. Figs. 1506, 1509. A device to protect the air brake, signal or steam heat hose from injury. See also ARMORED BRAKE HOSE.

Hospital Car. Figs. 367, 2836-2846. A car fitted with hospital appliances for use in treating injuries caused by railroad accidents. Such cars are usually run to the scene of accidents with the wreck train.

Hot Water Circulation Heating System. Figs. 2054, etc. A system by which the car is heated by the circulation of hot water, the water being heated either by fire in a heater, or by steam from the locomotive, or by a combination of both.

Hot Water Heater. See BAKER HEATER.

Hot Water Pipes. Pipes running alongside of a car under the seats, which contain hot water, and by which the car is heated. Between the seats the pipes on the side of the car have a hot water pipe guard rail running over and above them.

House Car. An enclosed freight car.

House Cars, Placard Boards for (M. C. B. Recommended Practice). See PLACARD BOARDS FOR HOUSE CARS.

Housing. A term frequently applied to any part of a device which encases some or all of the working parts.

Housing Box. A JOURNAL BOX.

Hub (of a Car Wheel). The central portion into which the axle is fitted.

Hub Bolts (Steel-Tired Wheels). Bolts fastening the face plates to the hub.

Hydraulagraph. Fig. 2021. A wheel press recording gage.

Hydraulic Jack. Figs. 2709, etc. A machine in which the power is exerted by means of the pressure of some liquid acting against a piston or plunger, for raising heavy weights, as a car.

I

I-Beam. A rolled steel commercial bar whose cross section has the form of the letter I.

I-Beam Type Bolster. A bolster whose cross section has the shape of the letter I.

I-Section Bolster. See I-BEAM TYPE BOLSTER.

Ice Bunker (Refrigerator Car). 9, Fig. 211, Figs. 214, 219, 232, 891, 893, 896, 906, 909, 914, 915. The receptacle in which the ice is placed in a refrigerator car.

Ice Car. A car for transporting ice, usually constructed with insulation similar to a refrigerator car, but without ice tanks or ventilators.

Ice Pan (Refrigerator Cars). A receptacle for carrying ice in cars which do not have end ice bunkers.

Ice Tanks, Refrigerator Car. See REFRIGERATOR CARS, FLOORS AND ICE TANKS.

Icing Door. A door in the roof of a refrigerator car through whose opening ice and salt are placed in the ice tanks.

Impact Tests. An individual paper on the impact between freight cars in switching service, by Professor Louis E. Endsley, will be found in the 1915 M. C. B. Proceedings, page 458. It includes a description of the testing and recording apparatus and the results of a series of tests.

Imperial Gallon. An Imperial gallon contains 277.274 cubic inches and an Imperial gallon of water weighs 10 lbs.

Inclined Floor Timbers (Hopper Car). The wooden sills to which the sloped floor of a hopper car is nailed.

Indicator (Car Heating). Used in connection with the regulation of the hot water circulation heating system.

Indirect Lighting. Figs. 2435-2440. A system of lighting in which the light is not thrown directly on an object but thrown up and reflected.

Injector (Car Heating). Used in connection with the regulation of the hot water circulation heating system.

Inlet Valve (Steam Heating). Figs. 2083, 2085, 2152. The valve controlling the inflow of steam to the heater pipes.

Inside Casing (Baker Heater). Sheet iron or steel plate bent and riveted into the shape of a frustum of a cone, which forms the top of the fire pot.

Inside Ceiling (Refrigerator Car). The inside layer of light boards in the roof of the car. More properly, CEILING.

Inside Corner Brace. See CORNER BBACE PLATE.

Inside Cornice (Passenger Car Interiors). A molding filling the angle where the roof joins the side of the car.

Inside Cornice Fascia. A projecting board which forms a molding or ornament under the inside cornice.

Inside End Piece (Passenger Truck Frame). The end piece which is nearest to the center of the car. It is usually straight, while the outer one is cut away on top so as to make room for the draft rigging.

Inside Hung Brakes. Figs. 1352, etc. Brake attachments for trucks in which the brake shoes and beams are between the wheels. When attached on the outside they are Outside Hung Brakes.

Inside Lining Stud. A vertical strip or post extending from the side sill to the girth to serve as a nailing strip for the inside lining.

Inside Roof. A light board roof or ceiling under the main roof and separated from it by the purlins.

Inside Window Panel. A panel inside of a passenger car between the windows.

Inside Window Sill. A horizontal piece of wood or metal under the window on the inside.

Inside Window Stop. A wooden or metal strip attached to a window post on the inside of a window blind or an inner sash of a double window. It forms a groove in which the blind or window sash slides. Also called window casing. Sometimes the window molding forms a stop on the inside.

Inspection Car. Figs. 2642, etc., 2741. A car used for inspecting track and right-of-way. See HAND CAR, VELOCIPEDE CAR.

Instruction Car. A car used for the instruction of railway employees in matters pertaining to their work. See AIR BRAKE, FUEL, LIGHT, INSTRUCTION CAR.

Insulating Paper (Refrigerator Cars). Figs. 888-911; Page 1063. A heavy paper or other material, specially prepared to make it a poor conductor of heat, placed between the linings as part of the insulation of the car.

Insulation Paper for Refrigerator Cars, Specifications for. (Recommended Practice.)

In 1917 the following Specifications for Insulation Paper for Refrigerator Cars were adopted as Recommended Practice:

1. *Scope.*—These specifications cover insulation paper for refrigerator cars.

I. MANUFACTURE

2. *Material.*—Insulation paper shall be made of good quality fibrous material, thoroughly saturated with an asphaltum bitumen. It shall be furnished in either of two weights, known as 90-lb. or 110-lb. paper.

II. PHYSICAL PROPERTIES AND TESTS

A—Before Exposure.

3. *Porosity Test.*—A test sample 1 ft. square shall not show a leakage of more than 8 oz. of water, when subjected for two hours to a water column of 55 in. at 60° to 80° F. Tests to be made with apparatus as shown in Fig. 1.

4. *Mullen Test.*—The strength of a test sample, as determined by the standard "Mullen" test, made at a temperature of 70° F., and with load applied at the rate of 3 to 4 lb. per second, shall be as follows: 90-lb. paper, not less than 55 lb.; 110-lb. paper, not less than 70 lb.

5. *Bending Test.*—Paper shall be so pliable, after being cooled in water at a temperature of 32° to 35° F., and while at this temperature, that it may be bent flat upon itself without breaking.

6. *Ash.*—The total amount, by combustion of a test sample, of inorganic matter or ash shall not be more than 6 per cent of the original weight.

B—After Exposure.

(This test to be made at the option of the purchaser.)

7. *Mullen Test.*—The strength of a test sample, as determined by the standard "Mullen" test, made at a temperature of 70° F., shall not be affected more than 10 per cent of the original by exposure to a temperature of 150° F., or to air saturated with water vapor at room temperature for seven days.

8. *Bending Test.*—After exposure to a temperature of 150° F., or to air saturated with water vapor at room temperature for seven days, paper shall be so pliable at temperature of 32° to 35° F., and while at this temperature, that it can be bent flat upon itself without breaking.

9. *Drying and Absorption.*—The original weight shall not decrease more than 3 per cent. by exposure to a temperature of 150° F., nor increase more than 10 per cent by exposure to air saturated with water vapor at room temperature for seven days.

10. *Sampling.*—The inspector shall examine and weigh 5 per cent of the paper in each lot offered, and select one sample from each lot of 200 rolls or fraction thereof. Not more than one sample shall be taken from any one roll. Each sample shall have the lot number stenciled on it.

III. PERMISSIBLE VARIATIONS

11. *Weight.*—The average weight of the roll shall correspond within 1 per cent of the weight as indicated by test sample, or the respective weights per 1,000 sq. ft. shall not be less than 85 lb. or 104 lb. for the two weights of paper specified in Section 2.

IV. INSPECTION AND REJECTION

12. *Inspection.*—(a) The inspector representing the purchaser shall have free entry, at all times while work on the contract of the purchaser is being performed, to all parts of the manufacturer's works which concern the manufacture of the material ordered. The manufacturer shall afford the inspector, free of cost, all reasonable facilities and necessary assistance to satisfy him that the material is being furnished in accordance with these specifications. Tests and inspection at the place of manufacture shall be made prior to shipment.

(b) The purchaser may make the tests to govern the acceptance or rejection of the material in his own laboratory or elsewhere. Such tests shall be made at the expense of the purchaser.

(c) All tests and inspection shall be so conducted as not to interfere unnecessarily with the operation of the works.

13. *Rejection.*—(a) Material represented by samples which fail to conform to the requirements of these specifications will be rejected.

(b) Material which, subsequent to test and inspection at the factory or elsewhere and its acceptance, shows defects or imperfections will be rejected and shall be replaced by the manufacturer.

14. *Rehearing.*—Samples tested in accordance with these specifications, which represent rejected material, shall be held for fourteen days from date of test report. In case of dissatisfaction with results of tests, the manufacturer may make claim for a rehearing within that time.

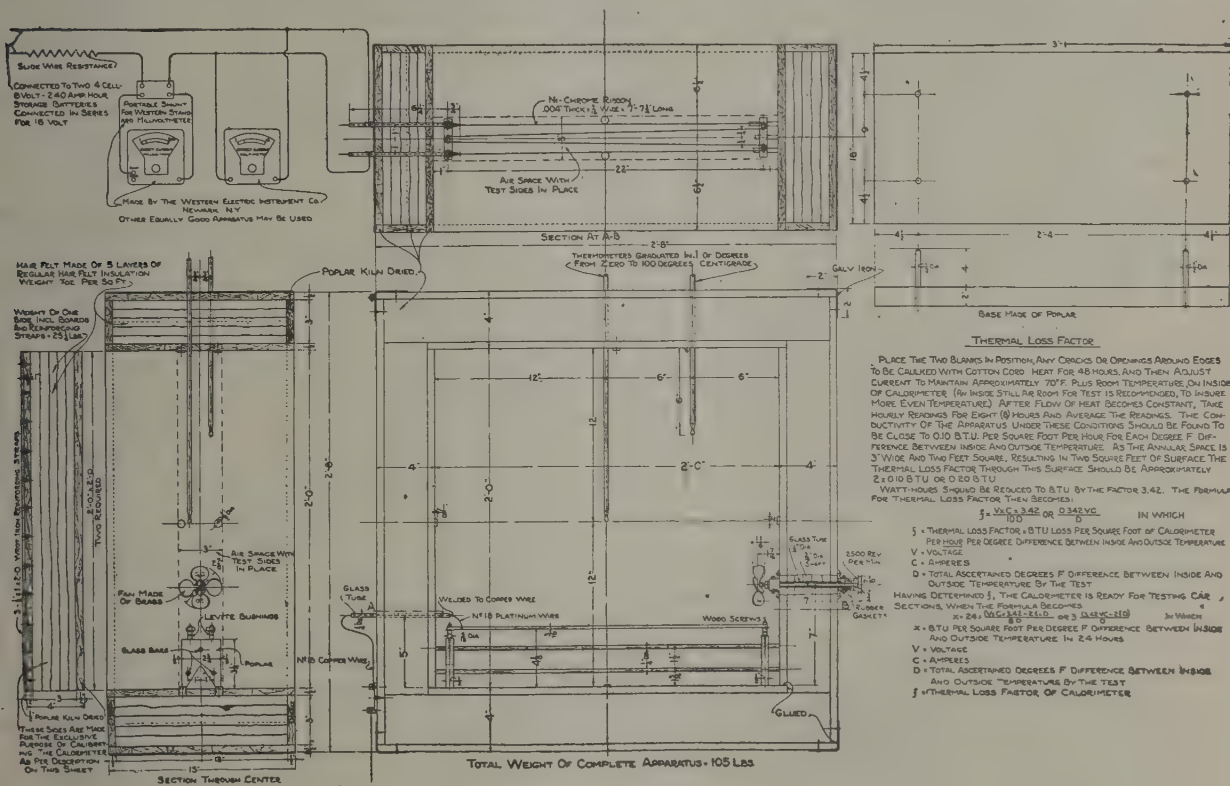
APPENDIX

Note.—The paper shall be supported on the under side by a perforated plate or other means, provided

(a) The car shall be insulated throughout, including floors, sides, ends and roof (except pier panels), with material of such a nature that it can be securely fastened so as to withstand the vibration incident to railway service. The insulating material must be such that it will not support combustion, will not absorb moisture beyond its own weight, and when wet, will not become corrosive.

(b) Side and end wall and roof insulating material shall be securely fastened. Where the nature of the material permits, it shall be cemented; and also mechanically clipped if necessary for proper support. Floor insulation shall extend the entire distance between side walls either in one full width or in sections fitted between floor supports and be secured in place.

(c) The construction of side and end walls and



APPARATUS FOR I NSULATION TESTS.

the area of the opening through the plate is 20 per cent of the area of the supported paper. The diameter of the holes in the perforated plate to be approximately ¼ in.

Insulation (Refrigerator and Heater Cars). 11, Figs. 210, 211; Page 1288. A system of walls, and dead air-space used in the construction of the sides, ends, roof and floor to make them poor conductors of heat, thus facilitating the keeping of the contents of the car cool or warm, as may be desired.

" (Passenger Train Cars.) The proper insulation of all-steel passenger cars is also an important matter. See Figs. 1607-1624.

tests, together with a description of the testing ma-

In 1915 the following method of making insulation

chine, was adopted as Recommended Practice:

Insulation Methods and Apparatus for Testing. (M. C. B. Recommended Practice.)

roof of car shall be such as to avoid or reduce to a minimum continuous metal connection from outside to the inside of the car.

(d) To insure maximum of insulating and sound-deadening efficiency, the construction at the junction of side and end walls and floor shall be such as to prevent the circulation of air through the side and end walls or through the floor or into the car.

(e) The thermal efficiency of the materials in side and end walls, in roof and in floor, must be such that a test duplicate section through walls, roof or floor (duplicate with the exception of framing members such as posts, braces, carlines or stringers which are to be omitted), will not transmit, when subjected to the test hereinafter described, more than the following amount of heat per square foot of surface in twenty-four (24) hours for each degree Fahr. difference in

temperature between the inside and outside walls of the section.

For side walls, end walls and roof...8 b. t. u.
For floor ....7 b. t. u.

The method of testing shall be as follows:

A calorimeter, as illustrated and described in R. M. S. drawing, Sheet 18, shall be used in all tests. It shall be carefully constructed and of the materials indicated and before used must be standardized for its thermal loss factor. The sections to be tested shall truly represent the materials as used and disposed in the car.

The heat must be supplied by direct electric current of constant voltage, measured by standardized instruments. The difference between inside and outside temperatures must be held as nearly seventy degrees Fahr. as possible. Readings of temperature and current shall not be recorded until forty-eight hours after heat is turned on and test begins, in order to insure thorough heat saturation of calorimeter and test sections. The duration of actual test shall be eight (8) hours, during which time temperature and electric readings shall be made and recorded each hour or more frequently, if considered necessary. The average of all readings thus recorded shall be taken as the final result.

Interchange of Traffic (M. C. B. Rules for).

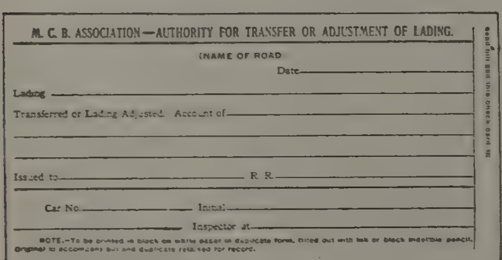
Revised at Chicago, Ill., June, 1918.

CARE OF FOREIGN FREIGHT CARS.

Rule 1. Each railroad is responsible for the condition of all cars on its line, and must give to all, equal care as to inspection and repairs, regardless of responsibility for expense of repairs.

INTERCHANGING FREIGHT CARS.

Rule 2. Cars having defects for which delivering company is responsible must be properly carded when offered in interchange.


M. C. B. ASSOCIATION—AUTHORITY FOR TRANSFER OR ADJUSTMENT OF LADING.

(NAME OF ROAD

Date——————

Lading ——————

Transferred or Lading Adjusted Account of——————

Issued to—————— R. R.——————

Car No.—————— Initial——————

—————— Inspector at——————

NOTE.—To be printed in black on white paper in duplicate form, filled out with ink or black indelible pencil. Original to accompany bill and duplicate retained for record.

Empty cars offered in interchange must be accepted if in safe and serviceable condition, the receiving road to be the judge. A foreign bad order car previously delivered under load must be received back by the delivering line, providing it has the same defects which existed when it was delivered under load, and is moving empty on its home route. Owners must receive their own cars, when offered home for repairs, at any point on their lines, subject to the provisions of these rules.

Loaded cars offered in interchange must be accepted, with the following exceptions (*a*) to (*e*), inclusive:

(*a*) Cars (whether loaded or empty) having defects in violation of the Safety Appliance Acts, should not be offered in interchange.

(*b*) Cars loaded with explosives must be handled in accordance with the regulations of the Interstate Commerce Commission.

Cars containing inflammable liquid which is leaking must be repaired or transferred without any unnecessary movement or at nearest available point.

(*c*) Cars improperly loaded (not complying with the Loading Rules) when transfer or rearrangement of lading is necessary.

Cars of 80,000 lb. capacity and over, equipped with M. C. B. Standard axles, may be loaded to maximum shown in Column "A" of Rule 86, which is the total weight of car and lading for the respective capacities given.

(*d*) Lading of open cars when dimensions of lading are in excess of published clearances of roads over which the shipment is destined.

(*e*) When cars can not pass approved third rail clearances or overhead clearances for electrical conductors of the American Railway Association.

..............................**RAILROAD.**

BAD ORDER TRANSFER.

Send to..................R. R. Transfer track and

Send to owner or..........R. R. when empty for repairs

Account of following defects.....................

....

Car No...............Initial ....

Date...............191...

Signed ....

Car Inspector.

3½ by 8 inches.

To be printed in green.

(*f*) The following defects must be repaired by receiving line while car is under load:

1. Defective wheels and axles under all cars.
2. All other truck defects on home cars.
3. All other truck defects on foreign cars, except metal bolsters, center plates where cast integral with bolsters, metal truck sides, metal truck transoms and metal spring planks; also excepting non-M. C. B. standard journal boxes and contained parts in cases where the M. C. B. Standard is not a proper substitute.
4. Defective outside wooden end sills on all cars.
5. Defective body center plate and center plate bolts that do not pass through center sills on all cars, except when such center plates are cast integral with bolster on foreign cars; also center pins that are not applied from inside of car on all cars.
6. Renewal of roof boards of outside wooden roofs, and of inside metal roofs, where such renewal does not exceed 25 per cent of the roof boards, and where purlines, rafters, ridge pole, side and end plates are in good condition, on all cars.
7. Missing or defective side doors (except that an adjustment order may be obtained to apply proper door protection, as required by the Loading Rules), end doors, roof doors and hatch covers on all cars.

(*g*) A. R. A. Car Service Rule 15 will apply when transfer or rearrangement of lading is necessary.

(*h*) The car transfer check authorizing transfer or rearrangement of lading to be of the form shown.

(*i*) When load is transferred by the receiving line, the car, when empty, if foreign, may be returned to the delivering line, properly side-carded on both sides of car with a bad order transfer, return when empty

....RAILROAD.

BAD ORDER.

Return when empty to owner or............R. R.

For Repairs......................................

....

Car No..................Initial..................

Date.....................191..

....

Per.........................

DO NOT RELOAD THIS CAR.

To be printed in black

card, showing the defects for which the car was transferred, in which case it must be accepted.

(*j*) When load is not transferred, the car, if foreign, may be returned, when empty, to the delivering line, properly side-carded on both sides of car with a bad order return when empty card, showing the defects for which the car is returned, in which case it must be accepted.

(*k*) In rejecting cars account having defects in violation of the Safety Appliance Acts—per Section (*a*)—or on account of being improperly loaded—per Sections (*b*) and (*c*)—or on account of being unable to pass the approved clearances of the American Railway Association—per Section (*e*)—also in rejecting

RETURN CARD.

........................Car No........................

from..Ry.

to..Ry.

for the following defects..............................

....

....

....

....

....

....

..................191.. *Inspector*

3½ by 8 inches.

To be printed in red.)

defective empty foreign cars, all of the defects objected to must be designated with ink or black indelible pencil on return cards of the form shown and placed on both sides of car.

Rule 3. (*a*) Cars will not be accepted in interchange unless equipped with air brakes having 1¼ in. air-brake pipe and angle cocks; also quick-action triple valve, pressure-retaining valve and an efficient hand brake.

Cars built after January 1, 1919, must be equipped with M. C. B. Standard triple valves.

(*b*) Cars will not be accepted in interchange equipped with stem or spindle coupler attachments or American continuous draft rods.

(*c*) Cars built after October 1, 1914, and prior to January 1, 1917, will not be accepted in interchange unless equipped with either the No. 1 or the No. 2 M. C. B. brake beam, as indicated by the light weight of the car; the No. 1 beam must not be used on cars having a light weight in excess of 35,000 lb.

Cars built after January 1, 1917, or cars receiving general repairs after October 1, 1918, must be equipped with metal brake beams of not less than the capacity of the No. 2 M. C. B., or stronger, as the conditions may require.

All of the M. C. B. brake beams referred to shall have the letters "M. C. B." and proper number plainly stamped or cast on strut, as required by the specifications.

After October 1, 1920, cars will not be accepted in interchange unless equipped with all-metal brake beams.

After January 1, 1918, all brake beams applied to new cars shall be in accordance, in all respects, with the requirements of dimensions shown on Sheets M. C. B. 17 and 17-A, Standards.

(*d*) Cars built after October 1, 1915, with axles other than M. C. B. Standard, will not be accepted in interchange.

Cars built prior to October 1, 1915, will not be accepted in interchange after October 1, 1920, unless equipped with M. C. B. Standard axles.

Cars built after October 1, 1920, with journal bearings other than M. C. B. Standard, will not be accepted in interchange.

After October 1, 1920, cars will not be accepted in interchange with axles of less capacity than required by the sum of the light weight and marked capacity of the car.

(*e*) Tank cars (empty or loaded) will not be accepted in interchange unless they comply with the M. C. B. Tank Car Specifications.

(*f*) After October 1, 1920, no car carrying products which require for their refrigeration the use of salt with ice and which are equipped with brine tanks will be accepted in interchange unless provided with suitable device for retaining the brine between icing stations.

(*g*) After September 1, 1919, cars will not be accepted in interchange unless stenciled showing month and year built, or bearing a badge plate giving this information. Cars built prior to 1895 may be stenciled "Built prior to 1895," or bear a badge plate giving this information.

In the case of tank cars the body and tank should bear distinctive dates unless constructed at the same time.

(*h*) After October 1, 1920, no car will be accepted in interchange unless the body is stenciled light weight and capacity in pounds as provided for in Rule 86. Tank cars shall be weighed and stenciled by the tank car companies only, or by authorized representatives of the tank car companies.

After October 1, 1918, when cars equipped with short draft arms receive general repairs, long metal draft arms extending beyond the body bolster, steel draft members extending full length of car, steel center sills or steel underframes must be applied.

(*i*) After October 1, 1920, no car with trucks of less than 60,000 lb. capacity will be accepted in interchange unless equipped with wooden or metal draft arms extending beyond the body bolster, or metal draft arms integral with body bolster, or metal draft arms extending to metal body bolster and securely riveted to same.

(*j*) Refrigerator cars not equipped with door hooks and fasteners to secure the doors in an open position will not be accepted in interchange.

(*k*) After September 1, 1919, no car will be received from owner unless properly equipped with United States Safety Appliances or United States Safety Appliances, Standard.

(*l*) All flat cars that can be used for twin or triple shipments of lading, built after January 1, 1918, must have side stake pockets spaced minimum 2 ft. 0 in. and maximum 3 ft. 6 in. After January 1, 1922, no flat car that can be used for twin or triple shipments will be accepted in interchange unless the side pockets are so spaced.

(*m*) Cars built after January 1, 1919, must be equipped with coupler operating lever connected direct with coupler lock or lock lift without the use of links, clevises or chains.

USE OF DEFECT, ORIGINAL RECORD OF REPAIRS, BILLING REPAIR AND JOINT EVIDENCE CARDS.

Rule 4. If a car has defects for which the owners are not responsible, the receiving line shall require that a defect card be securely attached to the car, as per Rule 14.

Defect cards shall not be required for any damage so slight that no repairs are required nor for raked or cornered sheathing, roof boards, fascia, or bent or cornered end sills, not necessitating the shopping of the car.

Use of Defect Card.

At outlying points where joint inspection is not in effect, the matter will be left to the judgment of the receiving line. Where chief joint interchange inspectors are employed, the decision will be made by the chief interchange inspector.

Defect cards shall not be required for missing material in fair usage from cars offered

NOTE—Fill in defects on both sides with ink or black indelible pencil. Attach this card to car as per Rule 14.

M. C. B. DEFECT CARD.

(*Name of Road.*)

Date................

Car specified below will be received at any point on this company's line with the following defects:

....

....

....

Car No..........Initials............

Inspector at..............

Send bill on this card to..........

3⅝ by 8 inches.

in interchange. Neither shall they be required of the delivering company for improper repairs that were not made by it, with the exception of the cases provided for in Rules 56, 57 and 70.

Use of Defect Card.

Rule 5. Defect cards must be of the form shown on page 304. They must be of cardboard, printed in red ink on both sides, and must be filled in on both sides with ink or black indelible pencil. The cards must plainly specify in full each item for which charges are authorized, indicating the location of defects, as provided for in Rule 14.

To justify bill, repairs authorized by defect card must be made within two years from date of first receipt of car on home line, except wrong repairs, which must be corrected within nine months from date of first receipt of car on home line.

Rule 6. Any road making partial repairs of defects on a car which are covered by defect card will have the defects repaired crossed off the original card with ink or indelible pencil and card replaced on car. A copy of the card accompanying the bill with the defects which were not repaired crossed off will be sufficient authority to bill.

Rule 7. When repairs are made to a foreign car (except as otherwise provided in Rule 108), or to any car on the authority of a defect card, shall be used for original record of repairs, from which the billing repair card shall be made.

Use of Original Record of Repairs.

This form embodies the minimum information required for the proper preparation of billing repair cards. Additions may be made to this form and its size made to suit the requirements of any company. This form of original record of repairs may be in book form if so desired.

A card similar to the above in its essential requirements, upon which repairs to more than one car may be recorded, may be used for recording minor repairs made in transportation yards.

In recording repairs upon the original record, the following requirements must be observed:

(1) Cars shopped for repairs must be carefully inspected by an authorized person before work of repairing is begun, and all work authorized by him must be entered upon the original record, including the location of each item of repairs and the exact reason or cause for making repairs. This information must not be assumed, but must be determined by an actual inspection. The common terms "broken," "bent," "missing," etc., if used, when caused by wreck, derailment, cornering, sideswiping, or other causes shown in Rule 32, must be qualified to show such cause.

(2) Special care must be taken to obtain a correct account of the material actually used.

The finished sizes of lumber as applied to the car must be shown on original record; feet, board measure, need not be shown.

The number and size of bolts, and purpose for which they are used, must be shown upon original record; the weights needs not be

shown. Nuts must be specified, except those used on bolts renewed, in which case an average of one nut per bolt will be assumed as used, regardless of whether double nuts are used.

The actual weight of forgings, structural or pressed steel shapes and weight and kind of castings must be shown on original record in space provided, except where weight of same is accurately determined by definite description.

Paint and nails must be shown on original record; quantity need not be shown in those cases where it can be properly determined by the billing clerks.

Use of Original Record of Repairs.

(3) All items carrying labor charges must be covered in proper detail on the original record; the time or money charges (as per Rules 107 and 111) need not be shown. For items of labor computed on the rivet basis, the number and diameter of rivets must be shown on original record. For items of labor for straightening or repairing, computed upon weight basis, the weight of material must be shown on original record.

(4) The original record must be signed by the authorized person making original inspection and the person making the complete inspection or by other authorized person making the original record, to vouch for the correctness of same.

The original records covering minor repairs made in transportation yards must be signed by either the person inspecting the repairs or by the workman who repairs the car.

All corrections made on original record must be made by the person or persons who have vouched for the correctness of the original record by their signatures.

These original records must be kept on file, for ready reference, preferably either at point where repairs are made or point at which billing repair cards are made, for a period of one year, after which they may

M. C. B. ASSOCIATION—RECORD REPAIR CARD

(NAME OF RAILROAD)

End	Repairs Made		Iron			Chain	Lumber	Springs	Cast Steel	Why Made
			Cast	Wrot.	Mall.					

Date______19___Repaired at______Inspector______Labor Hours______
Car No.______Initial or Name______Kind______

TO BE RETAINED BY PARTY MAKING REPAIRS

Record repair card may have carbonized back.
3½ by 8 inches.

be stored in accordance with local regulations.

The billing repair cards must check with the original record of repairs, in so far as they should properly check as regards the details of charges.

Rule 8. When repairs of any kind are made to foreign cars a billing repair card must be furnished car owner, except as otherwise provided for in Rule 108. This card must specify fully the repairs made, the reason for same, the date and place where made and name of road making repairs; also show location of parts repaired or renewed, as per Rule 14.

M. C. B. ASSOCIATION—BILLING REPAIR CARD

(NAME OF RAILROAD)

End	Repairs Made		Iron			Chain	Lumber	Springs	Cast Steel	Why Made
			Cast	Wrot.	Mall.					

Date______19___Repaired at______Inspector______Labor Hours______
Car No.______Initial or Name______Kind______

TO BE ATTACHED TO BILL

Billing repair card must not have carbonized back.
3½ by 8 inches.

When repairs are made to any car on authority of a defect card issued by other than owner of car, in addition to the billing repair card furnished the car owner, a separate billing repair card must accompany the defect card. This separate billing repair card must show repairs made, details of charges, date and place where repairs were made;

M. C. B. ASSOCIATION—BILLING REPAIR CARD—(Wheels and Axles)

(NAME OF RAILROAD)

Wheels and Axle Removed						Wheels and Axle Applied					
Maker	Ry Co.'s Initials on Wheel	Wheel No. Date Cast	Service Metal Before Turning	Service Metal After Turning	Cause of Removal	Maker	Ry. Co.'s Initials on Wheel	Wheel No. Date Cast	Service Metal	New or Sec. Hand	Net Charge
Axle						Axle					
Location	Size and Kind of Wheels Removed and Applied			Size of Journals Removed and Applied					Labor		
									Total		

Date______191___ Repaired at______ Inspector______
Car No.______ Initial or Name______ Kind______

To Be Attached To Bill

also show reference to name or initials of road issuing defect card and date issued.

Use of Billing Repair Card.

If no bill is to be rendered, the billing repair card must be attached to the monthly bill, with the words "no bill" written across the face of the card, in which case the cards must be entered in the billing statement in

M. C. B. ASSOCIATION—RECORD REPAIR CARD—(Wheels and Axles)

(NAME OF RAILROAD)

Wheels and Axle Removed						Wheels and Axle Applied					
Maker	Ry Co.'s Initials on Wheel	Wheel No. Date Cast	Service Metal Before Turning	Service Metal After Turning	Cause of Removal	Maker	Ry. Co.'s Initials on Wheel	Wheel No. Date Cast	Service Metal	New or Sec. Hand	Net Charge
Axle						Axle					
Location	Size and Kind of Wheels Removed and Applied			Size of Journals Removed and Applied					Labor		
									Total		

Date______191___ Repaired at______ Inspector______
Car No.______ Initial or Name______ Kind______

To be retained by parties making repairs

the first four columns, with the notation "no bill" in the fifth column for reference.

The billing repair card shall be made in duplicate, the original to be known as the billing repair card and the duplicate to be known as the record repair card, and to be

NOTE.—The present forms of original record may be used until present stock is exhausted.

NOTE.—Use of present forms, if not conforming to recommended forms shown, may be continued until stock is exhausted.

of the forms shown. All items of repairs to be in handwriting or typewriting.

Rule 9. The following information must be specified on billing repair cards:

M. C. B. couplers, or parts thereof, R. and R.	New or secondhand. Size of shank. (Where 12¼-in. head coupler or M. C. B. type D coupler is removed or applied, it must be so stated.) Riveted yoke or key attachment.
Wheels and axles, R. and R.	Cast-iron, cast-steel, wrought-steel or steel-tired wheels. New or secondhand. Cause of removal (see Rule 10). M. C. B. or non-M. C. B. length of axle, diameter and length of journal, diameter of wheel fit, diameter of center of axle. (Only one dimension for length of journal, diameter of journal or diameter of wheel fit to be given, which shall be the dimension nearest the condemning limit.) All markings on wheels and axles. If no marks are found on same, a notation to that effect must be made. Box number (see Rule 14).
Journal bearings	New or secondhand (relined journal bearings are considered as new). Solid, filled or other kind, R. and R. Length of journal. Box number (see Rule 14).
Metal brake beams, R. and R.	New or secondhand, applied. If M. C. B. and number of same, or non-M. C. B. Make or name. Cause of removal.
Brake shoes, applied	New or secondhand. Cast or reinforced back. Make and type.
Triple valve, R. and R.	When cleaned, must show "Tested per Rule 60" (when so tested) to justify charge.
Air hose applied	New or secondhand.
General	Weight of forgings, castings, etc. Finished sizes of lumber. Feet of lumber. Value of miscellaneous Hours of labor. items. (The above information to be shown opposite each item, except where no bill is rendered.)

When lead paint is used, it must be so specified.

When triple valve, cylinder or centrifugal dirt collector is cleaned, the initial of road and date of last previous cleaning must be shown.

If necessary to remove load to make repairs, as specified in Rule 107, it must be plainly stated.

When tank or safety valve of tank cars is tested in accordance with the M. C. B. Specifications for Tank Cars, the certificate of test, as required by the Interstate Commerce Commission regulations, must accompany the billing repair card.

Use of Billing Repair Card.

Rule 10. In noting the cause of removal of wheels and axles, the terms used in Rules 68 to 86, inclusive, shall be used.

In all cases of wrought-steel wheels, the actual thickness of tread must be shown before and after turning off, measured from base line of tread to the condemning limit of tread, which is ¼ in. above the witness groove; also show actual thickness of tread on other wheels applied. This information must be reported to car owners regardless of whether or not repairs are chargeable to owners.

THE.......................RAILWAY CO.

REPORT OF IMPROPER REPAIRS TO..........CARS.

Station.......................*191*..

Car No......*Initial*......*Received from*..............*Ry.* *At*..........*Date*..........*191*..

Description of wrong Repairs.............. | *How Repairs should be made*..............

Show how Carded on other Side.
We Certify Above to be Correct. { ....*Inspector for*..........*Ry.*
..................*Inspector for*..........*Ry.*

SEE RULE 12.
Size, 3½ by 8 inches.

FORM OF JOINT EVIDENCE CARD.

Rule 11. Journal bearings having a babbitt lining ⅜ in. thick or thicker, shall be charged as filled journal bearings, and not as solid journal bearings.

THE.......................RAILWAY CO.

COPY OF M. C. B. DEFECT CARD. *Issued by*..............*Ry.* *At*..........*Date*..........*191*..

Inspector..............*Reading as follows*..............

COPY OF M. C. B. BILLING REPAIR CARD. *Issued*..............*Ry.* *At*..........*Date*..........*191*..

Inspector..............*Reading as follows*..............

DISPOSITION OF CAR. *Carded to*..............*Shop;* *Repaired,* *forward without repairs*

Rule 12. The evidence of a joint inspector, or the joint evidence of two inspectors, one representing the owner of the car and the other representing a railroad company, subscriber to the M. C. B. rules, that the repairs are not proper, shall be final; the evidence to be signed only after an actual inspection has been made.

A joint evidence card shall be used for this purpose, which shall describe and show loca-

tion of parts repaired or renewed, as per Rule 14. This card shall be of the form shown.

Use of Joint Evidence Card.

If repairs are not corrected at the time of inspection, the joint evidence card shall be attached to the car, as per Rule 14.

Joint evidence must be obtained within ninety days after first receipt of car home.

The joint evidence may be obtained at any point on the home line at which the improper repairs are found, but preferably at the point where the car is received, and only after an actual inspection is made.

Rule 13. The joint evidence card showing copy of billing repair card, covering wrong repairs, when wrong repairs have been corrected, shall be sent to the company issuing such billing repair card. If within sixty days from the date of such request the latter does not issue its M. C. B. defect card covering, bill made on copy of joint evidence and copy of billing repair card shall be final authority, provided the wrong repairs mentioned on joint evidence card are covered by such billing repair card. It must be stated on back of joint evidence card where and when the wrong repairs were corrected.

Use of Joint Evidence Card.

Rule 14. The end of car toward which the cylinder push rod travels shall be known as B end and the opposite end shall be known as A end.

Facing the B end of car, in their order on the right side of car, wheels, journal boxes and contained parts, shall be known as R1, R2, R3 and R4, and similarly those on the left side of car shall be known as L1, L2, L3 and L4.

Defect cards and joint evidence cards must be securely attached to the car with at least four tracks, preferably on the outside face of intermediate sill between cross-tie timbers on wooden cars, and on steel cars to cardboard located either on cross tie under car or on inside of side sill at the end of car.

Rule 15. Duplicate defect, billing repair or joint evidence cards must be furnished promptly, on request, for lost or illegible cards.

GENERAL INSTRUCTIONS.

Rule 16. Any car having defects which render it unsafe to run, unsafe to trainmen, or to any lading suitable to the car, may be repaired.

Repairs to foreign cars shall be promptly made, and the work shall conform in detail to the original construction, and with the quality of material originally used, except as provided for in Rules 17, 18 and 87.

Rule 17. In repairing foreign cars:

(a) Defective non-M. C. B. Standards may be replaced with M. C. B. Standards (which must comply with M. C. B. specifications), provided such substitution does not impair the strength of car. Any increased cost resulting from, and any expense of alteration necessary for, the application of such M. C. B. Standards shall be charged to car owner. Scrap credits are to be allowed for undamaged parts thus removed.

(b) Malleable iron, wrought iron or steel M. C. B. Standards may be substituted for each other or for gray iron M. C. B. Standards, gray iron M. C. B. Standards applied in lieu of malleable iron, wrought iron or steel M. C. B. Standards shall be considered as wrong repairs.

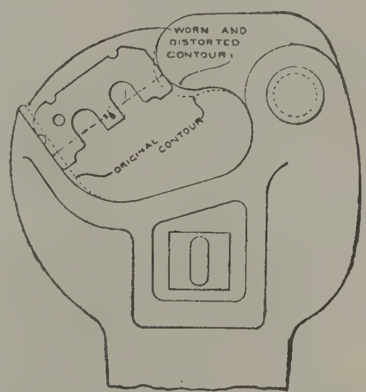
(c) In replacing M. C. B. Standard couplers, M. C. B. type D couplers or M. C. B. Temporary Standard couplers, the dimensions of shank and butt of M. C. B. couplers standard to the car must be maintained, except that 9⅛ in. butt may be substituted for 6½ in. butt when used with M. C. B. standard yoke in substitution for non-M. C. B. standard yoke.

(d) If the car owner elects, on account of improper repairs, to remove an M. C. B. Standard coupler, M. C. B. type D. coupler or M. C. B. Temporary Standard coupler in good condition, secondhand credit should be allowed, and charge be confined to secondhand coupler applied.

(e) M. C. B. Standard No. 2 brake beams may be used in repairs to all freight equipment cars equipped with M. C. B. No. 2, M. C. B. No. 1 or non-M. C. B. Standard beams. Any increased cost resulting from the application of No. 2 brake beams to be borne by the car owner. M. C. B. Standard No. 3 brake beam must be replaced in kind.

(f) Billing repair card must specify kind of material applied and removed, and bill rendered in accordance therewith.

(g) Cast-iron brake shoes may be replaced with brake shoes having reinforced back and the increased cost charged to party responsible for the repairs.



(h) White pine, yellow pine, fir or cypress may be used when repairing siding, when of equal grade or quality to the material standard to the car. Fir, oak or southern pine may be substituted for each other in the renewing or splicing of longitudinal sills and side plates. Oak and southern pine may be substituted for each other in renewing end plates. Fir and southern pine may be substituted for each other in renewing or splicing end plank and side plank.

(i) Brake shafts, sill steps, uncoupling levers and grabirons must not be welded.

Cotter keys are not to be applied to knuckle pins of couplers on cars other than hopper and fixed-end gondolas.

Rule 18. Couplers that exceed the distance of 5⅛ in. between point of knuckle and guard arm, measured perpendicularly to guard arm, must have the defective part or parts renewed to bring coupler within gage, in which case owners are responsible.

When M. C. B. couplers of another make are applied to a car, the uncoupling arrangement shall be

made operative at the expense of the company making the repairs.

Rule 19. In making repairs to foreign cars, the following materials must not be used:

Cast-iron brake wheels.

Malleable iron couplers.

Open knuckles.

Malleable or steel-backed journal bearings.

Rule 20. Cars must be maintained within the limits of standard height for couplers, measured from the top of the rails to the center line of coupler head. As far as possible, cars should be adjusted when empty.

When construction of car and trucks precludes the common methods of adjusting coupler heights, the application of metal shims between journal boxes and arch bars will be permissible.

The use of liners between male and female portions of center plates is prohibited where the vertical bearing surfaces are reduced.

Empty cars measuring 32½ in. or less shall be adjusted to 34½ in., or as near as practicable thereto, but not exceeding 34½ in. Loaded cars measuring 31½ in. or less shall be adjusted to 33½ in., or as near as practicable thereto, but not exceeding 33½ in. When bill is to be rendered, the height of car before and after altering must be shown on billing repair cards.

Rule 21. Bills may be rendered against car owners:

(a) For the cost of applying temporary running boards and hand rails to cars originally equipped with roofs or running boards, to make such cars safe for trainmen, when owners are responsible for the defective condition of the roof; also for the cost of applying temporary hand railings to, or boarding over the opening on, empty well-hole cars.

(b) For applying temporary transverse tie rods to cars with sides spread or bulged beyond the clearance limits of the handling line.

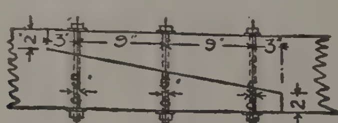


FIG. 8.

Rule 22. Draft timbers must not be spliced. Longitudinal sills may be spliced at both ends. The splicing of any sill between cross-tie timbers will not be allowed.

The splice may be located either side of body bolster, but the nearest point of any splice must not be within 12 in. of the same, excepting center sills, which must be spliced between body bolster and cross-tie timber, but not within 24 in. of body bolster.

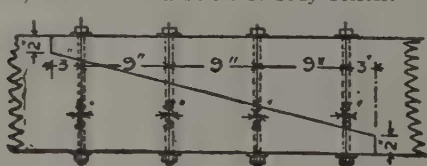


FIG. 9.

In splicing longitudinal sills other than center sills, if same are less than 12 in. in depth, the plan shown in either Fig. 8 or 9C shall be followed. If the sills are 12 in. or more in depth, the plan shown in either Fig. 9 or 9C shall be followed. Where intermediate sills are spliced between the body bolster and cross-tie timber the splice must be reinforced as per Figs. 9A or 9B. In splicing center sills the plan shown in Fig. 9B shall be followed.

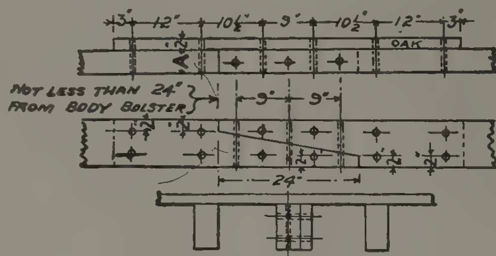


FIG. 9A.

THE SIZE OF HORIZONTAL OR CROSS BOLTS TO BE 5/8 INCH.

The size of horizontal or cross bolts should be ⅝ in.

Sills of foreign cars shall be spliced as above provided.

Cars delivered in interchange with center sills

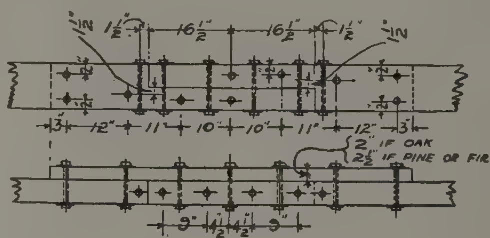


FIG. 9B.

ALL BOLTS 5/8" DIAM.

spliced in accordance with Fig. 9A will be accepted.

Steel sills may be spliced in accordance with Figs. A, B, C and D. Adjacent sills may be spliced.

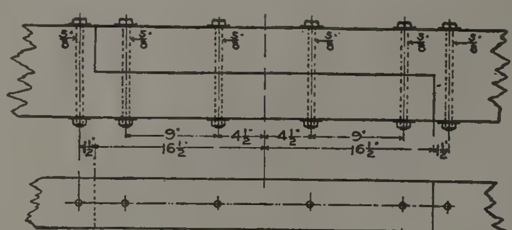


FIG. 9 C.

The splice for center sills, except as otherwise herein stated, to be located not less than 7 in. from either side of the body bolster, consisting of butt joints. The butt joints to be reinforced by plates on both sides to be not less than twice the length of the protruding

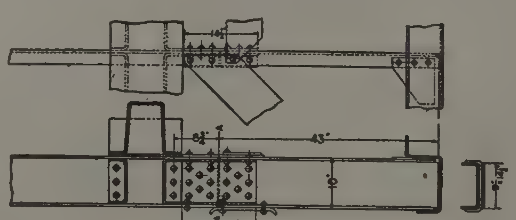


FIG A SECTION A-A

end, but not exceeding 24 in., and not less than thickness of web plate, with the one on the flange side of channel to include flanges, while the outside plate should only cover the web. The rivets to be spaced as shown on Figs. A and B.

Fig. A shows the method of splicing center sills in front of body bolster.

Fig. B shows the method of splicing center sills back of body bolster.

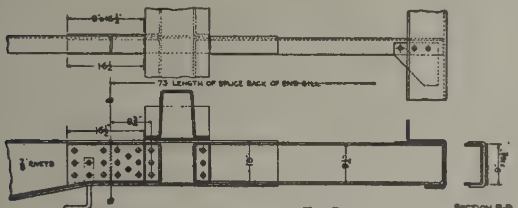


FIG. B.

Fig. C shows method of splicing in cases where cars are damaged to such an extent that the center sills have to be cut off less than 8 in. from the front side

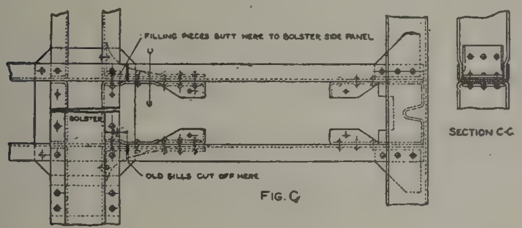


FIG. C

of the body bolster. This method is not recommended for sills with protruding ends less than 3 in. The outside plate in this splice may be made of pressed steel or a steel casting. The rivets should be spaced as shown on sketch.

Fig. D shows the method of splicing side sills. This

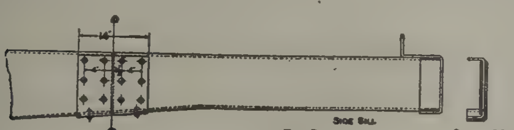


FIG. D.

splice may be located on either side of the body bolster. The rivets should be spaced as shown on sketch.

Rule 23. Vacant. October 1, 1918.

Rule 24. Wheels on the same axle must be of the same circumference.

In no case should two wheels be mounted on the same axle when the thickness of the two flanges together will exceed the thickness of one normal and one maximum flange, or 2 17-32 in.

Rule 25. New wheels must not be mated with secondhand wheels.

Rules 26-29, inclusive. Vacant.

Rule 30. (a) All freight cars shall be light-weighed as follows, and shall be marked in accordance with M. C. B. rules with the following marks:*

(1) The light weight, which shall be the multiple of 100 lb. nearest the scale weight, except that when the scale weight indicates an even 50 lb., the lower multiple shall be used.

(2) Capacity in pounds. Cubical capacity, except for flat and tank cars.

(3) Station symbol.

(4) Date of weighing, month and year.

(b) Each new car must be weighed separately and marked at the carworks, under the supervision of the owner's inspection. The accuracy of the scales used must be certified to by a railroad-scale inspector appointed by the car owner.

These provisions to be incorporated in the contract covering the purchase of the equipment.

(c). Wooden and steel underframe cars (except refrigerator cars) should be reweighed and remarked each year during the first two years the cars are in service and thereafter once every two years. All-steel cars and all refrigerator cars should be reweighed and remarked at least once every three years. This weighing should be done at any favorable time during the year in which the car is due to be weighed, regardless of the month in which the previous weight was obtained. This paragraph does not apply to tank cars.

(d) When a car is materially changed by repairs, alterations or repainting, it should be reweighed and remarked. (See paragraph [f] [8].)

(e) Any car without marking should be immediately reweighed and marked. Any car (except tank cars) which has not been reweighed and remarked within the prescribed period should be immediately reweighed and remarked. If the car (except tank cars) is reweighed at any time and is found to have a variation of 300 lb. or more (for refrigerator cars 500 lb. or more) between the marked and actual weight, it should be immediately remarked.

(f) (1) When empty cars are received in yards for inspection for defects or while empty cars are on shop tracks for repairs, there should be selected the cars whose condition and whose date of last weighing, etc., indicates that they should be reweighed and remarked. The number of cars selected will be regulated in accordance with facilities and traffic conditions.

(2) The initials and numbers of cars selected, also old light-weight marks, shall be reported to the weighmaster on the prescribed blank.

(3) Cars should then be cleaned and swept out under the supervision of the yardmaster or some one especially designated.

Cars should be dry and free from snow, ice, false floors, removable stakes, posts, or anything else affecting the weight.

(4) Missing parts, such as side or end doors, or parts peculiar to certain types of cars, should be replaced and included in the marked weight.

(5) Temporary double decks in stock cars should be removed before cars are weighed.

(6) The old light-weight stencil marks should be entirely painted out with quick-drying paint.

(7) Before cars are weighed, the accuracy of the scale must be regularly certified by the scale department, scale must be properly balanced and free from interference, and the weighmaster must know that cars are clean.

(8) Cars should not be light-weighed during rain, snow, sleet or heavy winds; except that when cars have been materially changed by repairs, alterations or repainting they must be weighed, even if it is necessary to do so under unfavorable weather conditions.

(9) Cars should be light-weighed at rest, uncoupled and free at both ends.

(10) The weights of the cars so obtained should be furnished immediately on the prescribed blank to the car marker, who will mark the cars as provided in paragraph (a). When desired, any portion of the marks which will not be changed may be marked on the car before reweighing.

*Tank cars shall be weighed and stenciled by the tank car companies only, or by authorized representatives of the tank car companies.

Complete reports of such reweighing and remarking should be forwarded on prescribed form to the designated transportation and mechanical officers and a copy retained by weighmaster.

(g) When a car is remarked the car owner should be notified of the old and the new weights, with place and date. The proper officer to whom these reports should be made will be designated in "The Official Railway Equipment Register."

(h) Whenever a weighmaster at a point not equipped for marking freight cars, as provided in paragraph (e), ascertains, as per paragraph (f), the light weight of a car which is not marked in accordance with this rule, he shall attach to the car the prescribed "Light Weight Card" with the light weight and send two copies of the card to the designated officer of the railroad on which the scale is located, one copy to be sent to the owner of the car. The presence of the Light Weight Card on the car shall be authority for remarking the car at first available station.

Rule 31. The re-light-weighing of cars, as provided above, to be charged to car owners, except when the weight of the car is changed on account of repairs due to unfair usage; when such repairs are made, on authority of defect card, charge for re-light-weighing may be included on same authority.

PARTS OF CARS WHICH JUSTIFY REPAIRS IF OWNERS ARE RESPONSIBLE, OR REPAIRS OR CARDING IF DELIVERING COMPANY IS RESPONSIBLE.

Delivering Company Responsible.

Rule 32. Damage or loss to any car, due to wreck, derailment, cornering, sideswiping, flood, overloading, explosion, collapsing structures, or unconcealed fire damage, including cars on ferries or floats; also damage due to storm where car is derailed or destroyed.

Defect cards shall not be required for any damage so slight that no repairs are required, nor for raked or cornered sheathing, roofing, fascia, or bent or cornered end sills, not requiring the shopping of the car, the receiving line to be the judge.

Rule 33. Owners will be responsible for the expense of repairs to safety appliances, except where involved with other delivering line damage, as per Rule 32.

In making repairs to safety appliance details, nails or lag screws must not be used where screws, bolts or rivets are required by law.

The use of drive screws is not permissible.

Handholds or grabirons must be of wrought iron or steel.

Rule 34. Freight cars not now equipped with United States Safety Appliances, or United States Safety Appliances, Standard, may be so equipped at car owner's expense and special notice sent immediately to the car owner.

Rule 35. Vacant. October 1, 1915.

Delivering Company Responsible.

Rule 36. Temporary advertisements tacked, glued, pasted, varnished or secured to cars by screws, wire, or any other manner.

The size and character of cards which may be used on freight cars may be divided into five classes, viz.:

1. Routing cards.—To be of cardboard; maximum size, vertical dimension, five inches; horizontal dimension, eight inches.

To be permitted on all loaded cars.

The text to be as follows: No picture or trademark to be permitted. Space for railroad information to occupy lower three-fifths of card. Any printing on the upper two-fifths to be limited to letters not exceeding one-half inch in any dimension. All printing to be in black ink. Any deviation from the above will be considered as an advertisement, and cards should be removed and charges made in accordance with Rule 107.

They may be affixed by shippers, not to exceed one card on each side of a car; must not be pasted or glued, but placed in rack or on specified location when such is provided for in local rules.

(See copy of card in reduced form.)

2. Commodity Cards.—To be of cardboard; maximum size, vertical dimension, five inches; horizontal dimension, eight inches.

To be permitted only on cars loaded with perishable or fragile freight.

No picture or trade-mark to be permitted. All printing to be in black ink, and show only the name of commodity. Any deviation from the above will be considered as an advertisement, and cards should be removed and charges made in accordance with Rule 107.

They may be affixed by shippers, not to exceed one card on each side of a car; must not be pasted or glued, but placed in rack or on specified location when such is provided for in local rules.

3. Special Placards.—These shall be such as are required by the "Interstate Commerce Commission Regulations for the Transportation of Explosives and other dangerous articles by freight and by express," and are to be of the size as therein described. They shall be used, be of the text and be attached to the cars as prescribed by said regulations.

UNITED STATES ARMY.

Q. M. SUPPLIES.

Initial and No.................Contents...........

Point Shipment.............. Via..........R. R.

Consignee................ Destination..........

Via......................................

Date Shipment ....Consignor.

Size 5 inches vertical dimension.
" 8 " horizontal "

ROUTING CARD FOR QUARTERMASTER'S SUPPLIES

SEE RULE 36.

Missing placards or certificates on cars containing explosives and other dangerous articles must be replaced. Placards and certificates on empty cars, except inflammable placards on tank cars, must be removed. Application or removal of such placards or certificates should be charged for on authority of defect card in accordance with Rule 107.

4. Symbol and M. C. B. Cards.—These are prescribed by individual roads for special purposes. Their size, use, text and method of application will be prescribed by each individual road to suit its requirements.

5. Special Cards Required by the Federal or State Governments.—Customs Regulation Card, printed on red cardboard, eight inches by ten and one-half inches

[illegible] the United States Customs Seal and will be used as prescribed by the United States Customs Regulations.

(Name of Consignor, etc.)
(Name of Consignor, etc., in letters not more than one-half inch in any dimension.)

Initial and No.................. Contents..............

Point of Shipment .... R. R.

Consignee and Destination ....

Via ....

Date..........................

Vertical dimensions, [illegible] inches.
Horizontal, " " "
To be permitted on all loaded cars.
No picture or trademark to be permitted.
Space for railroad information to occupy lower three-fifths of card. Printing on upper two-fifths to be limited to letters not exceeding one-half inch in any dimension.
All printing to be in black ink.

SEE RULE 36

ROUTING CARD.

Other cards required by the laws of the United States, and within some of the States.

Rules 37-40 inclusive. Vacant.

Rule 41. When a car having damage for which delivering line is responsible is found with other defects which are ordinarily owner's responsibility and are not associated with delivering line defects, such [illegible] defects may be repaired at car owner's expense.

Rule 42. Vacant. October 1, 1914.

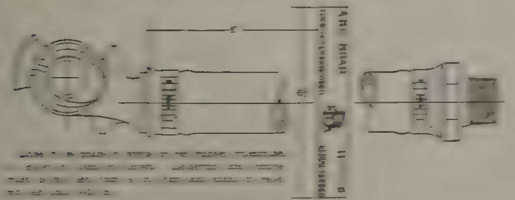
Owners Responsible. *Rule 43.* Damage or loss to any car, except as provided for in Rules 32, 42, 48, 84 and 99. Inside parts or concealed parts are at owner's risk.

Rules 44-48 inclusive. Vacant.

Owners Responsible. *Rule 49.* Stock cars not equipped with partitions for stock [illegible] and broken parts.

Rules 50-55 inclusive. Vacant.

Rule 56. Cars [illegible] to be equipped with metal brake beams and so stenciled, if found with wooden brake beams.



M. C. B. HOSE LABEL AND [illegible]

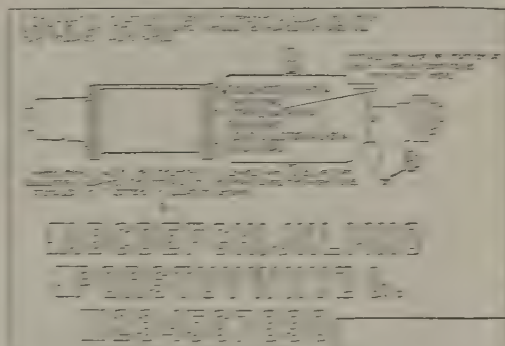
Delivering Company Responsible. *Rule 57.* Cars not equipped with M. C. B. standard label in air brake hose.

The use of a rectangular label in addition to the band label is optional with any railroad, provided that between the two labels is not less than two inches.

Rules 58-59 inclusive. Vacant.

Owners Responsible. *Rule 60.* Cylinders or triple valves not cleaned, oiled and tested or dirt collectors not cleaned within twelve months, and the initial of road, together with date of last cleaning, oiling and testing, stenciled with white paint preferably on the brake cylinder or auxiliary reservoir, or at [illegible] readily visible in a convenient location at release rod.

Air brakes bearing cleaning markings nine months old or over may, when on repair or [illegible] be cleaned and stenciled.



SEE RULE 60

Triple valves cleaned must be removed from car and tested in accordance with the M. C. B. code of tests for repaired triple valves.

A method of marking brake apparatus which has been cleaned, oiled and tested, is shown above. In order to condense the stenciling as much as possible, the words "cleaned and oiled" and "tested" have been omitted, as their significance is well known. Old markings must be erased before new stenciling is applied.

Rule 61. Vacant.

Rule 62. In replacing air-brake hose on foreign cars, new 1913 M. C. B. Standard specification hose must be used to justify bill.

In replacing brake shoes on foreign cars, new shoes must be used to justify bill.

Rules 63 and 64. Vacant.

Delivering Company Responsible. *Rule 65.* [illegible] when delivering company is responsible for damage to wheels and axles.

Rule 66. Vacant. October 1, 1914.

Rule 67. No part of body or truck frame or attachments is less than [illegible] in. above the top of the rail.

WHEELS.

Delivering Company Responsible. *Rule 68.* Flat sliding, cast-iron, cast-steel, wrought-steel or steel-tired wheels, if the spot is [illegible] in. or over in length, or if there are two or more adjoining spots, each 2 in. or over in length. The same responsibility shall [illegible] regardless of length of slid spot.

A separate defect card should be furnished [illegible] wheels.

Rule 69. Vacant. October 1, 1918.

Rule 70. Cars intended to be equipped with wrought-steel or steel-tired wheels and

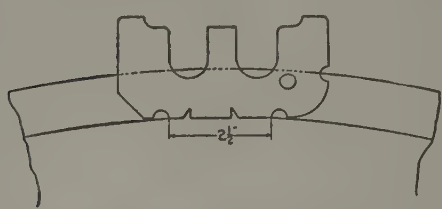


FIG. 2.—METHOD OF GAGING SHELLED AND FLAT SPOTS.

Delivering Company Responsible.

so stenciled, if found with cast-iron or cast-steel wheels.

Cars intended to be equipped with cast-steel wheels and so stenciled, if found with cast-iron wheels.

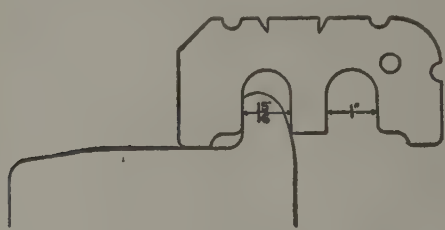


FIG. 3.—METHOD OF GAGING WORN FLANGES

Wrought-steel wheels may be substituted for cast-steel or steel-tired wheels.

Rule 71. Shelled out: wheels with defective treads on account of cracks or shelled-out spots 2½ in. or over, or so numerous as to endanger the safety of the wheel.

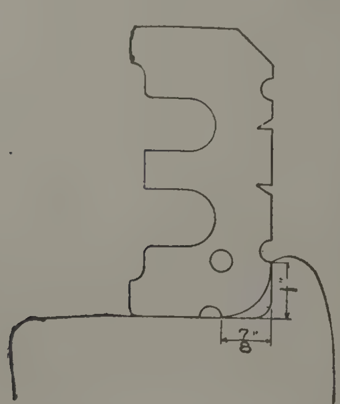


FIG. 4.—METHOD OF GAGING WORN FLANGES

Owners Responsible.

Brake burn: wheels having defective treads on account of cracks or shelling out due to heating.

Rule 72. Seams ½ in. long or over at a distance of ½ in. or less from the throat of the flange, or seams 3 or more in. long, if such seams are within the limits of 3¾ in., as shown in Fig. 5.

Rule 73. Worn through chill: when the worn spot is 2½ in. or over in length. Care must be taken to distinguish this defect from flat spots caused by sliding wheels.

Rule 74. Worn flanges—cast-iron or cast-

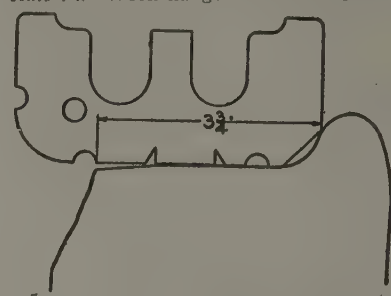


FIG. 5.—METHOD OF GAGING CHIPPED RIMS.

steel wheels: wheels under cars of less than 80,000 lb. capacity, with flanges having flat vertical surfaces extending 1 in. or more from tread, or flanges 15-16 in. thick or less, gaged at a point ⅜ in. above tread. Wheels under cars of 80,000 lb. capacity or over,

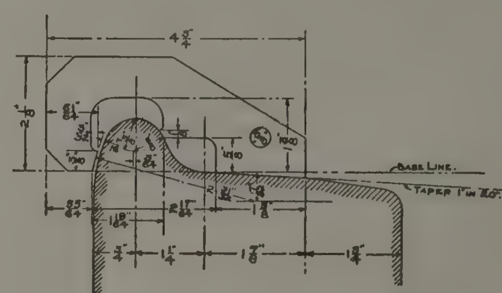


FIG. 6.—MAXIMUM FLANGE THICKNESS GAGE, FOR ALL WHEELS CAST AFTER JANUARY 1, 1908.

with flanges having flat vertical surfaces extending ⅞ in. or more from tread, or flanges 1 in. thick or less, gaged at a point ⅜ in. above tread. (See Figs 3 and 4.)

Worn flanges—wrought-steel or steel-tired wheels: flanges having flat vertical surfaces extending 1 in. or more from tread, or

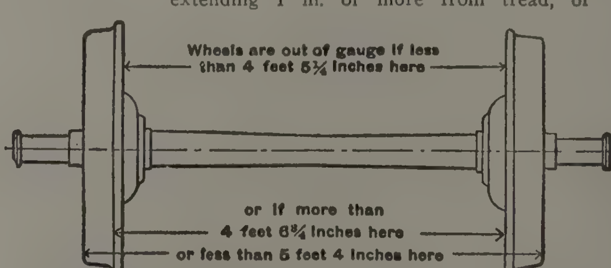


FIG. 7.—MEASUREMENTS TO BE MADE AT THE SAME HEIGHT ON THE WHEELS AS THE CENTER OF THE AXLE. FOR WHEELS CAST PRIOR TO THE M. C. B. STANDARD TREAD AND FLANGE ADOPTED IN 1907.

flanges 15-16 in. thick or less. (See Figs. 3 and 4.)

Rule 75. Thick flange: flange over 1-19-64 in. thick for cast-iron wheels having increased flange and tread standards of 1907 and 1909. (See Fig. 7.)

Rule 76. Tread worn hollow: if the tread

is worn sufficiently hollow to render the flange or rim liable to breakage.

Rule 77. Burst: if the wheel is cracked from the wheel fit, outward, by pressure from the axle.

Rule 78. Cracked or broken flange, chipped flange if it exceeds 1½ in. in length

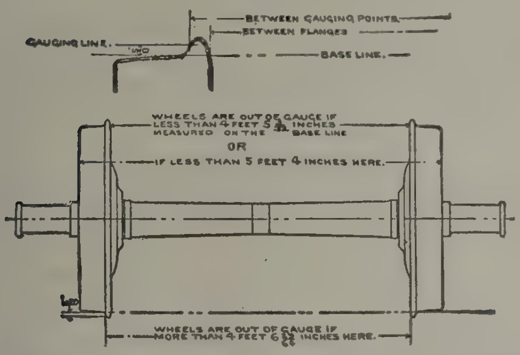


FIG. 8.—MEASUREMENTS TO BE MADE AT THE SAME HEIGHT ON THE WHEELS AS THE CENTER OF THE AXLE. FOR WHEELS CAST AFTER JANUARY 1, 1908.

and ½ in. in width; broken or chipped rim, if tread measured from the flange at a point ⅝ in. above tread is less than 3¾ in. in width (see Fig. 5); cracked tread, cracked plate, one or more cracked brackets, or broken in pieces, provided these defects were not caused by derailment or wreck.

Rule 79. Vacant. October 1, 1914.

Owners Responsible.

Rule 80. Wrought-steel or steel-tired wheels loose; broken or cracked hubs, plates, bolts, retaining ring or tire.

Rule 81. Wheels loose or out of gage. (See Fig. 8 for wheels cast prior to the M. C. B. Standard tread and flange adopted in 1907, and Fig. 9 for wheels cast after January 1, 1908.)

Rule 82. Vacant. October 1, 1914.

Rule 83. The determination of flat spots, worn flanges and chipped treads shall be made by a gage, as shown in Fig. 1, and its application to defective wheels, as shown in Figs. 2, 3, 4 and 5. The determination of thick flanges for all wheels cast after January 1, 1908, shall be made by a gage shown in Fig. 7.

AXLES.

Rule 84. Cut journals, axles bent, or axles damaged, as provided in Rule 32.

Delivering Company Responsible.

Rule 85. Axles broken or having seamy journals; fillets at back end of journals less than ⅛ in. radius on axles of 40,000 lb. capacity, less than 5-16 in. radius on axles of 50,000 and 60,000 lb. capacity, and less than ⅜ in. radius on axles of greater capacity; length of journal increased ½ in. over standard length, or collar broken off or worn to ¼ in. in thickness or less.

Owners Responsible.

FOR CARS WITH NON-M. C. B. STANDARD AXLES (FOUR AXLES PER CAR).

Rule 86.

(a) Non-M. C. B. Standard axles less than the following prescribed limits must be removed from service:

Capacity, Lb.	Journal, In.	Wheel Seat, In.	Axle Center, In.
70,000	4	5⅝	4⅞
60,000	3¾	5	4⅜
50,000	3½	4¾	4⅛
40,000	3¼	4⅝	3⅞

NOTE.—Axles heretofore known as 70,000-lb. and 50,000-lb. capacity axles are not M. C. B. Standard axles.

FOR CARS WITH M. C. B. STANDARD AXLES (FOUR AXLES PER CAR).

Owners Responsible.

The total weight of car and its lading must not exceed weight given in column "A." Column "B" is the nominal capacity stenciled on all cars. Axles must be removed from service when less than the prescribed limits in columns "C," "D," "E," or when the condemning limits in columns "F" and "H" are reached.

All cars to have their light weight and capacity in pounds stenciled on them as per paragraph (h), Rule 3.

(b) M. C. B. Standard axles must be used in replacing M. C. B. Standard axles, subject to condemning limits for such axles.

M. C. B. Standard axles may be used to replace non-M. C. B. Standard axles of like capacity when over-all length conforms to M. C. B. Standard length, at expense of car owner, except that in case of delivering line defects the charge against owner shall be confined to the difference in value between the non-M. C. B. Standard axle removed and the M. C. B. Standard axle applied.

Non-M. C. B. Standard axles may be used to replace non-M. C. B. Standard axles in kind, until October 1, 1920, subject to condemning limits of such axles.

M. C. B. Standard 60,000-lb. capacity axle, with wheel seat less than the condemning limit for such axle, but above the condemning limit for non-M. C. B. Standard axle, may be used until October 1, 1920, to replace a non-M. C. B. Standard axle when latter is of M. C. B. Standard length.

(c) When secondhand axles are applied, the diameter of wheel seats and centers must not be less than limiting dimensions shown above, and the diameter of the journals must be at least ⅛ in. greater than the limiting dimensions shown above. The length of journals must not exceed ⅜ in. over standard length, the collar must not be less than 5-16 in. thick, and the fillet at back end of journals on axles of 40,000 lb. capacity cars must not be less than ⅛ in. radius, axles of 50,000 and 60,000 lb. capacity cars not less than

M. C. B. STANDARD AXLES LIMITS OF WEAR AND DIMENSIONS, NEW.

A	B	Limits of Wear.					Dimensions, New.						
Total Weight. Lb.	Nominal Capacity. Lb.	C In.	D In.	E In.	F In.	H In	C In.	D In.	E In.	F In.	G Ft.	G In.	H In.
210,000	140,000	5½	7⅜	6 5/16	11½	¼	6	7⅝	6 7/16	11	7	6¾	⅞
161,000	100,000	5	6¾	5¾	10½	¼	5½	7	5⅞	10	7	4½	¾
132,000	80,000	4½	6¼	5¼	9½	¼	5	6½	5⅜	9	7	2½	¾
95,000	60,000	3¾	5½	4 11/16	8½	¼	4¼	5¾	4¾	8	7	0¼	⅝
66,000	40,000	3¼	4⅞	4 3/16	7½	¼	3¾	5⅛	4¼	7	6	11¼	⅝

5-16 in. radius, nor less than 3/8 in. radius on axles of cars of greater capacity.

(d) When axle is removed on account of owner's defect on wheel, if diameter of journal is not at least 1/8 in. greater than limiting diameter shown, or if journal is more than 3/8 in. longer than standard length, or collar is less than 5-16 in. thick, the axle shall be considered as scrap, and so credited.

If owner elects, on account of improper repairs, to remove an M. C. B. Standard axle unsuitable to the car and apply a non-M. C. B. Standard axle, he shall charge the average credit price for non-M. C. B. Standard axle applied and give credit for the value of M. C. B. Standard axle removed as a secondhand or scrap axle, as covered in limits above, and at prices as provided in Rule 98.

(e) The truck as a whole shall be equal in strength to the carrying capacity of the axles.

See paragraph (c) Rule 2.—Cars of 80,000 lb. capacity and over, equipped with M. C. B. Standard axles, may be loaded to maximum shown in Column "A," which is the total weight of car and lading for the respective capacities given.

IMPROPER REPAIRS.

Rule 87. Any company making improper repairs by using material which the repairing line should carry in stock, as prescribed in Rule 122, is solely responsible to the owners, with the exception of the cases provided for in Rules 56, 57 and 70. Such improper repairs must be corrected within nine months after first receipt of car on home line, to justify bill.

The company making such improper repairs must place upon the car, at the time and place the work is done, an M. C. B. defect card, which card must state the wrong repairs made.

Rule 88. In order that repairs to cars may be expedited as fully as possible, foreign or private line cars may be repaired by the handling line by using material from their own stock instead of ordering material from car owner, as prescribed by Rule 122, in which event the repairing line is absolved from all responsibility for the cost of standardizing repairs thus made.

Rule 89. Vacant. October 1, 1913.

Rule 90. If an intermediate road finds it necessary to standardize wrong repairs, it may render bill against the car owner for the expense, except as provided in Rules 56, 57 and 70. A copy of the billing repair card of such intermediate line shall be final as to the fact that such wrong repairs existed and shall perform the same function as a joint evidence card, except in cases covered by Rule 88.

INSTRUCTIONS FOR BILLING.

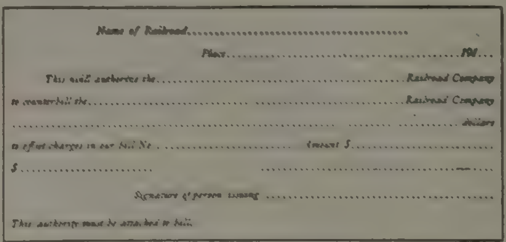
Rule 91. Bills may be rendered for work done under Rule 16, except in cases where owners are not responsible and the car bears no defect card covering the defects repaired, stating upon the bill the date and place where the repairs were made; the billing repair card or defect card to accompany the bill.

Billing repair cards returned for correction, or on account of exceptions, must not be defaced in any manner on the face of the card.

NOTE.—The following rules of the American Railway Accounting Officers' Association must be observed when rendering or correcting bills, except as otherwise provided for as between roads under U. S. Federal control.

(a) Bills should not be rendered for amounts less than 25 cents in aggregate, but charges for items less than 25 cents may be held until they amount to that sum, provided said aggregate is rendered within 60 days.

(b) No bills should be returned for correction on account of incorrect car numbers, but shall be passed for payment at once and the alleged errors in car


Name of Railroad ....
Place .... 191...
This will authorize the .... Railroad Company
to counterbill the .... Railroad Company
.... dollars
to offset charges in our bill No .... Amount $..............
$.............. ....
Signature of person issuing ....
This authority must be attached to bill.

M. C. B. Association Counterbilling Authority.

SEE RULE 91.

numbers brought to the attention of the company rendering same, within 60 days from date of receipt of bill.

The billing company shall furnish correct car reference, or shall issue within 30 days countercharge authority as per form shown.

(c) No bills shall be returned for correction on account of other error or questionable charges unless the net amount involved exceeds 10 per cent of the total amount of bill, but shall be passed for payment at once and the alleged error brought to the attention of the billing company within 60 days from date of receipt of bill. The billing road must furnish proper explanation or shall issue within 30 days countercharge authority on form shown.

(d) Undercharges shall be similarly adjusted on regular authority of the company against which the bill has been rendered.

(e) When bills are returned for correction, all defect cards and billing repair cards, except those in question, must be retained by the company against which the bill has been rendered.

(f) All bills should be rendered promptly. Bills rendered after one year from date of repairs may be declined.

Rule 92. In rendering bills, cars shall be treated as belonging to companies or individuals whose name or initials they bear, except in case of Line Cars where the equipment list of the general officers of the Line designates a party to make settlement.

Rule 93. Separate bills must be rendered for cars destroyed.

All charges for repairs made to cars on account of owner's defects, defect cards and rebuttal authorities must be consolidated against any one company into one bill, except that a separate bill shall be made for the period prior to January 1, 1918.

Separate statements to be made:

First. For owner's defects for each calendar month.

Second. For all charges based on defect cards, including rebuttal charges.

NOTE.—Totals only of these statements to be shown on the recapitulation.

The title and address of officer to whom correspondence should be forwarded relative to exceptions to charges should appear on the bill.

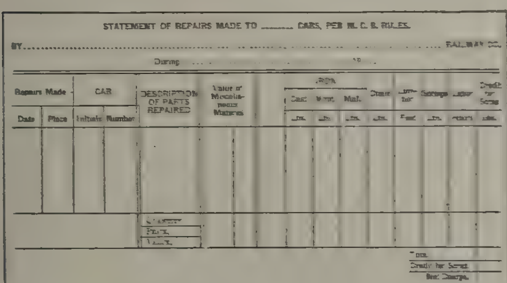
Rule 94. For repairs made on authority of M. C. B. defect card, the defect card, together with a billing repair card, must accompany the bill, subject to requirement that repairs must be made within two years

from date of first receipt of car on home line, except wrong repairs which must be corrected within nine months from date of first receipt of car on home line, to justify bill. In the case of repairs covered by defect card, if the owner changes the original standard of parts so involved, the charge must be no greater than if the original design had been followed.

No bill shall be rendered for repairs which have not been made, except as follows:

If the owner elects to dismantle the body or trucks, or both, charge may be made for such material as would have been required for the repairs covered by the defect card, but such charge to be confined to the actual material stated on card. No labor shall be charged in such case, except in so far as labor is already included in M. C. B. prices for material.

Rule 95. Bills may be rendered against car owners for the labor only of replacing the following material when lost on the line of the company making the repairs: Couplers, including yokes, springs and followers, when lost with the couplers; friction draft gear complete, whether or not lost with the coupler.



SEE RULE 96.

Rule 96. In making bills under these rules, the information necessary should be embodied on the form shown, whether the same is made as a bill or a statement to accompany a bill.

The columns in form referred to may be arranged to accommodate any billing machine.

Rule 97. Vacant. October 1, 1917.

Rule 98. Bills rendered for wheels and axles shall be in accordance with the following schedule of prices for material, with the proper debits and credits:

	New.	Second-hand.	Average Credit Price.
One 33-in. cast-iron wheel	$15.00	.....	$7.75
One 33-in. cast-steel wheel	37.00	.....	16.00
			Scrap.
One 33-in. wrought or rolled steel wheel.	50.00	....	$8.00
One M. C. B. Standard Axle, 140.000 lb.	46.50	$27.90	9.30
One M. C. B. Standard Axle, 100.000 lb.	40.00	24.00	8.00
One M. C. B. Standard Axle, 80,000 lb..	33.00	19.80	6.70
One M. C. B. Standard Axle, 60,000 lb..	26.00	15.60	5.30
One M. C. B. Standard Axle, 40.000 lb..	10.00	5.00	1.65
And with an additional charge for all labor for one pair of wheels and axles removed from all types of trucks...... (No additional charge for trueing journals.)	3.25	.....	
Removing, turning and replacing a pair of wrought-steel or steel-tired wheels, for all types of trucks.................... (No additional charge for trueing journals.)	5.00	.....	.....

NOTE.—All non-M. C. B. Standard axles shall be charged and credited at the average credit price shown for such axles, except as follows: New non-M. C. B. Standard axles [illegible] over-all length or [illegible] journal dimensions, for which M. C. B. Standard axle can not be substituted, shall be charged at price [illegible] for such axle.

The following table shall cover new and average credit prices for non-M. C. B. Standard axles:

	New.	Average Credit Price.
One non-M. C. B. axle, 70.000-lb.	$28.60	$6.00
One non-M. C. B. axle, 60.000-lb.	26.00	5.31
One non-M. C. B. axle, 50.000-lb. or under	10.00	1.65

NOTE.—For non-M. C. B. Standard axles of capacities other than those shown in above table, use the new and scrap prices shown for M. C. B. Standard axle of same capacity; if same capacity is not shown, use new and scrap prices shown for M. C. B. Standard axle of next lower capacity.

The following average scrap credit prices must be allowed for wheels removed from dismantled cars:

	Average Credit Price.
One cast-iron [illegible]	[illegible]
One cast-iron [illegible]	[illegible]
One cast-iron [illegible]	[illegible]
One cast-iron [illegible] 100.000-lb. capacity	7.75

If new wheels and axles are substituted for average credit price wheels and second hand or average credit axles, proper charges and credits shall be allowed, although such substitutions be made on account of only one loose or defective wheel or defective axle, with the following exceptions: In case the owner of a car removes a damaged wheel or axle, no charge shall be made for any difference in value between the parts used and those removed that are not damaged.

The price for new wrought-steel wheels shall be based on the scrap value of $8.00 for metal inside the condemning limit (which is ¼ in. above the limit groove) plus $1.75 for each 1-16 in. of service metal (on radius of tread) in connection with standard full flange contour, also base of limit groove not less than 29½ in. in diameter. In no case shall a charge or credit for service metal be made in excess of 1½ in.

IN CASE OF OWNER'S DEFECTS.

No credit will be allowed owner for loss of service metal due to turning off wheels. Should there be a further loss of service metal, however, due to the application of other wheels, the proper credit for such additional loss must be given the owner. Any increase in the amount of service metal, due to the application of other wheels, may be charged to the owner.

DELIVERING LINE DEFECTS.

When repairs are not covered by a defect card, the proper credit for any loss of service metal must be given the owner, at the rate of $1.75 for each 1-16 in. of service metal removed, measured on radius of tread, in connection with full standard tread and contour, and charge shall be made against the owner for any increase in the amount of service metal due to application of other wheels.

When the repairs are covered by the defect card of another company, charge covering such repairs shall be made against the owner of the car, the defect card and the billing repair card to be attached to the bill. The owner to render counter-bill on the authority of the defect card against the company issuing same, including an additional charge to cover the loss of service metal, on account of the defects covered by the card. Should there be an additional loss of service metal, on account of the application of other wheels, the company making the repairs shall allow the proper credit to the owner to cover such additional loss of metal. Should there be an increase in the amount of service metal, due to the application of other wheels, such increase may be charged to the owner.

The above provisions shall govern any loss or increase of service metal on account of the mate wheel, even if same is not defective, when both wheels are turned off to correspond.

The necessary information must be given in all cases, as provided in Rules 9 and 10.

In cases of slid-flat wheels ⅝ in. for loss of service metal will be allowed for flat spots 2½ in. long and 1-16 in. for each additional inch or fraction thereof.

Any additional loss of service metal that it is necessary to remove on account of worn flange or tread must be borne by car owner.

Rule 99. In no case shall car owner be charged for the second or subsequent applications of journal bearings if applied within 30 days from initial application at same journal location on same road, same trip, except when renewed within such period account change of wheels or axle at same journal location, in case the application of wheels is chargeable to owner.

Rule 100. Bills or statements which do not embody all the information called for by the headings of the columns may be declined until made to conform to the requirements of the rule.

Rule 101. Bills for repairs made under these rules and for material furnished shall be in conformity with schedule of prices and credits for the articles enumerated below:

	Material.	8-in.	10-in.
	Air-brake Equipment:		
1	Air-brake hose, 1⅜-in. M. C. B. Standard, complete with fittings, applied to car, charge	$2.00	$2.00
2	Air-brake hose, M. C. B. standard, average credit for fittings for same	.60	.60
3	Angle cock, plain handle, complete, applied to car, charge	1.58	1.58
4	Angle cock, plain handle, average credit	.92	.92
5	Angle cock, self-locking, complete, applied to car, charge	1.88	1.88
6	Angle cock, self-locking, average credit	1.16	1.16
8	Auxiliary reservoir, detachable type	2.75	6.25
9	Auxiliary reservoir, combined type	2.75	6.25
10	Brake pipe air strainer, 1¼-in.	.60	.60
11	Brake pipe air strainer, union nut	.12	.12
12	Brake pipe strainer union nut swivel	.12	.12
13	Centrifugal dirt collector 1-in.	1.20	1.20
14	Centrifugal dirt collector, 1¼-in.	1.50	1.50
15	Centrifugal dirt collector deflector and plug	.30	.30
17	Cut-out cock, complete, applied to car, charge	1.39	1.39
18	Cut-out cock, average credit	1.00	1.00
19	Cylinder body	2.00	3.50
21	Cylinder piston and rod	1.00	1.50
22	Cylinder piston follower	.08	.25
23	Cylinder piston packing leather	.60	1.00
24	Cylinder piston packing leather expander	.05	[illegible]
25	Cylinder piston release spring	.50	.50
26	Cylinder non-pressure head	.60	1.25
27	Cylinder pressure head, plain	.50	.75
28	Cylinder pressure head with lever brackets, lugs and bolts	1.50	1.75
29	Cylinder gasket	.06	.08
33	Gasket, air hose coupling applied	.06	.06
34	Gasket, leather, union, all sizes	.04	.04
35	Pipe nipple on end of train line, threaded, 12 in., or less in length	.20	.20
36	Piston stop	.10	.10
37	Pressure-retaining valve, two-position, applied to car, charge	1.05	1.05
38	Pressure-retaining valve, two-position, average credit	.62	.62
39	Pressure-retaining valve, three-position, applied to car, charge	3.05	3.05
40	Pressure-retaining valve, three-position, average credit	2.10	2.10
41	Release valve, applied to car, charge	.66	.66
42	Release valve, average credit	.41	.41
43	Release valve rod, with or without cotter key and staple, applied, net	.11	.11
54	Rubber seat, for triple emergency valve, check valve or vent valve	.05	.05
56	Train pipe air strainer (1¼-in.)	.60	.60
61	Triple cylinder or main cylinder gasket	.40	.40
83	Triple union nut	.16	.10
84	Triple union swivel	.10	.10
85	Triple valve body, complete, old style W. A. B	5.50	5.50
86	Triple valve body, complete, old style N. Y.	6.00	6.00
87	Triple valve body, K type	8.00	8.00
90	Triple valve gasket	.20	.20

	Material.	Charge.	Credit.
92	Altering height of one end of car, by adjusting center plates or body bolsters, net (this also applies to renewing full length shims)	$2.50	....
93	Altering height of one end of car, shimming springs, net (this includes renewing of shims)	1.20	....
94	Altering height of car with metal shims, between journal boxes and arch bars; labor charge to be based on regular allowance for box bolts. Material to be charged at actual weight, and proper credit allowed for material removed.		
95	Bolts, nuts and forgings, finished per pound	.035	$0.005
96	Box lids, pressed steel, including bolt, cotter, washer and spring, all sizes, each, net	.20	....
97	Brake shoe applied, no credit for scrap	.45	....
98	Brake shoe, reinforced back, applied; no credit for scrap	.55	....
99	Brake shoe key applied; no credit for scrap	.06	....
100	Cardboard (for defect or destination card), complete, applied, each	.30	....
101	Castings, rough iron, per pound	$0.0225	$0.005
102	Castings, rough, malleable, per pound	.04	.005
103	Castings, rough steel (other than those referred to in Rule 105), including bolsters, side frames, etc.), per pound	.08	.005
106	Chain, per pound	.045	.005
106a	Coupler, complete, new, M. C. B. "D," either 5 in. by 7 in. or 6 in. by 8 in. shank	26.00	....
106b	Coupler body, new, M. C. B. "D," either 5 in. by 7 in. or 6 in. by 8 in. shank	5.75	2.25
106e	Coupler knuckle, new, applied, M. C. B. "D"	6.55	.80
106f	Coupler knuckle lock, new, applied, M. C. B. "D"	1.95	.12
106g	Coupler lock lifter, new, applied, M. C. B. "D"	.35	.02
106h	Coupler knuckle thrower, new, applied, M. C. B. "D"	.65	.04
106i	Coupler knuckle pin, new, applied, M. C. B. "D"	.75	.05
107	Coupler, M. C. B., complete, new, steel 5" x 5" shank	19.00	....
108	Coupler M. C. B., Temporary Standard, complete, new, steel 5" x 5" shank	21.50	....
109	Coupler, M. C. B., complete, new, steel 5" x 7" shank	20.00	....
110	Coupler, M. C. B., Temporary Standard, complete, new, steel 5" x 7" shank	22.50	....
111	Coupler body, M. C. B., one, new, steel 5" x 5" shank	12.50	1.10
112	Coupler body, M. C. B., Temporary Standard, one, new, steel 5" x 5" shank	15.00	1.25
113	Coupler body, one, malleable, 5" x 5" shank	....	1.10
114	Coupler body, M. C. B., one, new, steel 5" x 7" shank	13.50	1.20
115	Coupler body, M. C. B., Temporary Standard, one, new, steel 5" x 7" shank	16.00	1.35
116	Coupler body, one, malleable, 5" x 7" shank	....	1.20
117	Coupler knuckle, one, new, open	....	.40
118	Coupler knuckle, one, new, solid, applied	4.75	.40
119	Coupler knuckle pin, one, new, applied	.50	.05
120	Coupler lock, one, new, applied	1.25	.06
121	Coupler release clevis, applied, net	.06	....
122	Coupler release clevis link, applied, net	.06	....
123	Coupler release clevis pin or bolt, applied separately, net	.04	....
124	Other individual malleable, wrought or steel parts, per pound	.04	....
125	Door hook, refrigerator car, one, applied, net	.08	....
126	Door hook staple or eye, one, applied, net	.05	....
127	Door, for end of box or stock car, wooden, each, applied; no credit for scrap	2.50	....
128	Door, for end of box or stock car, ventilated (wooden frame with iron rods), each, applied; no credit for scrap	4.50	....
129	Door, for side of box or stock car, wooden, each, applied; no credit for scrap	6.50	....
130	Door, for side of box or stock car, ventilated (wooden frame with iron rods), each, applied; no credit for scrap	9.00	....
131	Door, wooden, single, for side of carriage, automobile or furniture car, when doorway is over 6 ft. wide, each, applied; no credit for scrap	7.50	....
132	Door, for side of stock car, with iron rods, each, applied; no credit for scrap	8.50	....
133	Door, for roof of coke car, wooden, each, applied; no credit for scrap	2.00	....
134	Door, for roof of stock car, wooden, each, applied; no credit for scrap	2.00	....
135	Half door, for side of stock car, each applied; no credit for scrap	4.00	....
136	Half door, or twin door, for side of carriage, furniture or automobile car, wooden, each applied; no credit for scrap	6.50	....
137	Half door, for end of furniture, carriage or automobile car, each, applied; no credit for scrap	7.50	....
138	Handhold, one, applied, net	.50	....
139	Hatch cover, for roof of refrigerator car, wooden, each, applied; no credit for scrap	2.25	....
140	Hatch plug, for refrigerator car, wooden, each, applied; no credit for scrap	2.50	....
141	Iron, galvanized, per pound	.10	....
142	Journal bearings, brass or bronze, lined or unlined, per pound, applied	.18	.12
143	Journal bearings, filled brass or bronze shell, per pound, applied	.14	.12
	JOURNAL BEARINGS. WEIGHT TO BE CHARGED AND CREDITED AS FOLLOWS:	Lbs.	Lbs.
144	For journals 7 in. long and over, but not 8 in.	10	6
145	For journals 8 in. long and over, but not 9 in.	13	8
146	For journals 9 in. long and over, but not 10 in.	20	12
147	For journals 10 in. long and over, but not 11 in.	25	15
148	For journals 11 in. long and over	37	23
149	Journal bearings, cast steel or malleable iron back, credit for scrap, per pound	....	$0.02
150	Key ring, one, applied, net	$0.05	....
151	Lag screws, each, no credit for scrap	.01	....
152	Labor, per hour	.58	....

NOTE—Other air-brake material to be charged for at catalogue prices.

	Material.	Charge.	Credit.
153	Lumber.—Yellow, White and Norway Pine, Poplar, Oak, Hickory and Elm, dressed and framed, per foot B.-M. required to make the part	[illegible]	....
154	Nails, per pound	[illegible]	....
155	Nut-lock, one, applied, net	[illegible]	....
156	Paint, lead, freight car, mixed per pound	[illegible]	....
157	Paint, mineral, freight car, mixed per pound	.12	....
158	Pipe, ¾-in. per foot	[illegible]	.0025
159	Pipe, 1-in. per foot	.06	.005
160	Pipe, 1¼-in., per foot	[illegible]	.01
161	Ratchet wheel key, one, applied, net	.05	....
162	Spring cotters or split keys, each, renewed when not used with application of other parts being renewed, net	.04	....
163	Spring cotter or split key, one, renewed, when used in connection with other parts being repaired or renewed, net	.01	....
164	Staple, one, applied, net	[illegible]	....
165	Steel for springs, rough, per pound	[illegible]	[illegible]
166	Steel helical springs, per pound	[illegible]	[illegible]
167	Steel, pressed and flanged, per pound	.04	.005
168	Steel, plate and structural, per pound	.03	.005
169	Stenciling sides and ends when done to preserve identity of car, when not necessitated by other repairs, net, per Rule 102	[illegible]	....
170	Turnbuckles, all sizes, each, net	[illegible]	....

BRAKE BEAMS.

The following illustrations (Figures 1 and 2) are to be used for identifying all M. C. B. No. 1, 2 and 3 brake beams. All beams which do not conform to these illustrations shall be charged and credited as non-M. C. B. brake beams:

No.	MATERIAL.	Charge New.	Charge Second-hand.	Average Credit Defective or Missing.
171	M. C. B. No. 1 trussed or solid type, complete, with or without safety chain clips or finger guards (per Figures 1 and 2)	$4.00	$3.45	$1.65
172	M. C. B. No. 2 trussed type, complete, with or without safety chain clips or finger guards (per Figure 1)	5.00	3.75	1.60
173	M. C. B. No. 3 trussed type, complete, with or without safety chain clips or finger guards (per Figure 1)	6.50	5.00	1.45
174	Non-M. C. B. trussed or solid type, complete, with or without safety chain clips or finger guards (per Figure 1)	2.55	1.55	.55
175	Non-M. C. B. wooden, wooden trussed or composite beams or parts of same shall be charged at M. C. B. prices for lumber, forgings, castings, etc.	....	....	....
176	Non-M. C. B. wooden, wooden trussed or composite beam removed when M. C. B. metal brake beam is applied	....	....	.30
177	Finger guard pin, finger guard casting or safety chain clip, applied separately, each, net	.10	.10	....

Rule 102. Not more than one pound of mineral paint can be charged for 15 sq. ft. of surface covered, and not more than one pound of lead paint for 12 sq. ft. of surface covered. No charge to be made for lettering except when done to preserve the identity of the car and not necessitated by other repairs.

In computing charges for lumber, if finished length of the piece in odd inches is under 6 in., the half foot will be allowed for rough length; if 6 in. or over, the even foot will be allowed. Finished thickness, if under 1 in., consider as 1 in. rough; if 1 in. or over, but under 1½ in., consider as 1½ in. rough; 1½ in. or over, but under 2 in., consider as 2 in. rough; and upward on corresponding scale. The same scale will apply to width, except for matched sheathing, roofing, lining and flooring on which ¾ in. shall be added to finished face width, for rough. The total amount of each item may be charged in even feet B. M.; if fractional amount is less than ½ ft., it should be dropped.

In computing charges for bolts, nuts and forgings, if fractional weight of each entry on billing repair card is less than one-half pound, it must be dropped; if one-half pound or more, charge the entire pound.

Rule 103. Whenever scrap credits are allowable the weights of scrap credited shall be equal to the weights of the new metal applied, except as otherwise provided in the rules, and except in the case of scrap M. C. B. couplers and parts of same, and material applied on defect cards, in which cases the weight and kind of metal removed shall be credited.

Rule 104. Secondhand M. C. B. couplers, or parts, when used in repairs shall be charged at 75 per cent of value new. Secondhand M. C. B. couplers or parts removed shall be credited at 75 per cent of value new. Credits shall be confined to the body, lock, knuckle and knuckle pin, whether secondhand or scrap. In the type "D" coupler, credit shall be allowed for all parts.

When new M. C. B. coupler is applied it shall be so charged whether or not it is of same make as that removed.

Secondhand metal brake beams when used in repairs shall be charged at prices shown in Rule 101. Defective metal beams removed, or missing beams, shall be credited at average credit price for such beam. In the case of missing beams, credit shall be allowed at average credit price according to class of beam applied.

In the case of an M. C. B. metal beam substituted for a defective wooden, wooden trussed or composite beam, the beam removed shall be credited at average credit price for kind of beam removed.

Where a metal beam is removed, repaired and reapplied, the charge shall be based on specified price for the secondhand beam, less average credit price for same, without additional labor charge for repairing the beam.

No additional charge shall be made, nor credit allowed for finger guard pins, finger guard pin castings, nor safety chain clips when complete beam is applied. The finger guard pins, finger guard pin castings and safety chain clips shall only be charged when these details are applied separately.

NOTE.—The average credit price of brake beams is based on the average value of the beams removed, less labor cost of repairing, this labor cost being included in the secondhand price.

Rule 105. Manufactured articles not included in Rules 98 and 101 must be charged at current market prices.

NOTE.—Manufactured articles are those which are not subject to competitive prices, and which can only be obtained from one manufacturer or concern.

Material furnished by owners for repairs to their cars, whether for individual car or for stock, should be billed in conformity with schedule of prices shown in these rules. No store expense should be added by repairing road to the net cost of material furnished by car owner, when ordered in accordance with Rule 122.

Rule 106. For repairs made on and after October 1, 1918, thirty per cent shall be added to the net total amount of the bill, for material and labor; this provision to apply to all charges authorized in these rules, with the following exceptions:

Twenty-five per cent may be added to charges for repairs made on authority of defect card issued between January 1, 1917, and October 1, 1917; thirty-five per cent on defect cards issued between October 1, 1917, and October 1, 1918; thirty per cent on defect cards issued on and after October 1, 1918; regardless of date of repair.

No percentage to be added to bills rendered by car owners for material furnished by them for repairs to their cars on foreign lines.

No percentage to be added to freight or express charges on material furnished by owners for repairs to their cars.

No percentage to be added to bills covering settlement for destroyed cars or trucks, under Rule 112.

No percentage to be added to bills for dismantling cars nor to credits for scrap from dismantled cars.

Rule 107. The following table shows the labor charge which may be made for performing the various operations shown. Unless otherwise specified, the labor allowances include all work necessary to complete each item of repairs, except such items as are covered in material charges shown in Rule 101.

	LABOR.	Hours, Ordinary Cars.	Hours, Refrigerator Cars.
1	Advertisements, temporary, tacked, screwed or wired on car, removing per car	1	1
2	Advertisements, temporary, pasted, glued or varnished on cars, removing, per car	2	2
3	Air-brake equalizer or fulcrum, one, renewed	¾	¾
4	Air-brake block or plate (plus labor charge for R. and R. cylinder, when necessary to do so), one, renewed	2	2
5	American continuous draft rods, one rod welding	2½	2½
6	Anchor rod (bolster and dead wood), one, renewed	¾	¾
7	Anchor rod (bolster and dead wood), blacksmith labor repairing, including R. and R.	1¾	1¾
8	Anchor rod, head block tank car or Gould draft, one, renewed	1	1
9	Anchor rod, head block tank car or Gould draft, blacksmith labor repairing, including R. and R.	1¾	1¾
10	Anchor tank band, one, renewed	1	.....
11	Anchor tank band, blacksmith labor repairing, including R. and R.	2	.....
12	Anchor tank band "Y" bolt, one, renewed	½	.....
13	Anchor tank band "Y" bolt, blacksmith labor repairing, including R. and R.	1¼	.....
14	Anchor straps, any length, threaded one end, one renewed, allow for bolts securing same; threaded end of strap to be counted as one bolt.		
15	Anchor straps, any length, blacksmith labor repairing, not including R. and R.	¾	¾
16	Arch bars, 1 or 2, replaced on same side of truck	3½	3½
17	Arch bars, blacksmith labor, each, repairing	2½	2½
18	Arch bar tie strap, one, renewed	1	1
19	Arch bar tie strap, blacksmith labor, one, repairing, including R. and R.	2	2
20	Belt rail or girth (end), renewed, when two posts or braces are renewed, per end	1½	1½
21	Belt rail or girth (end), renewed, when not associated with renewal of posts or braces, per end	3	4
22	Belt rail plank (end) when renewed saparately, per end	1½	1½
23	Belt rail plank (side) when renewed separately	2	2
24	Bolster, body, composite, one, replaced	12	15
25	Bolster, body, metal, one, renewed	9½	9½
26	Bolster, body, wood, one, renewed	9½	12
27	Bolster, body, metal, one, renewed when draft timbers extend through same	15	17
28	Bolster, body, plain, metal or wood, one, renewed when one or more defective sills are renewed	2½	2½
29	Bolster, composite, one, renewed when one or more defective sills are renewed	3	3
30	Bolster truck, when not otherwise specified, one, renewed	9	9
31	Bolster truck, one, and one spring plank in same truck, renewed	13	13
32	Bolster truck, one, renewed, when no bolts or rivets require removal to remove bolster from truck (not including Bettendorf design)	3½	3½
33	Bolster, truck, Bettendorf, Andrews, Vulcan or Scullin type, one, renewed, including R. and R. one truck side when necessary (does not include rivets or bolts of the spring plank)	7	7
34	Bolster, truck, one, renewed, when one or more truck transoms are renewed on same truck	2	2
35	Body truss rod bearing or queen post, closed, one, renewed	1	1
36	Body truss rod bearing or queen post, closed, two on same rod, renewed	1½	1½
37	Body truss rod bearing or saddle block, open, one, renewed	¾	¾
38	Body truss rod washer or nut, renewed	½	½
39	Body truss rod, full length, renewed	2½	3¾
40	Body truss rod, per section, renewed	1¾	3
41	Body truss rod, per section, or full length, blacksmith labor repairing	1¼	1¼
42	Body truss rod, tightening and replacing on saddle	½	½
43	Braces, side or end, one, renewed	4½	6½
44	Braces, side or end, each, renewed, when associated with the renewal of posts	2¾	4¾
45	Brake beam, one, replaced, including attachments and connections	2	2
47	Brake beam, wooden truss, repairing	1¼	1¼
49	Brake beam head (wooden beam), one, renewed	¾	¾

	LABOR.	Hours, Ordinary Cars.	Hours, Refrigerator Cars.
50	Brake beam head (wooden beam), two on same beam, renewed	1	1
51	Brake beam safety chain, separately, one, renewed	¼	¼
52	Brake beam suspension spring hanger or link, one, renewed	½	½
53	Brake beam suspension spring and cap, single or double, either or both, renewed	¾	¾
54	Brake beam hook bolt, one, renewed	½	½
55	Brake chain, one, renewed	½	½
56	Brake connection rod or lever, one or both, renewed	½	½
57	Brake connection, repaired and replaced	1	1
58	Brake hanger, repaired and replaced	1	1
59	Brake hanger, separately, one, renewed	½	½
60	Brake hanger bearing, double, secured to spring plank, one, renewed	1¾	1¾
61	Brake hanger shackle box or bearing and cap, one, renewed	¾	¾
62	Brake hanger trimmer block, one, renewed	1½	1½
63	Brake hanger eye bolt, separately, one, renewed.	½	½
64	Brake lever guide or carrier, one, renewed	½	½
65	Brake lever bracket, one, renewed	¾	¾
66	Brake pawl, one, renewed	¼	¼
67	Brake pin or key bolt, or brake hanger bolt, any length, renewed, separately, each	¼	¼
68	Brake rod carrier, one, renewed	¼	¼
69	Brake shaft, one, renewed	1	1
70	Brake shaft, blacksmith labor repairing, including R. and R.	1½	1½
71	Brake shaft brace or support, one, renewed	½	½
72	Brake shaft brace or support, blacksmith labor repairing, including R. and R.	1	1
73	Brake shaft carrier or bow, one, renewed	½	½
74	Brake shaft carrier or bow, blacksmith labor repairing, including R. and R.	1	1
75	Brake shaft ratchet wheel, one, renewed	¾	¾
76	Brake shaft step board plate, only, one, renewed	1	1
78	Brake step board, one, renewed	2	2
79	Brake wheel, one, renewed	½	½
80	Buffer block, one, cast-iron, renewed	1	1
	Bolts—		
81	Carrier iron bolts, 6 in. or less, each	¼	¼
82	Carrier iron bolts, 6 in. or less, renewed in connection with R. and R. of carrier iron, coupler or any operation which includes same; no labor charge to be made.		
83	Carrier iron bolts or draft timber bolts, over 6 in. long, either or both, renewing at same end of car.		
	5 or less, each	½	½
	6 or more, all	3	3
84	Center plate bolts, one or more, or all at one end, renewing	3	3
85	Center plate bolts and center plate, at one end, renewing	3	3
	NOTE.—If center plate bolts pass through draft timbers, they shall be termed center plate bolts and charged accordingly.		
86	Coupler stop bolts, lug strap bolts or draft timber cross-tie bolts at same end of car when coupler is not removed.		
	5 or less, each renewing	½	½
	6 or more, all renewing	3	3
87	Coupler follower guide bolts or draft pin bolts each, renewing	¼	¼
88	Draft timber bolts, or carrier iron bolts, over 6 in. long, either or both, at same end of car, renewing.		
	5 or less, each	½	½
	6 or more, all	3	3
89	Journal box bolt or column bolt, one, renewed	1½	1½
	Each additional bolt renewed, in same truck	½	½
90	Bolts, 6 in. or less in length, other than those provided for, each, renewed	¼	¼
91	Bolts, over 6 in. in length, other than those provided for, each, renewed	½	½
92	Bolt, journal box, horizontal, when box is not renewed, each, renewed	¼	¼
93	Bolts, tightening, except when included in costs of other operations, each, 2 cents	.....	.....
94	Cap, discharge valve for tank car, one, renewed.	½	.....
95	Cap, dome, for tank car, one, renewed	¾	.....
96	Carline, one, renewed	4	.....
97	Carline, one, replaced, when out of place	1¼	.....
98	Carline, metal, one, renewed, exclusive of all related work	1	1
99	Carrier iron, one, renewed	¾	¾
100	Carrier iron, blacksmith labor repairing, including R. and R.	1½	1½
102	Carrier iron, Bettendorf type, adjusted, when turned over, each	½	½
103	Chute plank, top, middle or bottom, side, each, renewed	1½	.....
104	Chute plank, end, each, renewed	1	.....
105	Column casting, one or both, renewed, on same side of truck	3	3
107	Column casting, when arch bar is off, one or two, renewed	½	½
108	Column guide, one, renewed	1	1
109	Column guide, two, at same end of bolster, renewed	1½	1½
110	Center pin (head), renewed	1	1
111	Center pin (head), renewed, and placing car on center	2	2

	LABOR.	Hours, Refrigerator Cars.	Hours, Ordinary Cars.
112	Center pin (key or plain), renewed, including placing car on center if necessary	2	2
113	Center plates, one or two, at same end, renewed.	2½	2½
114	Corner band, one, renewed	1	1
114a	Coupler and transom gear, renewing or replacing	4	4
114b	Coupler only, transom gear, renewing or replacing	2	2
115	Coupler and complete gear, key attachments, renewing or replacing (Covers key-connected couplers with complete gear.)	4	4
116	Coupler, with stem attachments, coupler springs, one or more follower plates, American continuous draft key, American continuous draft rods, one or more coupler stops, renewing or replacing one or all, at same end of car, at same time	3½	3½
117	Coupler, with pocket attachments, coupler springs, one or more follower plates, one or more coupler stops, coupler stop bolts, coupler pocket, coupler pocket rivets, renewing or replacing, any or all at same end of car, at same time.. (This does not include coupler stops riveted which should be charged for on per rivet basis, in addition to the cost of removing and replacing, when it is necessary to do the riveting.)	5	5
118	No labor shall be charged for shifting back into position any coupler attachments.		
119	Coupler pocket, rivets, renewed, with long stroke air hammer, where not necessary to remove coupler, each	1	1
120	Coupler, with key attachments, renewing or replacing, where gear is not R. and R. (covers coupler with yoke key only)	2	2
121	Coupler springs, followers or complete gear on coupler with key attachment, removed or replaced, when not necessary to remove or replace coupler	2	2
122	Coupler key attachment cross key, renewing or replacing, when neither coupler nor gear is removed or replaced	1	1
123	Coupler yoke bolts, renewed, one or two, at same end of car (coupler not R. and R.)	1	1
124	Coupler yoke bolts or rivets, renewed, in connection with draft timber, inside end sill or sill renewals, or in connection with center sill splices, no labor charge to be made.		
125	Coupler yoke, blacksmith labor repairing	1½	1½
126	Coke rack cleat (wooden rack), each, renewed..	¾	.....
127	Coke rack gate (2 bars), renewed	1	.....
128	Coke rack gate (3 bars), renewed	1¼	.....
129	Coke rack gate guide, each, renewed	¾	.....
130	Coke rack gate slat, each, renewed	¾	.....
131	Coke rack stake clamp, each, renewed	½	.....
132	Coke rack stake clip, each, renewed	¼	.....
133	Coke rack thimble or catch, each, renewed	¼	.....
134	Coke rack stake, one, renewed	2	.....
135	Cross-tie timber, one, renewed	6	7
136	Cross-tie timber, one, renewed, when one or more defective sills are renewed	1½	2
137	Dead block, wooden, renewed, at one end of car	3½	3½
138	Dead block, metal, renewed, at one end of car..	2½	2½
139	Deck bearer, upper (stock car), one, renewed...	1	.....
140	Deck, upper, flooring, per board, renewed	½	.....
141	Door, end, old, rehanging	1	.....
143	Door, side, half or full, if entirely off rail, rehanging	2	2
144	Door, side, half or full, if not entirely off rail, replaced	½	½
145	Door bar (stock car), renewed	1	.....
146	Door siding, renewed, including fixtures and trimmings, per lin. ft. (not including R. and R. door)	½	½
147	Door batten, full length, or style (nailed door), renewed, not including R. and R. door	1	1
147a	Door batten, half length (nailed door), renewed, not including R. and R. door	½	½
148	Door rail or stile (framed door), renewed, not including R. and R. door	2	2
149	Door cap or housing (wood), renewed	2	2
150	Door cap or housing (metal), renewed	2	2
151	Door cap block or casting, separately, one, renewed	¼	.....
152	Door cap for small end door, renewed	1	.....
153	Door, end, old, rehanging on automobile car....	3	.....
154	Door hanger or roller, either or both, renewed, except when door is rehung	1	.....
155	Door hinge, one, renewed, except when door is rehung	1	1
156	Door guide bracket, one, renewed	1	.....
157	Door guide rail bracket, one, renewed	¼	.....
158	Door hasp or keeper, one or both, renewed	½	.....
159	Door seal hook or pin and chain, one, renewed..	¼	¼
160	Door stop, iron, one, renewed	½	.....
161	Door stop, wood, one, renewed	1½	.....
162	Door rod (lock), one, renewed, not including door rehung	1½	1½
163	Door rod (lock), blacksmith labor repairing	1	.....
164	Door rod bearing, only, one, renewed	½	.....
165	Door rod shoe, only, one, renewed, except when door is rehung	½	.....
166	Door track, top or bottom, one, renewed, not including door rehung	2	.....
167	Door track, top or bottom, blacksmith labor repairing	1	.....
168	Door track repaired on car	¾	.....

	LABOR.	Hours, Ordinary Cars.	Hours, Refrigerator Cars.
169	Door handle, one, renewed	¼	¼
170	Draft timbers, one, renewed	7	9
171	Draft timbers, two on same end, renewed	11	13
172	Draft timbers, one, extending beyond body bolster, renewed	12	15
173	Draft timbers, two, extending beyond body bolster, renewed	16	19
174	Draft timbers, one, renewed, when its center sill is renewed or spliced, at same end of car	2½	2½
175	Draft timbers, one, renewed, when its opposite center sill at same end of car is renewed or spliced	3½	3½
176	Draft timber filler block, renewed, when draft timbers are not renewed	2	2
177	Draft rod key, repaired	1	1
178	Drop end gate, replacing on authority of defect card	1	.....
179	Drop end gate (1 plank), plain, renewed	1½	.....
180	Drop end gate (1 plank), metal bound, renewed.	2	.....
181	Drop end gate (2 or 3 plank), plain, renewed...	3	.....
182	Drop end gate (2 or 3 plank), metal bound, renewed	5	.....
183	Drop end gate plank, one, renewed	1½	.....
184	Drop end gate plank plain, two on same end, renewed	2	.....
185	Drop end gate plank, metal bound, one, renewed	2½	.....
186	Drop end gate plank, metal bound, two, same end, renewed	4½	.....
187	Drop end gate cleat or strap, one, renewed	1¼	.....
188	Drop end gate hinge, one, renewed	1	.....
189	Drop end gate keeper or latch, one, renewed....	½	.....
190	Drop door chain, one, renewed	½	.....
191	Drop door hinge, one, renewed	1	.....
192	Drop door plank, each, renewed	1	.....
193	Drop door reach or connecting rod, one, R. and R. or renewed	½	.....
194	Drop door reach or connecting rod, blacksmith labor repairing	¾	.....
195	Drop door shaft and ratchet, either or both, renewed	1½	.....
196	Drop door shaft, blacksmith labor repairing	1½	.....
197	Drop door shaft pawl, one, renewed	½	.....
198	Drop door shaft key, one, renewed	¼	.....
199	End plank on gondola cars.		
	Without corner bands, one plank renewed	3½	.....
	Without corner bands, each additional plank, renewed on same end of car	2	.....
	With corner bands, bolted or riveted, one plank, renewed	5	.....
	With corner bands, bolted or riveted, each additional plank, renewed on same end of car.	3½	.....
200	End of car jacked into place and secured, when end framing is not renewed	2	2
201	End plate, one, renewed	14	15½
202	Fascia or drip molding, inside or outside metal roofs, bolted or nailed type, renewed, per lineal foot, 6 cents	.....	.....
203	Fascia, renailing, one or two ends, or one side..	¼	¼
204	Flooring boards, renewed, per lineal foot	½	¾
205	Flooring boards, renewed, in connection with two or more sills renewed, reduce price for renewal of flooring boards ¼ hour per lineal foot of car covered. No reduction to be made when sills are spliced	.....	.....
206	Flooring, short, over center sills, between drop doors, per lineal foot	¼	.....
207	Follower guide or rest plate, steel, steel underframe or steel center sill cars, tightened, per end	¼	¼
208	Follower tie strap, one, renewed	½	½
209	Grain strip, renewed separately, per lineal foot, 4 cents	.....	.....
210	Hand hold, removed and straightened, one	1	1
212	Hand rail rod or pipe, per side, separately renewed	1½	.....
213	Hand rail post, including rail removed and replaced	2	.....
214	Hand rail post, renewed, each additional	½	.....
215	Hay box, complete, renewed	3½	.....
216	Hay box door, one, renewed	2	.....
217	Head block casting (tank car), one, renewed....	3	.....
218	Hopper supporting strap, wooden hopper car (not including chute planks, R. and R.), one, renewed	2	.....
219	Hopper supporting strap, wooden hopper car, blacksmith labor repairing	2	.....
220	Journal boxes, on arch bar truck.		
	One, renewed	2	2
	Each additional, on same truck, renewed	1	1
221	Journal boxes, on solid pedestal truck.		
	One or two, renewed, on same axle	4	4
	Three or four, renewed, on same truck	7	7
222	Journal box, one, renewed, in connection with wheel renewals, including lid and dust guard..	½	½
223	Journal box lid, one, renewed	½	½
225	Journal wedge, renewed or replaced, separately, when jack is used and so specified	¾	¾
226	Key for center pin, separately, one, renewed....	¼	¼
227	Ladder, complete (wood), renewed	2½	2½
228	Ladder stile (wood), one, renewed	1½	1½
229	Ladder treads (wood), one or two, renewed	½	½
230	Lag screw, three or less, renewed	½	½
231	Letter or number board, one, renewed	¼	¼

No.	LABOR.	Hours, Ordinary Cars.	Hours, Refrigerator Cars.
232	Lining, renewed ,per sq. ft., surface covered, 6 cents for ordinary cars and 8 cents for refrigeration cars	.....	.....
233	Lining, renailing, per end or side section from door to end of car, either above or below belt rail	¼	¼
234	Lining, under sills or over flooring, per sq. ft., 4 cents	.....	.....
235	Lining, renewed, in connection with renewal of one or two posts or braces, per sq. ft., 4 cents.	.....	.....
236	Lining, renewed, in connection with renewal of three or more posts or braces, per sq. ft., 2 cents	.....	.....
237	Nuts only, 1¼ in. or under, six or less, renewed.	¼	¼
238	Nuts only 1⅜ in. or over, three or less, renewed.	¼	¼
239	Pedestal tie bolt or casting, either one or both, renewed	½	½
240	Pedestal tie strap, one, renewed	½	½
241	Pipe hanger cap or clamp, one, renewed	¼	¼
242	Pipe hanger, complete, renewed	½	½
243	Pipe hanger, blacksmith labor repairing	½	½
244	Pipe hanger, tightening, one or two	¼	¼
245	Platform end sill plank, full length and width of end sill, renewed, or flooring in lieu thereof	2	2
246	Platform end sill plank, one half section, renewed, or flooring in lieu thereof	1	1
247	Post, center, door, automobile cars, one, R. and R. to repair door (when attached to door)...	1½	.....
248	Post, door or side, each, renewed	3½	6
249	Post, corner or end, each, renewed	4½	7
250	Post, corner, door, end or side, each, renewed, where associated with renewal of side sill, inside end sill, side or end plate	2½	3½
251	Push rod guide, one, renewed	½	½
252	Push pole pocket (bolted), one, renewed	¾	¾
253	Push pole pocket, blacksmith labor repairing, including R. and R	1¼	1¼
254	Release lever (coupler), one, renewed	¾	¾
255	Release lever (coupler), blacksmith labor repairing, including R, and R	1¼	1¼
256	Release lever (coupler) repaired on car	¼	¼
257	Release lever bracket (coupler), one, renewed..	½	½
258	Renailing, roofing or siding, per lineal foot, 3 cents	.....	.....
259	Rod, vertical tie rod, one, renewal	¾	¾
260	Rod, vertical tie rod, blacksmith labor repairing, including R. and R	1¼	1¼
261	Rod or pipe, side or center hitch (stock car), one, renewed	¾	.....
262	Rod, transverse tie, one, applied. first application, including drawing sides of car together	2	.....
263	Rod, transverse tie, one, renewed (except first application)	¾	.....
264	Rod, longitudinal tie, full length, one, renewed.	1¾	.....
265	Rod, not otherwise specified, one, renewed	¾	¾
266	Roof boards, single, plate to ridge pole, including removing and replacing running board necessary to renew roof boards, per lineal foot..	¼	¼
267	Roof boards, longitudinal, renewed, only, per sq. ft. per course, 6 cents	.....	.....
268	Roofing, inside or outside, metal, including caps, roof clips and bolts on outside metal roofing, exclusive of roof and running board, renewed, per sheet	½	½
269	Roofing, inside or outside, metal, extending full width of car, including caps, roof clips and bolts on outside metal roofs, exclusive of roof and running board, renewed, per sheet	1	1
270	Roof cap, metal, inside or outside metal roof, renewed, exclusive of roof, roof sheet and running board, each	¼	¼
271	Roof boards, double board roof, including removing and replacing running board, per lineal foot	½	½
272	Roof purline, one, renewed	1	1
273	Roping staple, one, renewed	½	½
274	Roping staple, blacksmith labor repairing, including R. and R	1	1
275	Running board, latitudinal, secured with bolts or screws, renewed, per single board	¾	¾
276	Running board, latitudinal, one, renewed, complete	3	3
277	Running board, longitudinal, complete, renewed.	10	10
278	Running board, renewed, per lineal foot, per single board (except on tank cars), 4 cents	.....	.....
279	Running board to secure with screws, per lineal foot of single board, 2 cents	.....	.....
280	Running board saddle, separate, one, renewed..	½	½
281	Running board bracket, one, renewed	½	½
282	Running board bracket, blacksmith labor repairing, including R. and R	1	1
283	Running board extension block, renewed	½	½
284	Running board saddle, renewed in connection with partial renewal of running board over same, each	¼	¼
285	Running board saddle, renewed, when complete running board over same is renewed, no labor charge to be made	.....	.....
286	Safety chain hook or link (end sill), one, renewed	½	½
288	Safety valves, tank car, one or more, testing valve and stenciling tank	2	.....
289	Safety valve, tank cars, adjusting, per valve....	1	.....
290	Sheathing, when bolted to wooden or steel posts and braces, on box or automobile cars with sheathing only, renewed, including bolting, per sq. ft., 8 cents	.....	.....

No.	LABOR.	Hours, Ordinary Cars.	Hours, Refrigerator Cars.
291	Side bearing, one, renewed	1½	1½
292	Side bearing, each additional, at same end of car, renewed	½	½
293	Spring plank, one, renewed	8	8
294	Spring plank, Bettendorf, Andrews, Vulcan or Scullin type, one, renewed, including R. and R, both truck springs, but excluding spring plank rivets or bolts	3	3
295	Side plank on gondola car,		
	With corner bands, one, spliced	4	.....
	Without corner bands, spliced, one	3½	.....
	Without corner bands, one plank, renewed....	7	.....
	Without corner bands, same side of car, each additional plank, renewed	6	.....
	With corner bands, bolted or riveted, one plank, renewed	10	.....
	With corner bands, bolted or riveted, each additional plank, on same side of car, renewed	6	.....
296	Side plate, one, renewed	35	45
297	Side plate, one, spliced	11	20
298	Side slat or end slat (stock car), nailed, one, renewed	½	.....
299	Side slat (stock car) inside or outside, bolted, one, renewed	1	.....
300	Siding removed and replaced, per lineal foot..	¾	1
301	Siding removed and replaced, per lineal foot, where nails are set and holes puttied	.....	.....
302	Siding, removed and replaced, in connection with one or two adjoining belt rail renewals, per lineal ft.	½	.....
303	Siding, short, above or below door openings, not including fixtures, R. and R., renewed, per lineal foot	¼	¼
304	Slat, end (stock car), bolted or riveted, one, renewed	1	.....
305	Sheave wheel, in brake rod, one, renewed	½	½
306	Sill nailing girth, longitudinal or end, for steel or steel underframe cars, applied (excluding all other operations, which should be paid for in accordance with M. C. B. Rules), per lineal foot for longitudinal or end girths, including removal, 8 cents	.....	.....
307	Sill step, bolted, one, renewed	¾	¾
308	Sill step, blacksmith labor repairing, including R. and R.	1¼	1¼
310	Sill splices, renewal of, charge same as for original splicing	.....	.....
311	Sills, short stub, bolted to side of full length single center sill, and extending from end sill to point back of body bolster, and to which draft timbers are bolted.		
	One, renewed	18½	.....
	Two, renewed, same end	23	.....
312	1 center sill spliced, per end	22	30
313	2 center sills, spliced, same end	30	40
314	1 center sill, renewed	43	65
315	2 center sills, renewed	52	80
316	1 end sill, under siding, renewed	18	22
317	1 end sill, outside siding, renewed	8	8
318	1 end sill, under siding, renewed, when one or more defective sills are renewed or spliced...	8	10
319	1 end sill, outside siding, renewed, when one or more defective sills are renewed or spliced..	4½	4½
320	1 end sill, outside, with end posts tenoned into same, renewed	12	.....
321	1 intermediate sill, renewed	30	52
322	1 intermediate sill, short, for hopper cars, renewed	14	.....
323	2 intermediate sills, short, for hopper cars, at one end of car, renewed	16	.....
324	Intermediate sill, short, for hopper cars, renewed, when one or more full length sills are renewed or spliced at same end, each	2	.....
325	2 intermediate sills, renewed	37	72
326	3 intermediate sills, renewed	44	91
327	4 intermediate sills, renewed	51	110
328	1 intermediate sill and one center sill, renewed.	50	84
329	1 intermediate sill and two center sills, renewed	59	99
330	2 intermediate sills and one center sill, renewed.	57	103
331	2 intermediate sills and two center sills, renewed.	66	118
332	3 intermediate sills and 1 center sill, renewed..	64	122
333	3 intermediate sills and 2 center sills, renewed..	73	137
334	4 intermediate sills and 1 center sill, renewed...	71	141
335	4 intermediate sills and 2 center sills, renewed.	80	150
336	1 intermediate sill, spliced	15	21
337	1 side sill and 1 center sill, renewed	59	91
338	1 side sill and 2 center sills, renewed	68	106
339	2 side sills and 1 center sill, renewed	75	117
340	2 side sills and 2 center sills, renewed	84	132
341	1 side sill, spliced	15½	20
342	1 side sill, renewed	39	58
343	2 side sills, renewed	55	86
344	1 side sill and 1 intermediate sill, renewed	46	79
345	1 side sill and 2 intermediate sills, renewed	53	97
346	1 side sill and 3 intermediate sills, renewed	60	117
347	1 side sill and 4 intermediate sills, renewed	67	135
348	2 side sills and 1 intermediate sill, renewed	62	105
349	2 side sills and 2 intermediate sills, renewed	69	124
350	2 side sills and 3 intermediate sills, renewed	76	143
351	2 side sills and 4 intermediate sills, renewed	83	162
352	1 side sill, 1 intermediate and 1 center sill, renewed	66	110
353	2 side, 1 intermediate and 1 center sill, renewed.	82	136
354	1 side, 2 intermediate and 1 center sill, renewed.	73	129
355	2 side, 2 intermediate and 1 center sill, renewed.	94	160
356	1 side, 3 intermediate and 1 center sill, renewed.	80	148

LABOR.

	LABOR.	Hours, Ordinary Cars.	Hours, Refrigerator Cars.
357	2 side, 3 intermediate and 1 center sill, renewed.	96	174
358	1 side, 4 intermediate and 1 center sill, renewed.	87	167
359	2 side, 4 intermediate and 1 center sill, renewed.	103	193
360	1 side, 1 intermediate and 2 center sills, renewed	75	125
361	2 side, 1 intermediate and 2 center sills, renewed	91	151
362	1 side, 2 intermediate and 2 center sills, renewed	82	144
363	1 side, 3 intermediate and 2 center sills, renewed	89	163
364	1 side, 4 intermediate and 2 center sills, renewed	96	182
365	2 side, 2 intermediate and 2 center sills, renewed	98	170
366	2 side, 3 intermediate and 2 center sills, renewed	105	189
367	2 side, 4 intermediate and 2 center sills, renewed	112	208
368	Each side or intermediate sill spliced when longitudinal sills have to be renewed, or when other sills are spliced at same end................	5	8
369	1 center sill spliced, when intermediate or side sills have to be renewed....................	12	16
370	1 center sill spliced when other center sill has to be renewed	8	10
371	2 center sills, spliced, when intermediate or side sills have to be renewed......................	20	27
372	Sill stiffener or furring strip, bolted, per section renewed	1	1
373	Sill stiffener or furring strip, nailed, per section, renewed	½	½
374	Stakes, end or side, on gondola cars, each, renewed	2	.....
375	Stake pocket, wooden car, each, renewed........	½	.....
376	Stake pocket, blacksmith labor, repairing, including R. and R..............................	¾	.....
377	Stake pocket "U" bolt, one, renewed...........	¼	.....
378	Stake pocket "U" bolt, blacksmith labor repairing, including R. and R.....................	½	.....
381	Striking plate, one, renewed..................	1	1
382	Striking plate, blacksmith labor repairing, including R. and R............................	1½	1½
383	Sub-flooring between sills, including cleats, when not associated with sill renewals, refrigerator cars, per lin. ft. per course, 8 cents...........	.....	.....
384	Sub-flooring, between sills, including cleats, whether or not in connection with sill renewals, ordinary cars, per lin. ft. per course, 8 cents	.....	.....
385	Tank head blocks, not including castings, one renewed	4	.....
386	Tank head block casting, one, renewed.........	3	.....
387	Tank raised to apply draft bolts, empty car, per end	4	.....
388	Tank raised to apply draft bolts, loaded car, per end	6	.....
389	Train pipe replaced and tightened, when shifted	1	1
390	Truck, R. and R., when necessary in connection with repairs made on a rivet basis............	1	1
391	Truck hanger (swing motion truck), renewed...	3½	3½
392	Truck hangers, two, same end of car (swing motion truck), renewed	4	4
393	Truck hanger, blacksmith labor repairing, including R. and R...........................	5	5
394	Truck hanger, each additional in same truck, blacksmith labor repairing, including R. and R.	2	2
395	Truck hanger pin, separately (swing motion truck), renewed	2	2
396	Truck hanger pin, blacksmith labor repairing, including R. and R...........................	2½	2½
397	Truck hanger pin seat, one, renewed...........	1½	1½
398	Truck side, cast steel, one, renewed, not including spring plank rivets or bolts...............	5¾	5¾
399	Truck side, cast steel, two on same truck, renewed, not including spring plank rivets or bolts	7¼	7¼
400	Truck spring, replacing, one or cluster, when out of place, both loaded and empty car..........	¾	¾
401	Truck springs, one or all, in same truck, renewed	2	2
402	Truck transom, one, wood, renewed............	10	10
403	Truck transoms, two, wood, renewed, in same truck	12	12
404	Truck truss rod, outside, one, renewed..........	2	2
405	Truck truss rod, center, one, renewed..........	9	9
406	Truck truss rod, outside, blacksmith labor repairing, including R. and R.................	3	3
407	Truck truss rod, center, blacksmith labor repairing, including R. and R..................	10	10
408	Truck truss rod saddle, one, renewed..........	2	2
409	Truss rod, body bolster, one, renewed.........	1½	1½
410	Truss rod, body bolster, blacksmith labor repairing, including R. and R......................	2½	2½
411	Trussing car, empty	1½	1½
412	Trussing car, loaded	2	2
413	Truss rod across end of car, one, renewed......	1	1
414	Trussing truck bolster, empty car.............	1	1
415	Trussing truck bolster, loaded car............	1½	1½
416	Truss rod turnbuckle, one, renewed...........	1	1
417	Turnbuckle lock, one, renewed.................	½	½
418	Weighing and re-stenciling stock cars, net, non-per diem, each car, $1.25.....................	.....	.....
419	Weighing and re-stenciling other cars, net, non-per diem, each car, $1.00.....................	.....	.....
420	Weighing and stenciling all per diem cars, net, each $2.50	.....	.....
421	When necessary to remove load to make repairs at one end of car...........................	3½	3½
425	When any item is applied only and not removed, the full renewal labor price will be used.		
426	In all cases where more than one item of repairs is made on a car, each of which items if performed separately, would require the removal of the same truck or the raising of the same end of car, each item of repairs, except the initial one, should have its labor charge reduced one hour in order to provide for the overlapping labor brought about by the removal of the truck, or the jacking up of the car. This will also apply to wheels removed and replaced, altering height of car and renewal of shims.		

LABOR.

REPAIRS OF STEEL CARS OR STEEL PARTS OF COMPOSITE CARS.

430 All rivets ½ in. diameter or over, 16 cents net per rivet, which covers removal and replacing of rivets, including removing, fitting, punching or drilling holes when applying patches or splicing and replacing damaged parts, not to include straightening.

431 All rivets ¼ in. diameter and less than ½ in. diameter, 10 cents net per rivet, which covers removal and replacing of rivets, including removing, fitting, punching or drilling holes when applying patches or splices and replacing damaged parts, not to include straightening.

432 Straightening or repairing parts removed from damaged car, including all necessary fuel, power or welding process $1.00 per 100 lb.

433 Straightening or repairing parts in place on damaged car, also any part that requires straightening, repairing or renewing, not included on rivet basis, 58 cents per hr.

434 Repairs of steel tanks of tank cars:

Labor, repairing and testing, including rivet work per hr.	$0.68
Steaming, per tank, including steam................	2.00
Water for testing, per 1,000 gal.....................	.06

435 In making repairs to cars on a rivet basis, the cost of removing and replacing fixtures not secured by rivets, but necessarily removed in order to repair or renew adjacent defective parts, should be in addition to the rivet basis; rules covering wood-car repairs to govern.

DISMANTLING CARS ON AUTHORITY OF OWNER.

440 Dismantling wood constructed cars, including trucks and all work necessary, including handling, assorting and weighing scrap.

Box, stock and other house cars, except refrigerators..	$15.00
Flat cars	10.00
Gondola or hopper car having sides over 36 in......	14.00
Gondola or hopper car having sides 36 in. and under..	12.00
Refrigerator	18.00

Deduct $3.00 from the above prices when trucks are not dismantled.

Rule 108. No labor to be charged for the inspection of cars, testing or adjusting brakes, adjusting angle cocks, tightening unions or spreading cotters; sill steps, ladder treads or handholds, tightening or straightening on car.

No charge to be made for the material or labor of lubrication.

Rule 109. When it is necessary to apply an M. C. B. coupler complete, on account of a broken or missing knuckle or lock, the usual labor charge for replacing a coupler can be made.

When one or more carrier iron bolts over 6 in. long are replaced, and coupler at same end of car is removed and replaced, the regular labor charge for applying carrier iron bolts may be made.

When one draft timber is renewed the regular labor charge for renewing carrier iron bolts over 6 in. long, passing through or adjacent to mate draft timber, may be made.

Rule 110. No additional labor to be charged for:

Applying end sheathing when end plate or end sill under sheathing is renewed or replaced, also side sheathing when side sill or side plate is removed or replaced.

Applying center pins or friction rollers or putting car on center when center plates or center-plate bolts are applied at same end.

Applying center plate or center-plate bolts when car is raised to standard height by adjusting center plates or body bolster, at same end of car.

Applying dead block or platform plank when end sill is applied at same end.

Applying coupler when draft timber, one or both, is applied at the same end.

Applying brake hangers when brake beam is applied.

Rule 111. 1. When angle cocks, cut-out cocks, pressure retaining valves and release valves, or detail parts of same, are renewed, ground in or otherwise repaired, account defective or missing, charge shall be made for complete cock or valve and average credit allowed according to prices shown in Rule 101.

2. The following table shows the labor charges allowable for air-brake repair work. The letters "R. & R." mean "removed and replaced."

3. Whenever the number of bolts or nuts securing triple valve, triple cylinder cap or check case differs from the number specified in following prices or details no deductions or additions shall be made in the labor charges.

	Cents.
4. Connections: Pipe, pipe fittings, air hose, angle cock, cutout cock, release-valve, retaining valve or strainer, R. & R., for each connection made (disconnected and connected, or connected only)	6

NOTE.—No labor to be charged for bending pipe in connection with R. & R. of same. No additional charge to be made for lag screws or bolts in retaining valve R. & R. when the valve is renewed, repaired or cleaned. No overlap labor will be deducted when air hose is renewed and angle cock renewed or repaired.

	Cents.
5. Cylinder, R. & R., detachable	46
6. Cylinder, R. & R., combined type	60

DETAILS.	Cents.
Push rod (1 connecting pin)	6
Clamping piston (1 cap screw)	4
Cylinder head, R. & R. (4 nuts, ½ in., 2 cents each)	8
Disconnecting cylinder from reservoir (7 nuts, ½ in., 2 cents each)	14
Reclamping cylinder piston (1 cap screw)	4
Removing cylinder from car (6 nuts, ⅝ in., 4 cents each)	24
Total	60

7. Cylinder and reservoir, R. & R. 82

DETAILS.	Cents.
Removing push rod (1 connecting pin)	6
Removing cylinder head (4 nuts, ½ in., 2 cents each)	8
Removing cylinder from car (6 nuts, ⅝ in., 4 cents each)	24
Removing reservoir from car (2 nuts, ⅝ in., 4 cents each)	8
Removing release rods	8
Removing release valve	4
Removing 2 plugs	4
Removing triple (2 nuts, ⅝ in., 4 cents each)	8
Disconnecting train pipe union	6
Disconnecting retaining pipe union	6
Total	82

8. Cylinder and reservoir, tightened when loose (8 nuts, 2 cents each) 16

9. Cylinder cleaned, oiled, tested and stenciled, including obliterating old stencil marks 76

DETAILS.	Cents.
Removing push rod (1 connecting pin)	6
Clamping cylinder piston (1 cap screw)	4
Removing cylinder head (4 nuts, ½ in., 2 cents each)	8
Cleaning, testing and stenciling	58
Total	76

10. Cylinder-release springs, R. & R. 22

DETAILS.	Cents.
Removing push rod (1 connecting pin)	6
Clamping cylinder piston (1 cap screw)	4
Removing cylinder head (4 nuts, ½ in., 2 cents each)	8
Reclamping cylinder head (1 cap screw)	4
Total	22

11. Cylinder gasket, R. & R. 52

DETAILS.	Cents.
Disconnecting triple union	6
Disconnecting retaining pipe union	6
Disconnecting reservoir block (2 nuts, ⅝ in., 4 cents each)	8
Disconnecting reservoir from cylinder (7 nuts, ½ in., 2 cents each)	14
Removing push rod (connecting pin)	6
Clamping cylinder piston	4
Removing release rod	8
Total	52

	Cents.
12. Cylinder gasket, renewed, when cylinder is cleaned same time	30
13. Cylinder piston packing, R. & R.	26

DETAILS.	Cents.
Removing push rod (1 connecting pin)	6
Clamping cylinder piston (1 cap screw)	4
Removing cylinder head (4 nuts, ½ in., 2 cents each)	8
Removing leather packing (4 nuts), ½ in., 2 cents each)	8
Total	26

14. Cylinder piston packing leather, renewed, when cylinder piston is removed to clean or repair cylinder 8

15. Cylinder piston, R. & R. 30

DETAILS.	Cents.
Removing push rod (1 connecting pin)	6
Clamping cylinder piston (1 cap screw)	4
Removing cylinder head (4 nuts, ½ in., 2 cents each)	8
Removing leather packing (4 nuts, ½ in., 2 cents each)	8
Reclamping cylinder piston (1 cap screw)	4
Total	30

16. Cylinder piston packing-leather expander, renewed 18

DETAILS.	Cents.
Push rod, R. & R.	6
Clamp cylinder piston	4
Cylinder head, R. & R.	8
Total	18

17. Cylinder push rod, R. & R. or R. (1 connecting pin) 6

18. Dirt collector in branch pipe, cleaned, drained and stenciled 12

19. Dirt collector, R. & R. only 6

20. Oil plugs, R. & R., each 4

21. Release-valve rod, removed and replaced (including repairs, if necessary) 6

22. Reservoir, R. & R. 58

DETAILS.	Cents.
Removing from car (2 nuts, ⅝ in., 4 cents each)	8
Disconnecting from cylinder (7 nuts, ½ in., 2 cents each)	14
Removing release rods	8
Removing release valve	4
Removing 2 plugs	4
Removing triple valve (2 nuts, ⅝ in., 4 cents each)	8
Disconnecting unions	6
Disconnecting union, retaining pipe	6
Total	58

23. Retaining valve, R. & R. and cleaned only. 20

24. Triple valve gasket, renewed 20

NOTE.—Not to be allowed when triple valve is oiled, cleaned or removed for other repairs.

DETAILS.	Cents.
Disconnecting branch pipe union	6
Disconnecting retaining pipe union	6
Removing triple (2 nuts, ⅝ in., 4 cents each)	8
Total	20

25. Triple-cylinder cap, R. & R. (3 nuts, ½-in., 2 cents each) 6

26. Triple-cylinder cap gasket, renewed, when triple valve is not R. & R. and cleaned (3 nuts, ½-in., 2 cents each; gasket, 4 cents) 10

27. Triple emergency valve rubber seat, R. & R. when triple valve is not C. O. T. & S. 20

28. Threading one end of pipe 10

29. Triple valves removed, cleaned, oiled, tested and stenciled, including all necessary repairs (labor and material), exclusive of renewal of body or conversion of valve from one type to another. Average charge $1.70

DETAILS.	Cents.
Train pipe union, disconnected	6
Retaining pipe union, disconnected	6
Removing triple (2 nuts, ⅝ in., 4 cents each)	8
Check valve case (2 cap screws)	4
Emergency valve seats	10
Cylinder cap (3 bolts)	6
Cleaning, testing, stenciling and repairing, including material	$1.30
Total	$1.70

NOTE.—This average charge also includes the 1 in. union gasket for branch pipe and the ⅜ in. union gasket for retaining pipe, in connection with triple valve, but does not include triple valve gasket.

SETTLEMENT FOR DESTROYED OR DAMAGED CARS.

Cars Built Prior to October 1, 1914.

Rule 112. (a) When the body of trucks of a foreign car, built prior to October 1, 1914, are destroyed or badly damaged, the owner shall, upon request, furnish depreciated value of body and trucks separately (depreciation on each to be figured from the date the car was originally built), and the party responsible shall have the option of rebuilding or settling under the depreciated value.

If it is decided not to rebuild, the owner must be immediately advised.

(b) The settlement prices of new eight-wheel cars shall be as follows:

BODIES OF 8-WHEEL CARS.

Wood.

Box, 40 ft. long or over	$688.00
Box, 36 ft. long or over, but under 40 ft.	594.00
Box, 34 ft. long or over, but under 36 ft.	563.00
Box, 32 ft. long or over, but under 34 ft.	500.00
Box, under 32 ft. long	406.00
Flat, plain, 40 ft. long or over	313.00
Flat, plain, 32 ft. long or over, but under 40 ft.	250.00
Flat, plain, under 32 ft. long	156.00
Gondola, drop bottom, 40 tons capacity or over	500.00
Gondola, drop bottom, 30 tons capacity or over, but under 40 tons	469.00
Gondola, drop bottom, 25 tons capacity or over, but under 30 tons	438.00
Gondola, drop bottom, 20 tons capacity or under	313.00
Gondola, hopper bottom, 50 tons capacity	688.00
Gondola, hopper bottom, 40 tons capacity or over, but under 50 tons	563.00
Gondola, hopper bottom, 30 tons capacity or over but under 40 tons	500.00
Gondola, hopper bottom, 25 tons capacity, but under 30 tons	438.00
Gondola, hopper bottom, 20 tons capacity or less	344.00
Gondola, plain, 50 tons capacity or over	531.00
Gondola, plain, 40 tons capacity, but under 50 tons	469.00
Gondola, plain, 30 tons capacity but under 40 tons	438.00
Gondola, plain, 25 tons capacity, but under 30 tons	375.00
Gondola, plain, under 25 tons	219.00
Stock, 34 ft. long or over	500.00
Stock, 32 ft. long or over, but under 34 ft.	469.00
Stock, under 32 ft. long	406.00
Self-clearing hopper, 30 tons, but less than 40 tons	469.00
Self-clearing hopper, 40 tons, but less than 50 tons	500.00
Self-clearing hopper, 50 tons capacity and over	625.00

The lengths of cars above mentioned refer to lengths over the end sills.

The prices for car bodies contained in the foreging schedule are exclusive of the following items, the prices of which may be added when a car is so equipped:

(a) Double-deck stock cars, per car	$ 50.00
(b) Metal body bolsters; also composite body bolsters in which the metal members are at least 8 in. in depth and have an aggregate minimum sectional area of 16 sq. in., provided car is 60,000 lb. capacity or over and so stenciled, and has trucks with journals 4¼ in. or over when new, per car	$60.00
(c) Center sills or continuous metal draft members shall be figured per lineal foot per member, according to depth and weight as follows and including draft lugs riveted on, or cast integral on cast-steel extensions. (Where such cast-steel extensions are used, the metal sills or continuous metal draft members to which they are attached must be figured full length of car.)	
8 in. in depth and not less than 18 lb. per ft., per member	1.80
9 or 10 in. in depth and not less than 20 lb. per ft. per member	2.20
12 in. in depth and not less than 25 lb. per ft. per member	2.60
15 in. or over in depth and not less than 33 lb. per ft. per member	3.00
(d) Cover plate used on metal center sills or continuous metal draft members, per lineal foot of the sills actually covered, whether plate is applied top or bottom, or both, or in part on top and in part on bottom. (This price shall not apply to what is commonly known as tie plates, regardless of dimensions.) Price, per ft.	1.30
(e) Metal draft arms extending 24 in. or more back from center line of body bolster, including draft lugs, whether riveted on or cast integral, per car	130.00
(f) Friction draft gears, per car	50.00
(g) Metal needle beams, when used in conjunction with metal center sills or continuous metal draft members, per car	20.00
(h) All-steel ends of the corrugated type, per car	80.00
(i) Air brakes, 8-in., per car	10.00
(j) Air brakes, 10-in., per car	65.00
(k) Ventilating fixtures of box cars, per car	40.00

(l) Where allowances as above are based upon length, fractional parts of a foot in the aggregate length shall be counted as 1 ft., if ½ ft. or greater; if less than ½ ft., they shall be dropped.

NOTE.—Paragraphs (a), (f), (h), (i), (j), (k) apply to all cars built prior to October 1, 1914, so equipped, whether wood, steel underframe or all steel.

BODIES OF 8-WHEEL CARS.

Steel or Steel Underframe.

Box, wooden body, metal underframe, 50 tons capacity, 38 ft. 6 in. long or over, but less than 40 ft. over end sill	$1280.00
Box, wooden body, metal underframe, 50 tons capacity, 36 ft. long or over, but less than 38 ft. 6 in. over end sills	1156.00
Box, wooden body, metal underframe, 50 tons capacity and over, 40 ft. long or over, but less than 46 ft. over end sills	1313.00
Box, wooden body, metal underframe, 30 tons capacity and over, 36 ft. long over end sills	1125.00
Box, wooden body, metal underframe, 40 tons capacity and over, but less than 50 tons capacity, 36 ft. long and over, but less than 38 ft. long over end sills	1125.00

Box, wooden body, metal underframe, 40 tons capacity, but less than 50 tons capacity, 38 ft. long, but less than 40 ft. long over end sills......	1219.00
Box, wooden body, metal underframe, 40 tons capacity, but less than 50 tons capacity, 40 ft. long or over, but less than 46 ft. over end sills..	1250.00
Box, all steel, any capacity or length, per lb.......	.05
Flat, wooden floor, metal underframe, any capacity or length, per lb..............................	.05
Gondola, wooden body, metal underframe, solid bottom, 30 tons capacity and over, but under 40 tons	1000.00
Gondola, wooden body, metal underframe, solid bottom, 40 tons capacity, but under 50 tons......	1063.00
Gondola, wooden body, metal underframe, solid bottom, 50 tons capacity and over, but under 70 tons	1094.00
Gondola, wooden body, metal underframe, solid bottom, 70 tons capacity and over...............	1280.00
Gondola, all steel, any capacity or length, having either solid, drop or hopper bottom or self-clearing by floor dropping on side, per lb............	.05
Gondola, wooden body, metal underframe, hopper bottom, 32 ft. over end sills, but under 40 ft.....	1000.00
Stock, wooden body, metal underframe, 50 tons capacity, 36 ft. long or over, over end sill........	1219.00
Hopper, self-clearing wooden body, steel underframe, 50 tons capacity and over................	1188.00
Hopper, all steel (including coke cars), self-clearing, any capacity or length, per lb...............	.05
Gondola, wooden body, steel underframe, self-clearing, by floor dropping on side, 40 tons capacity and over, but under 50 tons.....................	1250.00
Gondola, wooden body, steel underframe, self-clearing, by floor dropping on side, 50 tons capacity and over	1280.00
Stock, wooden body, metal underframe, less than 50 tons capacity, 36 ft. long or over, over end sill	1125.00

To the above prices for box or stock cars with metal underframe and steel framed composite superstructure, add $94.00 if built with sheathing boards on outside, or $156.00 if built with sheathing boards on inside only.

The weight of bodies of all-steel cars shall be determined by deducting the average weight of the trucks from the stenciled light weight of the car as destroyed.

FOUR-WHEEL TRUCKS.

Capacity of Trucks.	Value New, per Pair. All Metal.	Value New, per Pair. With Wooden Bolsters.
50,000 lb. or under...................	$365.00	$325.00
60,000 lb. and less than 70,000 lb......	450.00	375.00
70,000 lb. and less than 80,000 lb......	470.00	400.00
80,000 lb. and less than 100,000 lb.....	500.00	......
100,000 lb. and less than 120,000 lb.....	540.00	......
140,000 lb. and less than 120,000 lb.....	625.00	......

For trucks with wrought steel wheels, an additional allowance of $200.00 per car shall be made.

For trucks with cast-steel wheels, an additional allowance of $125.00 per car shall be made.

Prices include brake beams complete, truck levers, dead-lever guides and bottom-connection rods.

Truck of 60,000 lb. capacity or over, which consist entirely of metal, with the exception of the spring planks, shall be considered as all-metal trucks.

Cars Built On or After October 1, 1914.

(c) When a foreign car built on or after October 1, 1914, is destroyed or badly damaged, the owner shall, upon request, furnish original cost price, new, depreciated from date car was built new, and the party responsible shall have the option of rebuilding or settling under the depreciated value. If it is decided not to rebuild, the owner must be immediately advised. If items listed have been added to the car subsequent to date car was originally built, the allowance for same, depreciated from date applied, may be added to depreciated value of car.

RATE OF DEPRECIATION TO BE USED IN SETTLEMENT FOR DESTROYED OR DAMAGED CARS.

(*Straight Depreciation Basis.*)

(d) In the case of wooden car bodies the depreciation due to age shall be figured at 5½ per cent per annum.

In the case of all-steel car bodies or car bodies with steel underframes and steel superstructure frames, the depreciation shall be figured at 4 per cent per annum. A steel superstructure frame car indicates a car having the side and end uprights, braces and plates riveted together.

In the case of car bodies with steel underframes and wooden superstructure, the depreciation shall be figured at 4½ per cent per annum, with the exception of steel underframe flat cars having wooden floors which shall be figured at 5 per cent per annum.

The depreciation on the tanks of tank cars for handling non-corrosive substances shall be 4 per cent per annum; for tanks of tank cars handling corrosive substances the depreciation shall be 5 per cent per annum.

The depreciation on trucks shall be figured at the rate applied for the type of car the trucks are under.

Allowances for depreciation shall in no case exceed 60 per cent of the value new.

Items for which a special allowance is made shall be depreciated from the date applied and at the same rate as applied to the car.

The amounts $10.00 and $65.00 for air brakes shall not be subject to any depreciation.

(e) The bodies of refrigerator cars, stock cars permanently fitted for stall shipments, and other freight cars, designed for special purposes, not referred to above, shall be settled for at the present cost price, as may be agreed to by the parties in interest, less the depreciation due to age, which shall be on the same basis as for regular freight equipment. The statement of reproduction cost as furnished by the owner shall show the reproduction cost of the body and trucks separately. The arbitrary value for trucks as given in this rule will not apply.

(f) In the case of cars equipped with racks for carrying coke and for other such purposes, and also stock cars other than those permanently fitted for stall shipments with feeding and watering attachments, the actual cost of these equipments shall be added to the standard settlement price for such cars.

Rule 113. For the mutual advantage of railway companies interested, the settlement for a car owned or controlled by a railway company, when damaged or destroyed upon a private track, shall be assumed by the railway company delivering the car upon such tracks.

When a car owned or controlled by a railway company is damaged or destroyed on the tracks of a road which is not a member of the per diem rules agreement of the American Railway Association, the road responsible for the per diem while in the possession of the non-subscriber shall be responsible to the owner for damage to or destruction of the car.

Rule 114. If the company on whose line the car is destroyed elects to rebuild the car, the original plan of construction must be followed, and the original kind and quality of materials used. In such cases no allowance shall be made for betterments not authorized by car owner.

Rules 115-121, inclusive. Vacant.

FURNISHING MATERIALS.

Rule 122. Companies shall promptly furnish to each other, upon requisition, and forward, freight or express charges collect from point of shipment, materials for repairs of their cars on foreign lines. If the material is for repairs of car owner's defects, the foreign company may bill the car owner for the entire freight charges, and in such case the car owner may reclaim freight charges for that portion of the movement over its own line. If the material is for repairs of user's defects, the foreign line may reclaim only for that portion of the movement over its line. A separate bill, with copy of freight, express or due bill attached, should be rendered for the freight or express charges, showing reference to bill covering repairs.

Requisitions for such material shall specify that same is for repairs of cars, giving car number and initial of such car, together with pattern number, sketch or other data to enable correct filling of requisition.

Material weighing less than 250 lb. gross weight ordered from car owner must be shipped by express.

The company having the car in its possession at the time shall provide from its own stock the following:

Lumber, forgings, hardware stock, paint, hairfelt, piping, air-brake material and all M. C. B. Standard material.

SETTLEMENT OF DISPUTES.

Rule 123. In order to settle disputes arising under the rules, and to facilitate the revision of the rules at the annual conventions of the Association, an Arbitration Committee of six representative members shall be appointed annually by the Executive Committee; four members of this committee to constitute a quorum.

In case of any dispute or question arising under the rules between the subscribers to said rules, the same may be submitted to this committee, through the Secretary, to receive consideration by the Arbitration Committee.

The abstract should set forth:

1. An agreed statement of facts.
2. Argument of plaintiff.
3. Argument of defendant.

The abstract should consist of not more than three typewritten pages, letter size, single space, the agreed statement of facts to be signed by both parties to the dispute.

Should one of the parties refuse or fail to furnish the necessary information, the committee shall use its judgment as to whether, with the information furnished, it can properly give its opinion. The decisions of the committee shall be final and binding upon the parties concerned. This committee shall report its decisions to the Association, and its report shall be incorporated in the annual report of proceedings of the Association.

REVISION OF THIS CODE OF RULES.

Rule 124. The Arbitration Committee shall ask for suggestions of changes, amendments and additions to these rules prior to each annual convention, which it shall consider, and it shall report its recommendations to the succeeding annual convention.

Rule 125. In the revision of these rules by the Association, a two-thirds vote shall be necessary for adoption.

Rule 126. Voting powers shall be the same as prescribed in the Constitution of the Master Car Builders' Association on matters pertaining to the adoption of standards and the expenditure of money.

Rule 127. This Code of Rules shall be introduced for discussion and revision at one session of the Master Car Builders' Association convention each year.

CONDITIONS OF ACCEPTANCE OF THIS CODE.

Rule 128. Any car owner or railway company may become a party to this Code of Rules by giving notice through one of its general officers to the Secretary of the Master Car Builders' Association.

Railroad companies becoming subscribers to this Code of Rules must have a representative member in the Master Car Builders' Association.

Rule 129. Any car owner or railway company that is a party to this Code of Rules shall be bound by same through its successive revisions, until one of its general officers files with the Secretary of the Master Car Builders' Association its notification of withdrawal.

Rule 130. Acceptance or rejection of this Code of Rules must be as a whole, and no exception to an individual rule or rules shall be valid.

Rule 131. This Code of Rules shall become effective October 1, 1918, in so far as billing for repairs is concerned; other provisions effective November 1, 1918.

AMERICAN RAILWAY ASSOCIATION.

Car Service Rule 15.

Unless otherwise agreed, the cost of transferring the lading of freight cars or rearrangement of lading at junction points shall be settled as follows:

First.—The delivering road shall pay cost of transfer or rearrangement—

(a) When transfer is due to defective equipment that is not safe to run according to M. C. B. Rules, except where the repairs can be made under load as per M. C. B. Rule 2.

(b) When transfer or rearrangement of load is due to contents being improperly loaded or overloaded, according to M. C. B. Rules, or the Interstate Commerce Commission Regulations for the Transportation of Explosives and Other Dangerous Articles by Freight and by Express, or when dimensions of the lading of open cars are in excess of the published clearances of any of the roads covered by the routing.

(c) When transfer is due to delivering line not desiring its equipment to go beyond junction points.

(d) When cars can not pass the approved clearances of The American Railway Association.

Second.—The receiving road shall pay cost of transfer or rearrangement—

(e) When cars can not pass clearances except as provided in paragraph (d), or when cars and lading

exceed load limit or can not be moved through on account of any other disability of receiving line.*

*Note to Rule 15 (*e*).—The word "cars" covers both closed and open cars, but not lading on open cars. The words "load limit" refer to the limits placed on bridges, tracks, etc., and not to car capacity.

(f) When receiving road desires transfer to save cost of mileage or per diem.

APPENDIX.

CODE OF RULES

Governing the Condition of, and Repairs to, Passenger Equipment Cars in Interchange.

The following modifications of this Code of Rules shall apply only to railroads under U. S. Federal control.*

The M. C. B. Rules in reference to defect carding of cars in interchange are modified as follows:

(A) Defect cards shall not be required as between roads under U. S. Federal control for any delivering line defects on cars belonging to roads not under U. S. Federal control and private car lines, as well as cars belonging to roads under U. S. Federal control. Defect carding for delivering line defects on any car is limited to the first and last road under U. S. Federal control receiving or delivering the car.

(B) Defect cards shall not be required as between roads under U. S. Federal control for improper repairs on cars belonging to roads under U. S. Federal control.

(C) Gas certificate shall not be required as between roads under U. S. Federal control for gas in containers of cars offered in interchange.

PREFACE.

These rules make car owners responsible for, and therefore chargeable with, repairs to their cars, except as otherwise provided.

All inspection of passenger equipment cars for interchange will be made in accordance with the following rules:

Rule 1. Each Railway Company shall give to foreign cars, while on its line, THE SAME CARE AS TO INSPECTION, OILING, PACKING AND THE ADJUSTMENT OF BRAKES THAT IT GIVES TO ITS OWN CARS, except in case of cars on which work is done under special agreement existing between the company owning the cars and the road operating same.

Rule 2. Cars, loaded or empty, offered in interchange with defects for which owner is responsible, provided they otherwise meet the requirements of the receiving line as to safety and clearances, must be accepted, with the following exception:

(*a*) Cars, loaded or empty, having defects in violation of the Safety Appliance Acts, should not be offered in interchange.

Rule 3. Passenger equipment cars operating in interchange shall be divided into two classes of service as follows:

(*a*) Line Service: Cars operating in a regular course over two or more systems of railroads and under an approved operating agreement.

(*b*) "Interchange Service: Cars moving over two or more systems of railroads and the operation of which does not comply with the requirements of Line Service."

(*c*) The expense of terminal heating, cleaning, lubricating, icing or watering cars (including water barrels), on trains to be used for the movement of troops shall be assumed by the road incurring such expense. Item of gas shall be handled in accordance with Rule 17.

Rule 4. If a car is offered with defects for which owner is not responsible, the delivering line must promptly furnish a defect card covering such defects, the defect card to be of form shown in freight code of rules.

Rule 5. Improper repairs to passenger equipment cars shall be handled same as outlined in freight code of rules.

Rule 6. The expenses of passenger equipment cars operated in interchange or line service shall be divided into four classes, namely:

(*a*) Owner's defects.

(*b*) Delivering company's defects.

(*c*) Line service expense; proratable on a mileage basis against the roads comprising the line.

(*d*) Electric lighting.

Rule 7. Owner's defects are as follows:

(*a*) Damage or loss to any car except as otherwise provided.

(*b*) Cracked or broken glass.

(*c*) Chimneys, wicks, burners, shades, and all other fittings of oil-lighting equipment when car is not in Line Service.

Mantles, tips, burners, domes, globes, bulbs, bowls and all other fittings of gas-lighting equipment when car is not in Line Service.

Fuses, incandescent bulbs, shades, belts, current, wiring, and all other parts of electric-lighting equipment. (See Rule 10.)

Gas shall be handled in accordance with Rule 17.

(*d*) All defective or missing inside or concealed parts of car, including tools and emergency repair parts missing from either inside or outside of all cars.

(*e*) Axle broken or having journal ½ in. or more under the standard diameter for car (except for 3¾ by 7 in. journal, which will be condemned at 3½ in.) or having seamy journal, fillet in back shoulder worn out, length of journal increased ½ in. or more over standard length for the car, or collar broken off or worn to ¼ in. or less under fair usage. Size of journal should be stenciled on truck. Axles standard to car must be maintained. When secondhand axles are applied, the diameter of the journals must be at least ⅛ in. greater than the limiting dimensions shown above. The length of journals must not exceed ⅜ in. over standard length, the collar must not be less than 5/16 in. thick, and the fillet at back end of journals must be good.

When axle is removed on account of owner's defect on wheel, if diameter of journal is not at least ⅛ in. greater than limiting diameter shown above, or if journal is more than ⅜ in. longer than standard length, or collar is less than 5/16 in. thick, the axle shall be considered as scrap, and so credited.

(*f*) Cast-iron, cast-steel, wrought-steel and steel-tired wheels with following defects:

(1) Loose. All wheels.

(2) Variation from gage (see Fig. 8 in freight code for wheels cast prior to M. C. B. standard tread and flange adopted in 1907, and Fig. 9 for wheels cast after

January 1, 1908. Fig. 9 also applies for all cast-steel, wrought-steel and steel-tired wheels.)

(3) Shelled out: Wheels with defective treads on account of pieces shelling out; if the spots are over 1 in., or so numerous as to endanger the safety of the wheel. Brake burn: Wheels having defective treads on account of cracks or shelling out due to heating. All wheels.

(4) Tread worn hollow: If tread is worn hollow ⅛ in. or over. Cast-iron wheels.

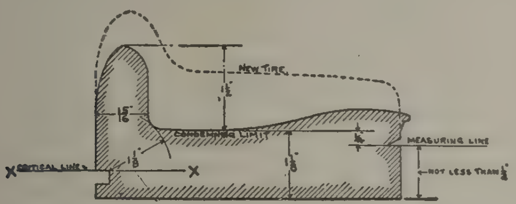


FIG. 1.—STEEL TIRE, RETAINING RING FASTENING.

(5) Worn flange: Flanges having flat vertical surfaces extending ⅞ in. or more from tread, or flanges 1 in. thick or less, gaged at a point ⅜ in. above tread. Cast-iron and cast-steel wheels.

Gage: For condemning worn flanges of cast-iron and cast-steel wheels under passenger cars should be the same as is used for condemning worn flanges of cast-iron and cast-steel wheels under freight cars of 80,000 lb. capacity or over. (See Figs. 3 and 4 of freight code.)

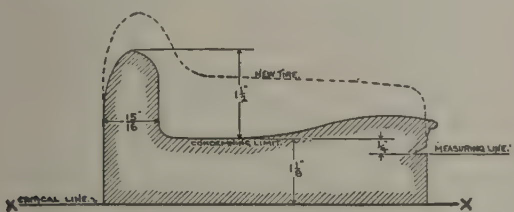


FIG. 2.—STEEL TIRE, SHRINKAGE FASTENING ONLY.

(6) Worn flange or tire: With flange 15/16 in. thick or less or having flat vertical surface extending 1 in. or more from tread, or with tire thinner than shown in Figs. 1, 2, 3 and 4 of passenger code. Wrought-steel and steel-tired wheels.

Gage for condemning worn flanges of wrought-steel and steel-tired wheels under passenger cars to be the same as is used for condemning worn flanges of

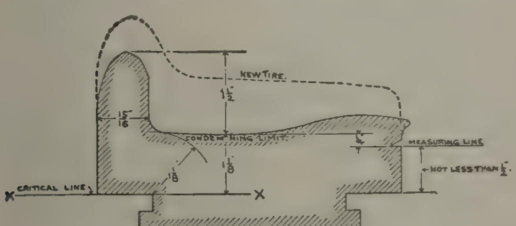


FIG. 3.—STEEL TIRE FASTENING.

wrought-steel and steel-tired wheels under freight cars, see Figs. 3 and 4 of Freight Code.

(7) Burst: If wheel is cracked from wheel fit outward by pressure from axle. All wheels.

(8) Flange, rim, tread, plate brackets or any other part of wheel, either cracked, chipped, seamy or broken under fair usage. All wheels.

(9) Broken or cracked hubs, plates, bolts, retaining ring or tire, occurring under fair usage. Steel-tired wheels.

(10) Worn through chill: When the worn spot is one (1) in. or over in length. Care must be taken to distinguish this defect from flat spots caused by sliding wheels. Cast-iron wheels.

(11) Thick flange: Flange over 1 19/64 in. thick for cast-iron wheels having increased flange and tread standards of 1907 and 1909, and for all cast-steel, wrought-steel and steel-tired wheels. See Fig. 7 of Freight Code.

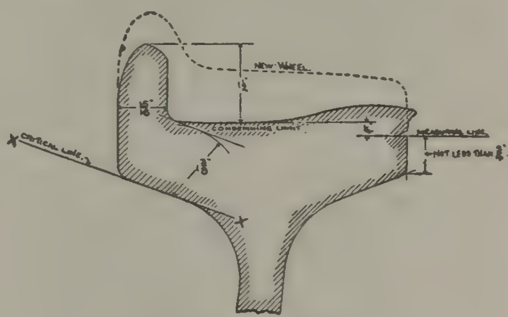


FIG. 4.—STEEL WHEEL.

(12) Wrought-steel wheels may be substituted for steel-tired wheels.

(*g*) Any company finding cars not within the limits of standard height for couplers must make repairs. As far as possible, cars should be adjusted when empty.

(*h*) Couplers that exceed the distance of 5⅛ in. between point of knuckle and guard arm, measured perpendicularly to guard arm, must have the defective part or parts renewed, to bring coupler within gage.

Rule 8. Delivering line defects are as follows:

(*a*) Damage or loss to any car, due to wreck, derailment, cornering, sideswiping, flood, overloading, explosion, collapsing structures, or unconcealed fire damage, including cars on ferries or floats; also damage due to storm where car is derailed or destroyed.

(*b*) Slid-flat wheels: If flat spots, caused by sliding, exceed 1 in. in length. All wheels. The same responsibility shall apply to the mate wheel, regardless of length of slid spot. A separate defect card shall be furnished in the case of wrought-steel or steel-tired wheels.

(*c*) Cast-iron wheels in place of cast-steel, wrought-steel or steel-tired wheels and cast-steel wheels in place of wrought-steel or steel-tired wheels.

(*d*) Private line cars having trucks equipped with steel-tired or wrought-steel wheels for movement in passenger trains, and trucks so stenciled, if found with cast-iron or cast-steel wheels.

(*e*) Cut journals, axles bent or axles damaged as provided in paragraph (*a*). When necessary to true up axles in cases of cut journals, if the journal is reduced below the limit as prescribed in Rule 7 (*e*), axle must be changed at the expense of the delivering line.

(*f*) Loss of service metal from wrought-steel or steel-tired wheels, caused by flat sliding, is chargeable to the company on whose road the damage occurs.

NOTE.—For loss of service metal on slid-flat wheels, ⅛ in. will be allowed for flat spots 2½ in. long or less, and $\frac{1}{16}$ in. for each additional inch or fraction thereof.

Any additional loss of service metal that it is neces-

sary to remove on account of worn flange or tread must be borne by the car owner.

(g) Steam hose missing from cars offered in interchange.

(h) Burst or broken steam pipes and fittings, damaged steam valves, traps, and parts of same (inside of car), when due to freezing, on cars equipped with a combined steam heat cut-out and drain valve, also on cars equipped with hot water system of heating.

Rule 9. Line Service expense items are as follows:

(a) Terminal cleaning. (See Note below.)

(b) Heating. (Terminal heating and coal furnished for individual heaters for heating en route.) See Note below.

(c) Chimneys, wicks, burners, shades and all other fittings of oil lighting equipment. Gas, gas mantles, tips, burners, domes, globes, bulbs, bowls and all other fittings of gas lighting equipment.

(d) Lubrication, labor and material.

Note.—The following items not being car owner's responsibility per standard in interchange, should be assumed by the handling line when the car is not operating in Line Service:
(1) Ordinary daily cleaning, sweeping and dusting interior, washing down or washing exterior, cleaning windows, etc. (If this service is performed on private or business cars, the cost shall be charged against the car owner.)
(2) Oil furnished unlighted cars in any service.
(3) Terminal heating. (The cost of heat furnished to private or business cars shall be charged against the car owner.)
(4) Coal, wood and ice. (Such items furnished private or business cars shall be charged against the car owner.)

Rule 10. Electric lighting.

(a) A charge of 5 mills per car-mile (with a minimum mileage of 100 miles for any calendar day) shall be made by the road owning the car against the road handling the car for the electric-lighting equipment on cars equipped either for axle generator or straight storage-battery service.

(b) This charge of 5 mills is to cover the expenses of operation, maintenance, depreciation and interest on the electrical equipment; therefore all expenses incident to the operation and maintenance of such special features (except inspection) shall be charged against the car owner unless due to unfair usage.

(c) The electrical equipment referred to consists of the following:

Axle-generator car:
 Battery complete in trays.
 Axle generator complete.
 Axle generator suspension.
 Axle generator regulator.
 Lamp regulator.
 Axle pulley.
 Belt and fasteners.

Straight storage car:
 Battery complete in trays.

Either axle-generator or straight storage car:
 Fuses, incandescent bulbs, reflectors, current, charging plug receptacles, conduit wiring, switchboard and battery box.

(d) On electrical head-end lighting system of passenger-equipment trains a charge of 50 cents shall be made for the electrical equipment for each 100 miles train is run. This charge does not include the cost of coal and attendant.

This charge is intended to cover the expenses of operation (excluding attendant and coal), maintenance, depreciation and interest on the following, which comprise head-end electrical equipment:

Head-end car:
 Generator set complete, including all regulating and control equipment and instruments.
 Dynamo hose.
 Chain drive, including sprockets.
 Train-line connectors and receptacles.
 Fuses, bulbs, wiring, etc.

Note.—In case a car fully equipped for straight storage lighting is included in a train lighted with head-end system, a charge of 5 mills per car-mile (with a minumum mileage of 100 miles for any calendar day) shall be made for each car so equipped.

If an attendant be furnished, such proportion of his wages and expenses as is properly chargeable to electric car lighting shall be prorated among the roads in interest on a mileage basis.

(e) For repairs to electric lighting equipment on cars in interchange or leased cars, the instructions issued by the manufacturer of the apparatus shall be strictly followed. In the absence of any agreement, the material furnished and applied must be of the same manufacturer's make and quality as that which it replaces.

(f) This rule applies irrespective of the kind of service in which the car is operating, unless there is a special agreement covering these items of expense.

Rule 11. Information as to mileage made by cars must be furnished promptly on request of owners by railways over which cars are run.

Rule 12. (a) In no case shall car owner be charged for the second or subsequent applications of journal bearings if applied within 30 days from initial application at same journal location on same road, same trip, except when renewed within such period account change of wheels or axle at same journal location, in case the application of wheels is chargeable to owner.

(b) The billing repair card must specify for journal bearings applied and removed, whether solid, filled or other kind, length of journal and box number.

Rule 13. No direct labor charge shall be made for applying brake shoes, journal bearings, hose (air, steam or signal), incandescent bulbs, gas domes, gas bulbs, gas globes, gas bowls, gas pillars, mantles, tips, filling lamps, charging storage batteries, gasing tanks, icing, coaling and watering cars or for inspection of cars, testing or adjusting brakes, adjusting angle cocks, tightening unions or spreading cotters.

No charge to be made for the material or labor of lubrication, except in line service.

Rule 14. No credit to be allowed for burned-out incandescent bulbs, burned-out fuses or scrap brake shoes removed.

Note.—Steel back brake shoes not to be removed if over one-half (½) in. thick; gray iron shoes not to be removed if over three-quarters (¾) in. thick.

Rule 15. (a) Brakes must be in perfect working order. Brake cylinders and slack adjusters must have been cleaned and oiled within twelve months. Triple valves, control valves and high-speed valves must have been cleaned, oiled and tested within six months, and date of last cleaning and oiling stenciled on brake cylinders or control valves with white paint. Dirt collectors and strainers must be cleaned every six months at time of cleaning triple valves or control valves.

(b) The adjustment of piston travel, based on not less than seventy (70) lb. initial pressure, must not be less than five (5) in. nor more than eight (8) in.

(c) Air-brake hose applied must be new and made in accordance with specifications for M. C. B. standard

1⅜ in. hose, and so labeled.

Rule 16. Private or other cars, except regular line cars, when offered in interchange equipped with steam hose couplings that will not couple with the standard on the receiving line must be changed by receiving company; the hose removed to accompany car and be reapplied when car leaves the line.

Rule 17. If a car not in line service is transferred from one railroad to another, the receiving road shall issue gas certificate or defect card authorizing the delivering road to bill against it for the number of atmospheres of gas and number of holders at the time car was received.

(Name of Road.)

GAS CERTIFICATE.

....
Car Number................ Initial................
Number of Atmospheres..........................
Number of Holders..................................
Size of Holders.....................................
.... Station, ... 19....
.... Inspector

Rule 18. The depreciation of all passenger equipment cars due to age shall be figured at 3 per cent per annum upon the yearly depreciated value of same, to continue not to exceed 50 per cent of its original value. The above method of depreciation applies equally to either body or trucks of such cars. The excess cost of betterments applied, depreciated from the date of application, may be added to the depreciated value of the car. No depreciation shall be allowed on the value of air brakes.

Rule 19. Bills for maintenance of passenger cars should be handled as provided in Rules 91 to 97, inclusive, of the freight code of rules.

Separate bills must be rendered monthly for:

(*a*) Repairs.

(*b*) Cars destroyed.

(*c*) Line Service expense.

(*d*) Electric lighting; repairs made to electric service equipment may be included in same bill with other repairs; however, bills for rental of electric lighting equipment should be rendered separately. The prices for materials and labor to be governed in accordance with these Rules.

The Master Car Builders' definition of passenger train cars shall determine whether or not cars are of passenger construction.

The M. C. B. rules and prices covering repairs to freight equipment cars will govern in cases of repairs to cars of freight car construction, moving in passenger service, and the M. C. B. rules and prices covering repairs to passenger equipment cars will govern in cases of repairs to cars of passenger car construction moving in freight service. In cases of cars of freight car construction, equipped with passenger car trucks, the M. C. B. rules and prices covering repairs to passenger equipment cars will govern, in case of repairs to such trucks, irrespective of the kind of service in which the car is used.

Rule 20. For repairs made on and after October 1, 1918, thirty per cent shall be added to the net total amount of the bill for labor and material, including gas; this provision to apply to all charges in these rules with the following exceptions:

Twenty-five per cent may be added to the charges for repairs made on authority of defect card issued between January 1, 1917, and October 1, 1917; thirty-five per cent on defect cards issued between October 1, 1917, and October 1, 1918; thirty per cent on defect cards issued on and after October 1, 1918; regardless of date of repairs.

No percentage to be added to bills rendered by car owners for material furnished by them for repairs to their cars on foreign lines.

No percentage to be added to freight or express charges on material furnished by owners for repairs to their cars.

No percentage to be added to bills covering settlement for destroyed cars or trucks.

LABOR.

Rule 21. The labor prices as shown in Rule 111 for freight cars shall be used for ordinary quick-action triple valves, and for cylinders 14 in. or less in diameter, on passenger cars.

The following labor charges are applicable for the items mentioned:

No.	Labor.	
1	Nuts only, 1¼ in. or under, six or less, renewed	$ 0.15
2	Nuts only, 1⅜ in. or over, three or less, renewed	.15
3	Bolts, tightening, each	.02
4	Lag screws, three or less, renewed	.15
5	Journal box lid, one, renewed	.29
6	Bolts, miscellaneous, 6 in. or less in length, each	.15
7	Bolts, miscellaneous, over 6 in. in length, each	.29
8	Bolts, key or brake pin, separately, one, renewed	.15
9	Backs of seats, and cushions of passenger cars, either vestibule or common, removing and beating or cleaning by air, per car	1.30
10	Cleaning baggage cars, each:	
	Inside	.70
	Outside, including trucks	.50
11	Cleaning common passenger and combination cars, each:	
	Inside	.90
	Outside, including trucks	.70
12	Cleaning mail cars, each:	
	Inside	1.60
	Outside, including trucks	.70
13	Cleaning mail-apartment cars, each:	
	Inside	1.40
	Outside, including trucks	.60
14	Cleaning carpets, seats, draperies, etc., parlor and sleeping cars, by beating or by air, including cleaning inside, per car	3.50
15	Cleaning parlor and sleeping cars, outside, including trucks	2.00
16	Cleaning vestibule passenger and combination cars, including vestibules and trucks, each:	
	Inside, single windows	1.60
	Inside double windows	1.80
	Outside, single windows	1.00
	Outside, double windows	1.20
17	Drinking water container, cleaning and steaming, including R. and R., each	.20
18	Glass, setting, per light	.58
19	Labor, on lubrication, per hour	.45
20	Labor, on repairs, per hour	.58
21	Wheels, labor changing, center pair only	6.40
22	Wheels, labor changing, center pair with one pair outside wheels, in same truck	7.20
23	Wheels, labor changing, center pair with two pair outside wheels, in same truck	9.60
24	Wheels, labor changing, outside pair, when center pair is not renewed	4.80
25	Wheels, labor changing, two outside pair in same truck, when center pair is not removed, or two pair in four-wheel truck	7.20
26	Wheels, wrought steel or steel-tired, turning to provide full flange and standard tread contour (not including R. and R.), per pair	2.00

NOTE.—For items of labor not covered in this rule, the amount chargeable shall be the actual number of hours consumed multiplied by the M. C. B. rate per hour. Prices quoted for cleaning cars include necessary cleaning material.

Rule 22. Prices for materials used in repairs made under these rules shall be in conformity with schedule shown below:

No.	MATERIAL.	New.	Second-hand.	Scrap.
1	Axle, 50,000 lb. or under	$10.00	$ 5.00	$ 1.65
2	Axle, 60,000 lb.	26.00	15.60	5.30
3	Axle, 80,000 lb.	33.00	19.80	6.70
4	Axle, 100,000 lb.	40.00	24.00	8.00
5	Axle, 140,000 lb.	46.50	27.90	9.30

No.	MATERIAL.	Charge.	Credit.
			Average Credit.
6	Air-brake hose, M. C. B. Standard, 1⅜ in., complete with fittings, applied	$2.00	$0.60
7	Air-signal hose, complete, with fittings, applied	1.75	.60
			Credit.
8	Bolts, nuts and forgings, per lb.	.035	$0.005
9	Brake shoes, reinforced, applied, each	.55	......
10	Brake shoes (flanged), applied, each	1.10	......
11	Brake-shoe key, applied, no credit for scrap	.06	......
12	Burners, dual wick, applied, each	.30	......

No.	MATERIAL.	Charge.	Credit.
13	Burners, round wick, applied, each	.55	......
14	Candles, per lb.	.15	......
15	Castings, rough, iron, per lb.	.0225	.005
16	Castings, rough, malleable, per lb.	.04	.005
17	Castings, rough, steel, per lb.	.08	.005
18	Chain, per lb.	.045	.005
19	Chimneys, dual wick, applied, each	.07	......
20	Chimneys, round wick, applied, each	.11	......
21	Coal, Anthracite (including labor), per ton	9.00	......
22	Conductor's valve or signal cord and couplings, applied, per car	.75	......
23	Gas mantles, applied, each	.40	......
24	Gas, Pintsch, per receiver, net	1.10	......
25	Hose, 1⅜ in., straight port, steam, complete with fittings, applied	5.00	2.50
26	Hose, as above, 1¼ or 1½ in., applied	5.00	2.50
27	Ice (including labor), per cwt.	.50	......
28	Journal bearings, brass or bronze, lined or unlined, per lb., applied	.18	.12
29	Journal bearings, cast steel or malleable iron back, credit for scrap, per lb.	......	.02
30	Journal bearings, filled brass or bronze shell, per lb., applied	.14	.13
31	Journal bearings. Weights to be charged and credited as follows:		
	For journals—	Lb.	Lb.
31-A	7 in. long and over, but not 8 in. long	10	6
31-B	8 in. long and over, but not 9 in. long	13	8
31-C	9 in. long and over, but not 10 in. long	20	12
31-E	10 in. long and over, but not 11 in. long	25	15
31-F	11 in. long and over	37	23
32	Lumber, for framing (not exterior or interior finish), yellow, white and Norway pine, poplar, oak, hickory and elm, dressed and framed, per ft. B. M. required to make the part	[illegible]	......
33	Nails, per lb.	.03	......
34	Oil, car, per gal.	.22	......
35	Oil, coach, per gal.	.35	......
36	Oil, illuminating, American roads, per gal.	.11	......
37	Oil, illuminating, Canadian roads, per gal.	.16	......
38	Shades, Acme or common lamp, applied, each.	.30	......
39	Steel, for springs, rough, per lb.	.05	$0.005
40	Steel, helical springs, per lb.	.04	.005
41	Terminal car heating, per day of 24 hours or less. (See Note below)	.40	......
42	Waste, woolen, per lb., applied	.20	......
43	Waste, cotton, per lb., applied	.09	......
44	Wicks, dual, applied, each	.02	......
45	Wicks, round, applied, each	.04	......
46	Wheels, wrought steel, value of service metal, per $\frac{1}{16}$ in., 33 in. wheel	1.75	1.75
47	Wheels, wrought steel, value of service metal, per $\frac{1}{16}$ in., 36 in. wheel	2.00	2.00
48	Wheels, wrought steel, value of service metal, per $\frac{1}{16}$ in., 38 in. wheel	2.25	2.25
49	Wheels, steel-tired, average value service metal, per [illegible]	[illegible]	[illegible]

No.	MATERIAL.	Charge.	Average Credit Price.	Scrap.
49	One 36 in. cast iron wheel	$17.50	$8.50	....
50	One 33 in. cast iron wheel	15.00	7.75	....
51	One 36 in. wrought steel wheel	59.00	....	$11.00
52	One 33 in. wrought steel wheel	50.00	....	8.00
53	One 33 in. cast steel wheel	37.00	16.00	....

NOTE.—New 33 in. and 36 in. wrought steel wheels must have base of limit groove not less than 29½ in. and 32½ in., respectively, in diameter, must contain 1½ in. service metal (on radius of tread), above condemning limit (which is ¼ in. above base of limit groove).

In no case shall a charge or credit for service metal be made in excess of 1½ in.

NOTE.—Material which can only be obtained from one manufacturer or concern and therefore not subject to competitive prices, may be charged at net store department cost.

NOTE.—Materials ordered from owner for repairs of cars shall be handled in accordance with Rule 122 of the freight code of rules.

NOTE.—Cars lying at stations for over 48 hours, expense of heating to be borne by railway in whose possession car may be if the delay is due to the handling line.

Rule 23. Acceptance or rejection of this code of rules must be as a whole, and no exception to an individual rule or rules shall be valid.

Rule 24. This code of rules shall apply to all passenger equipment cars interchanged in passenger trains, and becomes effective October 1, 1918.

Interior Finish or Inside Finish (Passenger Cars). Figs. 1601-1615; Page 1199. A term used to designate the fine wood or metal paneling and sheathing used on the walls, to distinguish it from the outside sheathing.

Intermediate Cross Tie. A timber sometimes framed across the longitudinal sills of wooden cars about half way between the cross tie timbers and the body bolster.

Intermediate Floor (Passenger Cars). A floor consisting of boards placed between the sills and between the deafening ceiling, or under floor, and the upper or main floor. Its purpose is to exclude noise and cold.

Intermediate Lining (Refrigerator Car). See BLIND LINING.

Intermediate Sill. 3, Fig. 260. The main longitudinal members of an underframe between the side sills and the center sills. Seldom used in steel construction.

Internal Cylindrical Gage. A very accurately made solid steel cylinder, used as a standard of measurement of cylindrical holes.

Internal Screw Gage. A solid steel cylinder with a screw thread on it, for testing the diameter of female screws.

Inverted Arch Bar. A bottom arch bar.

Inverted Body Queen Post. A post in the side of a car body which supports the inverted body truss rod or overhang truss rod. See QUEEN POST.

Inverted Body Truss Rod. A truss rod used as a hog chain.

Iron Paste, Specifications for Oxide of (M. C. B. Recommended Practice).

In 1916 the following Specifications were adopted for Oxide of Iron Paste:

1. *Scope.*—These specifications cover oxide of iron paste to be used in painting freight equipment cars, and as a priming or subsequent coats on steel cars.

I. CHEMICAL PROPERTIES AND TESTS

2. *Chemical Composition.*—(a) The paste shall conform to the following:

Pigment .... 70-75 per cent by weight
Oil .... 24-29 per cent by weight
Moisture............not over 1 per cent by weight.

(b) *Pigment.*—(1) The pigment shall conform to the following:

Sesquioxide of iron...not less than 25 per cent by weight
Carbonate of lime...............2-5 per cent by weight
Inert material ....Remainder.

(2) The pigment desired, if it contains sulphate of lime or gypsum, should have this fully hydrated. It should contain only such inert material as occurs with it in nature, with no addition of barytes, aniline colors, lakes or any other inorganic coloring matter. The inert material may contain sulphate of lime or gypsum, fully hydrated, silica, kaolin, soapstone, asbestine, or mixtures of any of these, sulphate of lime, and silica preferred.

3. *Oil.*—The linseed oil shall conform to the M. C. B. specifications for linseed oil.

II. PHYSICAL PROPERTIES AND TESTS

4. *Fineness.*—(a) The pigment shall be so fine that after having been separated from the oil and freed from hygroscopic moisture and then thoroughly mixed again with pure raw linseed oil, which has also been freed from moisture in the proportion of one part oil to one part pigment by weight, it will stand the following:

(b) Place a small amount of the above mixture on one end of a strip of dry glass, set the strip vertical where the temperature is 70° F. and allow to remain for thirty minutes.

(c) As the mixture runs down the glass, the fine-

ness will be acceptable if the oil and pigment does not separate in the first inch.

5. *Drying.*—Mix thoroughly the paste received with sufficient pure raw linseed oil to properly thin it for use; when thinned in this way and without the use of drier, the mixture shall dry on a piece of glass within seventy-two hours at a temperature between 60 and 80° F.

6. *Shade.*—(a) Samples of standard pigment showing shade desired will be furnished and shipments shall conform to standard shade.

(b) The shade of paint being affected by grinding, the railroad company's standard shade is that given by the dry sample mixed with the proper amount of oil and ground, or better, rubbed up in a mortar until the paste will pass the railroad company's test for fineness. As the comparison should always be made with fresh samples, samples should be made up for each day's testing. After paint has become dry it shall not be used further.

(c) The comparison can best be made by putting a small amount of the Standard paste and that to be compared in hillocks near each other on glass, and then lay a thin piece of glass as a cover on the two hillocks and press them together until the two samples unite. It is recommended to use the microscopist's cover glass for the glass used as a cover, as this thin glass does not change the shade perceptibly. The line where the two samples meet will be clearly marked if they are not of the same shade.

7. *Samples.*—Sample of paste shall be taken from one barrel, can or package in each shipment for test purposes.

III. PERMISSIBLE VARIATIONS

8. *Weight.*—As quotations are made by the pound on the basis of the paint weighing not over 15½ lb. per gallon, all paint received which weighs more than 15½ lb. per gallon, but not over 16½ lb. per gallon, will be accepted at the weight of 15½ lb. per gallon, the excess weight being at the expense of the manufacturer.

IV. MARKING

9. *Marking.*—Each barrel, can or package shall have such marking as shall be designated by the railroad company.

V. INSPECTION AND REJECTION

10. *Inspection.*—(a) The inspector representing the purchaser shall have free entry, at all times while work on the contract of the purchaser is being performed, to all parts of the manufacturer's works which concern the manufacture of the material ordered. The manufacturer shall afford the inspector, free of cost, all reasonable facilities to satisfy him that the material is being furnished in accordance with these specifications.

(b) The purchaser may make the tests and inspection to govern the acceptance or rejection of the material in his own laboratory or elsewhere. Such tests and inspection shall be made at the expense of the purchaser.

(c) All tests and inspection shall be so conducted as not to interfere unnecessarily with the operation of the works.

11. *Rejection.*—Material which, subsequently to above tests at the factory or elsewhere and its acceptance, develops imperfections or fails to pass any one of the tests herein required, will be rejected and shall be replaced by the manufacturer at his own expense.

12. *Rehearing.*—Samples tested in accordance with this specification, which represent rejected material, shall be preserved for fourteen days from date of test report. In case of dissatisfaction with results of tests, the manufacturer may make claim for a rehearing within that time.

J

Jack. Figs. 2709, etc; Page 1136. A machine for raising heavy weights, as a car. It commonly consists of one or more screws, turned by a lever and working in a case, which rests upon the floor or ground, as shown in the illustrations. See Screw Jack, Ratchet Jack.

Jacks take various names from their forms, sizes and shapes, and are designated as bell base, broad base, claw, low, ball-bearing, etc., and also from the uses for which they are designed, as journal box jack, traversing jacks, track jacks, etc. See Hydraulic Jack.

(Storage Battery.) A device used for breaking contacts when disconnecting cells.

Jack Arms (Steam Shovel). Heavy beams with jack screws at the ends which are put out on each side of the shovel at the forward bolster and supported on blocking. They prevent the car body from overturning due to the reaction of the dipper when digging.

Jack Screw (Pile Driver and Steam Shovel). A jack screw working on a jack screw pin or jack arms attached to the body, for relieving the springs of the cars from action and making the platform a rigid body. Tongs or crabs attached to the track are used to prevent the car body from rising when on the jack screws. Another device for this same purpose is a bolster jack screw.

Jacking Block. A Jacking Plate.

Jacking Plate. Fig. 967. A plate commonly applied to a steel side sill to protect it from damage when the car is being raised on jacks.

A topical discussion on the application of lugs to steel and steel underframe cars for jacking up car bodies will be found in the 1909 M. C. B. Proceedings, page 98.

Jamb (of a Door). The door post on each side of the door proper.

Jaw Bolt. A bolt with a forked end.

Jib (of a Derrick or Crane). More properly Boom.

Joint Bolt. A bolt used for fastening two timbers when the end of one joins the side of another. The lug bolt is another form for the same purpose.

Journal. The part of an axle or shaft on which the journal bearing rests.

Journal Bearing. Figs. 1061, 1071-1077. A block of metal, usually some kind of brass or bronze, in contact with a journal, on which the load rests. In car construction the term when unqualified means a car axle journal bearing. A standard shape has been adopted by the Master Car Builders' Association, but its composition is not specified. A lead-lined journal bearing is one coated on the inside with a thin sheet of lead to make it self-fitting on the journal.

Babbitt metal in some of its many forms is used for car journal bearings occasionally, and almost universally for the bearings of machinery. In order that the journal bearing may be more easily removable, and to distribute the load more equally, a journal bearing key, or wedge, is used to hold the bearing in place.

Roller and ball bearings have been used to some extent.

Journal Bearings for Passenger and Freight Equipment Cars, Specifications for (M. C. B. Recommended Practice.

In 1915 the following specifications were adopted. Section 5 modified in 1916.

1. *Classification.*—This specification will cover two grades of bearings and will be known as A and B.

I. CHEMICAL PROPERTIES AND TESTS

2. *Composition of Shell.*—The shell shall conform to the following requirements as to chemical composition:

SHELL.	A.	B.
Lead	24.0 to 30.0 per cent.	8.0 to 16.0 per cent.
Tin, not less than	4.0 "	7.0 "
Zinc and other impurities, not over	3.0 "	3.0 "
Copper, not less than	65.0 "	Not over 82.0 "

3. *Composition of Lining.*—The lining metal shall conform to the following requirements as to chemical composition:

LINING.	Up to ⅛ In.	⅛ In. and Over.
Lead	94.0 to 96.0 per cent.	Not over 88.0 per cent.
Antimony and Tin	3.0 to 5.0 "	" " 17.0 "
Tin	0.50 to 1.5 "	....
Other impurities, not over	0.5 "	0.75 "

4. *Analysis.*—The sample for chemical analysis shall be taken from the shell and lining at three points along the fractured surface, described in Section 5, either by drilling or by using cuttings thus obtained, well mixed.

II. PHYSICAL PROPERTIES AND TESTS.

5. *Tests.*—The finished casting representing a lot for acceptance shall be broken, either longitudinally or transversely, or both, without nicking, in order to ascertain the uniformity of the grain of the metal. When this fracture shows separation or imperfect mixing of component parts and dross or dirt spots, the lot shall be rejected.

6. *Number of Tests.*—Bearings shall be divided into lots of three hundred or less and one bearing shall be taken for test and chemical analysis from each lot.

III. PERMISSIBLE VARIATIONS IN GAGINGS

7. *Gaging.*—All bearings shall conform to gages and dimensions shown on drawings, and when linings are required they shall conform to the gages and dimensions for linings as shown on drawings.

IV. FINISH

8. *Finish.*—All bearing surfaces shall be smooth and free from tool marks. The castings shall be sound and free from blow-holes, dross and mechanical defects.

V. MARKING

9. *Marking.*—Each lot of three hundred or less shall bear a serial number, commencing with one at the beginning of the year and continuing consecutively until the end of the year, the year when cast, and the pattern number, legibly cast, by depressing the letters, on the sloping surface of the shoulder of the brass, and on the opposite sloping shoulder the railroad company's initials, M. C. B., and either "A" or "B," depending on the composition of the metal, and the figures to show the size of the journal bearing, and on the collar the manufacturer's name or trade-mark. All letters to be ¾ in. high, except the manufacturer's name or trade-mark, which should be the width of the shoulder or collar. The above marking shall be in accordance with Fig. 1.

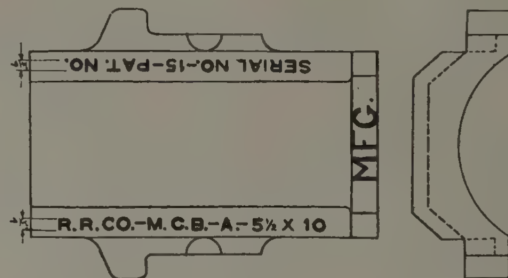


FIG. 1

VI. INSPECTION AND REJECTION

10. *Inspection.*—(a) The inspector representing the purchaser shall have free entry, at all times while work on the contract of the purchaser is being performed, to all parts of the manufacturer's works which concern the manufacture of the material ordered. The manufacturer shall afford the inspector, free of cost, all reasonable facilities to satisfy him that the material is being furnished in accordance with these specifications.

(b) The purchaser may make the analysis of the material at his own laboratory or elsewhere. Such tests shall show the material to conform to Sections 2, 3, 4 and 5.

(c) All tests and inspection shall be so conducted as not to interfere unnecessarily with the operation of the works.

11. *Rejection.*—Material which, subsequently to above tests at the mills or elsewhere, and its acceptance, shows any defects, shall be rejected and shall be replaced at the expense of the manufacturer.

12. *Rehearing.*—Samples tested in accordance with this specification, which represent rejected material, shall be preserved for 14 days from date of test report. In case of dissatisfaction with results of tests, the manufacturer may make claim for a rehearing within that time.

Journal Bearing Key. See JOURNAL BOX WEDGE.

Journal Bearing and Wedge Gages. Journals, 3¾ by 7, 4¼ by 8, 5 by 9 and 5½ by 10 inches. Standard. Sheet M. C. B. 14. Fig. 2943.

In 1900 gages for journal bearings and wedges for journals 5 by 9 inches and 5½ by 10 inches were adopted as standard.

In 1903 gages for journal bearings and wedges for journals 3¾ by 7 inches and 4¼ by 8 inches were advanced from recommended practice to standard. They are shown on Sheet M. C. B. 14.

Journals, 6 by 11 inches. Standard. Sheet M. C. B. 14-A. Fig. 2942.

In 1913 gages for journal bearings and wedges for

journals 6 by 11 inches were adopted as Recommended Practice.

In 1914 these gages were advanced to Standard and shown on Sheet M. C. B. 14-A.

In 1916 the journal bearing gage for 6 by 11 inch journal bearing was changed to provide additional clearance between journal bearing and stop lug.

Journal Boxes and Details (M. C. B. Standard). Figs. 2923-2943. (M. C. B. Sheet 1—14A.).

The journal box and details as shown in these drawings were adopted as standards of the Association, by letter ballot, in 1893, and revised in 1894 and 1896. For former action, see Proceedings 1874, page 40; Proceedings 1881, pages 14, 15 and 27.

The revision made in 1894 consisted in correcting the drawing at the top of the journal box, and in leaving off the lugs at sides of arch bars. Also in changing the wedge and bearing so as to make the latter flat on top instead of curved, as theretofore, and in curving the top of the wedge, thus making this construction similar in general arrangement to the standard forms for the 4¼ by 8 inch journal box.

The revision made in 1896 consisted in the elimination of the dust guard from Sheet 1, and the addition of notes providing that any suitable dust guard might be used, and that a rivet or nut might be used instead of the cotter, if preferred, in the hinge pin of the lid. Also in the addition to Sheet 3 of a similar note to the latter, and of notes concerning the lid spring and the wedge. At the same time the side lugs on the brass were increased so as to measure 1⅛ inches long instead of 1 inch long as they were formerly.

One additional note was made on Sheet M. C. B. 1 and two additional notes on Sheet M. C. B. 2 in 1898.

In 1899 the size of bolt hole was increased from 1 inch to 1 1-16 inches.

In 1905 the addition of a rib ⅜ inch deep on the back face of the lid immediately within the inside of the oil box was adopted.

In 1908 a dimension of 3-16 inch was shown, it being the distance from the center line of bolt hole to inside bearing face of lid.

In 1915 a hole was added to the front flange of wedge to facilitate removal by the use of a packing hook.

In 1915 the arc recess on each side of the wedge was made optional.

In 1916 note was added to Sheet M. C. B. 3 requiring bearings to be marked as called for in M. C. B. specifications.

In 1917 the arc recess on each side of wedge was omitted.

Journals, 4¼ by 8 inches. Sheets M. C. B. 4, 5, 6.

The journal box and details as shown in these drawings were adopted as standards of the Association, by letter ballot, in 1893, and revised in 1896. For former action see Proceedings 1891, pages 142-144.

The revision made in 1896 consisted in the elimination of the dust guard from Sheet 4; also, in removing the arch bar seat lugs from Sheets 4 and 5, and making the arch bar seat 4½ inches wide. Also, in the addition to Sheet 4 of notes providing that any suitable dust guard might be used, and that a rivet or nut might be used instead of a cotter, if preferred, in the hinge pin of the lid. Also, in the addition to Sheet 6 of a similar note to the latter, and of notes concerning the lid spring and the wedge. At the same time the side lugs on the brass were increased so as to measure 1⅛ inches long instead of ¾ inch long as they were formerly.

One additional note was made on Sheet M. C. B. 4 and two additional notes on Sheet M. C. B. 5 in 1898.

The revision in 1901 consisted of cutting out entirely the inner dust guard wall at the top.

In 1905 the addition of a rib ⅜ inch deep on the back face of the lid immediately within the inside of the oil box was adopted.

In 1908 the inside dust guard was restored at the top and joined to the inside side wall with an opening of 2¾ inches radius, the center being located one inch above the horizontal center line of the box.

In 1908 the distance from center line of box to edge of wedge stop was increased from 4⅝ inches to 4 11-16 inches to allow ⅛ inch clearance between wedge and stop.

In 1909 the vertical clearance of 1-16 inch between the side lugs on the journal bearing and the journal wedge was increased to ⅛ inch, to conform with the other standard journal boxes, the side lugs being reduced from ⅞ inch to 13-16 inch.

In 1915 a hole was added to the front flange of wedge to facilitate removal by the use of a packing hook.

In 1915 the arc recess on each side of the wedge was made optional.

In 1916 note was added to Sheet M. C. B. 6 requiring bearings to be marked as called for in M. C. B. specifications.

In 1917 the over-all width of journal bearing was increased to 4⅜ inches.

In 1917 the arc recess on each side of the wedge was omitted.

Journal, 5 by 9 inches. Sheets M. C. B. 7, 8 and 9.

The journal box and details shown in these drawings were adopted as recommended practice in 1896. In 1898 they were adopted as standards of the Association.

In 1900 the opening at the back end of box, corresponding with the dust guard, was increased from 3 3-16 inches to 3⅜ inches radius, making the opening 6¾ inches wide instead of 6⅜ inches, the height remaining unchanged.

The revision in 1901 consisted of cutting out entirely the inner dust guard wall at the top.

In 1902 the wedge stop lugs were increased in size and extended laterally to the sides of box.

In 1905 the addition of a rib ⅜ inch deep on the back face of the lid immediately within the inside of the oil box was adopted.

In 1907 the inside dust guard was restored at the top and joined to the inside side wall with a 3-inch radius, with the center located 1 inch above the horizontal center line of the box. The opening in the outside wall was enlarged at the side and struck with a 4-inch radius all around. The distance from the center of the box to the inside of the lug for the journal bearing key located in the top wall of the box was increased to 5 3-16 inches. The width of the inside side lugs for the journal bearings was decreased to 2⅝ inches.

In 1908 the center of box from which the lower half of the circle is struck was raised ¼ inch, increasing the depth to 1⅝ inches.

In 1909 the vertical clearance of 1-16 inch between the side lugs of journal bearing and wedge was increased to ⅛ inch, to conform to the other standard boxes, the side lugs being reduced from 1⅛ to 1 1-16 inches.

In 1909 the dust-guard opening in this box was modified, and words "cast steel" were omitted from the drawing of the wedge.

In 1912 the wedge was changed in design to provide increased bearing surface against side lugs.

In 1913 the distance from inside face of lid to center of pin hole was changed from 9-32 inch to 5-16 inch.

In 1914 the reference to skeleton wedge was omitted on Sheet M. C. B. 9 and note changed to read "Wedge shall be malleable iron or steel."

In 1915 a hole was added in the front flange of wedge to facilitate removal by the use of packing hook.

In 1915 the arc recess on each side of wedge was made optional.

In 1916 the legend "M. C. B." was shown in relief on side of box.

In 1916 note was added to Sheet M. C. B. 9 requiring bearings to be marked as called for in M. C. B. specifications.

In 1916 the lateral clearance between axle and inside wall of box, measured on horizontal center line, and also the normal clearance between vertical edge of dust guard and wall of box were changed.

In 1917 the arc recess on each side of the wedge was omitted.

Journals 5½ by 10 inches. Sheets M. C. B. 10, 11 and 12.

The journal box and details shown in these drawings were adopted as standard in 1900.

In 1901 the inner dust-guard wall at the top was cut out entirely to avoid all danger of the journal bearing striking the wall of the box at the rear.

In 1902 the wedge stop lugs were extended laterally to the sides of box.

In 1903 the radius of the dust-guard opening was changed to 3⅜ inches, and the diameter to 7¼ inches to allow proper play for the wheel fit.

In 1905 the addition of a rib ⅜ inch deep on the back face of the lid immediately within the inside of the oil box was adopted.

In 1907 the inside dust guard was restored at the top and joined to the inside side wall with a 3-inch radius located 1½ inches above the horizontal center line of the box. The opening in the outside back wall was enlarged at the side and struck with two 4-inch radii, the lower one-half having its center line on the center line of box, the center of the upper one-half being ¼ inch above the center line of the box. The distance from center of the box to the inside of the lug for the journal box key was increased to 5 11-16 inches. The width of the inside side lugs for journal bearings was decreased to 2⅝ inches.

In 1908 the distance from center line of box to face of wedge stop was increased from 5 11-16 inches to 5¾ inches, thus allowing ⅛ inch clearance between wedge and stop.

In 1908 the note reading "the total lateral [extreme positions of axle] equals ¼ inch." was eliminated.

In 1909 the word "malleable" was stricken out and the words "drop-forged" substituted for journal bearing wedge.

In 1911 the use of pressed or cast steel for journal box was authorized and reduction in thickness of metal and coring to lighten weight permitted, provided that the essential dimensions affecting interchangeability and the fitting of contained parts are adhered to.

In 1911 the notes on Sheet M. C. B. 11 referring to placing of letters "M. C. B." on top of box was changed from "arch bar seat" to "seat of truck sides."

In 1912 the wedge was changed in design to provide increased bearing surface against side lugs.

In 1913 the distance from inside face of lid to center of pin hole was changed from 9-32 inch to 5-16 inch.

In 1914 the reference to skeleton wedge was omitted on Sheet M. C. B. 12 and the note changed to read "Wedge shall be drop-forged or steel."

In 1915 a hole was added in the front flange of wedge to facilitate removal by the use of packing hook.

In 1915 the arc recess on each side of wedge was made optional.

In 1916 the lateral clearance between axle and inside wall of box, measured on horizontal center line, and also the normal clearance between vertical edge of dust guard and wall of box were changed.

In 1916 the legend "M. C. B." was shown in relief on side of box.

In 1916 note was added to Sheet M. C. B. 12 requiring bearings to be marked as per M. C. B. specifications.

In 1917 the over-all width of journal bearing was increased to 5⅜ inches.

In 1917 the arc recess on each side of the wedge was omitted.

Journals, 6 by 11 inches. Sheets M. C. B. 12-A, 12-B and 12-C.

The journal box and details shown in these drawings were adopted as Recommended Practice in 1913.

In 1914 the journal-box lid key was changed to conform with the key shown for the 5½ by 10 inch box.

In 1914 the journal box and details were advanced to Standard and shown on Sheets 12-A, 12-B and 12-C.

In 1915 the arc recess on each side of wedge was made optional.

In 1916 the legend "M. C. B." was shown in relief on side of box.

In 1916 note was added to Sheet M. C. B. 12-C requiring bearings to be marked as per M. C. B. specifications.

Journal bearing and wedge changed to provide ⅛-inch clearance, instead of 1-16-inch clearance, between journal bearing and stop lug.

Stop lug on box changed to provide ⅛ inch, instead of 3-16 inch between the end of the wedge and the wedge stop on the box.

The dimension 1 9-16 inches in the journal box lid from the center line of the hinge pin to the outside of the bulge was omitted and the thickness of the hinge pin key shown.

In 1916 the lateral clearance between axle and inside wall of box, measured on horizontal center line, and also the normal clearance between vertical edge of dust guard and wall of box were changed.

In 1917 the arc recess on each side of the wedge was omitted.

Journal Box and Contained Parts, Passenger Car. Standard. Sheet M. C. B. 13. Fig. 2941.

For Journals 4¼ by 8 inches.

In 1898 a Recommended Practice was adopted for passenger car journal box and contained parts for journals 4¼ by 8 inches. In 1901, as a result of letter ballot, this was changed to Standard, and is now shown on Sheet M. C. B. 13.

In 1917 the arc recess on each side of the wedge was omitted.

Journal Box and Contained Parts, Passenger Car. Standard. Sheet M. C. B. 8-A. Fig. 2933.

For Journals, 5 by 9 inches.

In 1911 the mouth and dust guard opening was changed to conform to similar journal box for freight car, and advanced to standard.

Journal Box. Figs. 1036-1070, 2804; Pages 1182, 1191, 1204, 1217, 1229, 1262, 1275, 1293. A metal box or acse which incloses the journal of a car axle, the journal bearing and key, and which holds the packing for lubricating the journal. Also called an axle box, car box, grease box, housing box, oil box, and pedestal box. British, usually axle box.

Journal Box Bolts. The bolts on either side of the journal box which secure it between the arch bars and the pedestal tie bar.

See Arch Bars, Column and Journal Box Bolts. (M. C. B. Standard.)

Journal Box Cover. See Journal Box Lid.

Journal Box Cover Bolt. A bolt used to fasten covers which have no hinge, to the box.

Journal Box Gages. Journal, 6 by 11 inches. Recommended Practice. Sheet M. C. B.—M. Fig. 3050.

Gages for 6 inch by 11 inch journal boxes were adopted as Recommended Practice in 1913. Instructions governing the use of the gages are as follows:

GAGE NO. 1—INSIDE GAGE

Dimension "A" gives minimum dust guard opening and minimum width for front of box. Dimensions "B" and "D" give maximum and minimum width between inside lugs or bearing stops. Dimension "E" gives exact distance between outer edge of lug or bearing stop and wedge stop and allowable variation in this distance is provided for by the slots "H" and "J," which fit over the walls at back of box or dust guard opening, these slots being ⅛ inch wider than walls, allowing 1-16 inch play each way, maximum allowance.

GAGE NO. 2—JOURNAL BOX BOLT HOLE GAGE

Dimension "O" is the exact distance between centers of journal box bolt holes, and dimension "Q" is size of the plugs, being 1-16 inch smaller than holes in box, thus allowing for a variation of ⅛ inch. Boxes are not to be accepted if plugs will not enter bolt holes. Boxes not to be accepted if wider than dimension "N," or do not have radius "P" to conform to truck frame.

GAGE NO. 3—DUST GUARD GAGE

The dust guard opening or slot must allow this gage to enter all the way. The dimension "T" is made of such width that the line "M-N" will not be above the bottom of dust guard opening.

GAGE NO. 4—OUTSIDE ALIGNMENT GAGE

This gage determines the relation between inner and outer center lines of box and is used in conjunction with Gage No. 1. The application being as follows: The plugs "Q" of Gage No. 4 are placed in bolt holes and points "M" and "R" extending over back end of box. Gage No. 1 is placed on the inside of box, through the dust guard opening. A normal box will show the point "M" of Gage No. 4 centrally located in slot "L" of Gage No. 1. The distance "K" of both gages coincides. The dimension of slot "L" allows for longitudinal variation of ⅛ inch, also points "R" allow for ⅛ inch variation in width at back of box. These points must go over all boxes accepted. The maximum amount, out of alignment, between inside and outside centers of box is ⅛ in.; that is, the point "M" of Gage No. 4 must not extend on either side of slot "L" of Gage No. 1 by more than this amount.

GAGE NO. 5—BOLT HOLE HINGE LUG GAGE

This gage is placed on the surface of lid opening and the location of holes in hinge lug must be such as to allow the plug points "X" to enter holes, the necessary variation to be allowed being provided for in the diameters "S" of same.

Journal Box Guide. See Pedestal.

Journal Box Jack. See Journal Jack.

Journal Box Lid. Figs. 1036-1070, 2804; Pages 1182, 1191, 1205, 1229, 1293. A door or lid covering an opening in the end of the journal box, by means of which oil and packing are supplied and journal bearings are inserted or removed. Such covers are made of cast iron, malleable iron, pressed steel and sometimes of wood. They are usually held closed by a spring.

Journal Box Lid Spring. Figs. 1042-1070, etc. A spring to hold the lid in place.

Journal Box Wedge. Figs. 1048-1065; Pages 1195, 1285, 1302. A device used to hold the journal bearing in place, to distribute the load evenly over the bearing and to allow it to be removed easily. Also called a journal box key. See Journal Boxes and Details.

Journal Brass. A Journal Bearing.

Journal Cooler. Fig. 2027.

Journal Jack. A small jack used for relieving the weight from car journals for the purpose of changing bearings or brasses. See Jack.

Journal Packing. Page 1174. Machined threads of wool or cotton or mixtures of these into which is incorporated mechanically curled vegetable fiber, usually cocoanut fiber, to impart to the product an elasticity not possessed by wool or cotton threads. See U. S. R. R. Spec. A-94.) The material is placed in a journal box so that it comes in contact with the lower half of the journal. Sometimes called packing or dope.

Journal Packing Guard. Fig. 1063, 1064. A device to keep journal packing in place.

Journal Spring. A spring supporting part of the weight of a car which is placed directly over the journal, and which usually rests on the journal box under the truck frame.

Jumper. Fig. 2518. A short conductor cable used to connect two electric circuits.

Jute. A course fiber raised in India for making bags, matting, ropes, etc.

K

Kalamined Iron. Sheet iron, coated with an alloy of zinc, lead, tin and nickel in the proportion of 29 lbs. of tin, 50 to 75 lbs. of zinc, 100 lbs. of lead, and three to six ounces of nickel. The alloy melts at a lower temperature than common zinc, and is claimed to give a more durable compound as well as a thinner and more adhesive coating. Galvanized iron is sheet iron coated in the same way with pure zinc.

Keeper. A ring, strap, pocket, or the like device for detaining an object as

The box on a door jamb into which the bolt of a lock protrudes when shut. When the keeper is for a beveled latch bolt, which is moved by contact with it, it is more commonly called a strike plate. They are also further designated by the name of the lock or latch which they accompany. See illustrated section on Locks.

The latch of a hook, which prevents its accidental disengagement.

Key. In general sense, a fastener; that which fastens; as a piece of wood in a frame of a building. Hence a pin inserted in a hole in a bolt, and used to secure the bolt or its nut. A split key is a special form.

An instrument for opening or shutting a lock by pushing the bolt one way or the other.

A block over the top of a journal bearing, called in full JOURNAL BEARING KEY. This part is also commonly called a wedge.

A beveled bar used with a gib to form a gib and key. See also KING BOLT KEY.

Fig. 2249. (For Lamps and Valves of Pintsch Gas Apparatus.) A substitute for the ordinary cocks of gas fixtures to prevent unauthorized tampering.

Key Bolt. A bolt slotted near the end to receive a key, which takes the place of a nut.

Key Hole Plate. An escutcheon plate.

Key Pin (of a Lock). The pivot on which the key turns when inserted in the lock.

Key Ring Tire Fastening. A mode of securing the tire to the wheel, composed of two rings, one of U-section and the other nearly rectangular. The former ring holds the tire and wheel together, and the latter ring holds the former in place, filling up the groove in the tire. When both rings are in place the outer lip of the groove in the tire is slightly hammered over, thus gripping the second or key ring, and retaining it in place.

Key Slot. (M. C. B. Standard.) In 1910 the key-slot dimensions in the coupler butt were modified, making it available for use on all standard sizes of coupler butts.

In 1910 a recommendation was adopted that coupler manufacturers use a key 5 by 1⅛ inches as a gage in order to secure correctness and uniformity in the size of the key slot.

In 1911 design of key slot in coupler shank was changed.

In 1918 details of 1½ by 6 in. key slot were adopted as Standard for 6 by 8 in. shank, as shown on Sheet 23-B.

Kicker. See COUPLER KNUCKLE KICKER.

Kicking Coil. A coil of wire consisting of about ten turns wound on a wooden core; it is located in the feed circuit between the lightning arrester and controller, and acts as an inductive resistance to the passage of lightning discharge through the apparatus. See LIGHTNING ARRESTER.

Kilowatt. One thousand watts.

King Bolt or **King Pin.** See CENTER PIN.

King Post (of a Truss). A single post or distance piece between a truss rod and the chord of a truss or beam. If two such posts are used they are called queen posts.

Kitchen (Dining Car). A large compartment at one end of the car provided with all the facilities of a well-organized kitchen. For ranges and other equipment, see Figs. 1708, etc.

Kitchen Car. A combined day coach and dining car for use on trains where a regular dining car could not be profitably run. More commonly Cafe Car or Cafe Coach.

Knee Iron. An L-shaped or angle iron casting or forging which is fastened to the corner where two timbers are joined to strengthen the joint.

Knuckle (M. C. B. Couplers). Figs. 650, 655; Pages 1182, 1126, 1227. The rotating coupling hook by means of which coupling is effected when the knuckle is locked by the catch or lock. It must conform to certain contour lines adopted by the M. C. B. Association.

(Of a Hinge.) The central tubular projections which carry the hinge pin. The term is of wide and general application in mechanics to many similar parts.

Knuckle (M. C. B. Standard Specifications). See AUTOMATIC CAR COUPLERS, SPECIFICATIONS.

Knuckle. (M. C. B. Standard.) In 1899 the vertical dimension of the knuckle was fixed at 9 inches as a minimum.

In 1903 the solid knuckle was adopted as a standard of the Association to be used for all repairs and in all new couplers after January 1, 1904.

In 1907 a limiting dimension of not more than 1 inch was shown for the diameter of core hole in lug of knuckle to prevent a recurrence of the slotted knuckle weakness.

In 1916 the "D" coupler, as shown on M. C. B. Sheet 23 was adopted as Standard.

Knuckle, Contour Line and Limit Gages. See COUPLER AUTOMATIC CAR.

Knuckle Emergency. See EMERGENCY COUPLER KNUCKLE.

Knuckle Joint. A joint in which a projection on each leg or leaf of a device is inserted between corresponding recesses in the other, the two being connected by a pin or pivot on which they mutually turn. The legs of dividers and the leaves of door hinges are examples of true knuckle joints. The term, however, has been somewhat commonly restricted to compound or universal joints designed to act in any direction.

Knuckle Kicker. See COUPLER KNUCKLE KICKER.

Knuckle Lock. See COUPLER KNUCKLE LOCK.

Knuckle Opener. See COUPLER KNUCKLE OPENER.

Knuckle Pin (M. C. B. Coupler). Figs. 650-692; Page 1285. The steel pin holding the knuckle in the jaws of the coupler. Sometimes called pivot pin.

Knuckle Pin Plate. Used in connection with three-stem coupler.

Knuckle Pivot Pin. (M. C. B. Standard.) In 1899 the sizes of pivot pins were fixed as follows:

1½ inches or 1⅝ inches in diameter and 13½ inches from the under side of head to center of pin hole for ⅜-inch cotter.

In 1904, as a result of the letter ballot, the note in the lower left-hand corner of Sheet M. C. B. 11, relating to pivot pins, was changed to read as follows:

"Pivot pin must be of steel, 1⅝ inches in diameter, of sufficient length to permit applying a ⅜-inch cotter pin below the coupling lug."

In 1916 the "D" coupler, as shown on M. C. B. Sheet 23 was adopted as Standard.

Knuckle Pivot Pins, Specifications for Heat-Treated, for Passenger and Freight Equipment Cars. (M. C. B. Standard.) Adopted as Recommended Practice in 1914; advanced to Standard in 1917.

I. MANUFACTURE

1. *Process.*—The steel shall be made by the open-hearth process.

2. *Heat Treatment.*—The pins shall be properly heat-treated to meet the requirements of the physical tests.

II. CHEMICAL PROPERTIES AND TESTS

3. *Chemical Composition.*—The steel shall conform to the following requirements as to chemical composition:

Carbon	0.55—0.70	per cent.
Manganese, not over	0.60	"
Phosphorus, not over	0.05	"
[illegible]	[illegible]	"

4. *Ladle Analysis.*—An analysis shall be made by the manufacturer from a test ingot taken during the pouring of each melt to determine the percentage of carbon, manganese, phosphorus, sulphur and silicon. Drillings for analysis shall be taken not less than ¼ in. beneath the surface of the test ingot. A copy of this analysis shall be given the purchaser or his representative. This analysis shall conform to the requirements specified in Section 3.

5. *Check Analysis.*—A check analysis shall be made from the finished material representing each melt, by the purchaser or his representative, and shall meet the requirements specified in Section 3.

III. PHYSICAL PROPERTIES AND TESTS

6. *Drop Tests.*—This test shall be made on a standard M. C. B. drop-test machine (see Plate 29-D), the pins resting on rounded supports held rigidly 10 in. center to center, shall be subjected to one blow by a 1640-lb. tup dropping from a height of 3 ft., or a 2240-lb. tup dropping from a height of 2¼ ft., and shall show a deflection of not less than 15 degrees or more than 30 degrees, without cracking or breaking.

7. *Number of Tests.*—The manufacturers shall furnish, free of charge, one extra pin with each lot of 200 or less.

IV. PERMISSIBLE VARIATIONS

8. *Permissible Variations.*—The diameter of the pins shall conform to the standard M. C. B. limit gages for rounds. The length shall not vary more than ⅛ in. below or above that specified.

V. FINISH

9. *Finish.*—The finished pin shall be straight, have a smooth surface, be uniform in diameter and shall not be painted.

VI. MARKINGS

10. *Markings.*—The manufacturer's name or identification marks shall be stamped on the head of each pin.

VII. INSPECTION AND REJECTION

11. *Inspection.*—(a) The inspector representing the purchaser shall have free entry, at all times while work on the contract of the purchaser is being performed, to all parts of the manufacturer's works which concern the manufacture of the material ordered. The manufacturer shall afford the inspector, free of costs, all reasonable facilities to satisfy him that the material is being furnished in accordance with these specifications.

(b) The purchaser may make the tests to govern the acceptance or rejection of the material in his own laboratory or elsewhere. Such tests, however, shall be made at the expense of the purchaser.

(c) All tests and inspection shall be so conducted as not to interfere unnecessarily with the operation of the works.

12. *Rejection.*—Material which, subsequently to above tests at the mills or elsewhere, and its acceptance, develops weak spots, cracks or imperfections, or is found to have injurious defects, will be rejected and shall be replaced by the manufacturer at his own expense.

13. *Rehearing.*—Samples tested in accordance with this specification, which represent rejected material, shall be preserved for 14 days from date of test report. In case of dissatisfaction with results of tests, the manufacturer may make claim for a rehearing within that time.

Knuckle Throw. (M. C. B. Standard.) In 1905 the following Recommended Practice was adopted: That the use of a knuckle-throwing device which will throw the knuckle completely open and operate under all conditions of wear is favored by the Association. Advanced to Standard in 1910.

In 1916 the "D" coupler, as shown on M. C. B. Sheet 23 was adopted as Standard.

L

Label. See AIR BRAKE HOSE, LABEL FOR.

Label Box (Postal Car). Fig. 2907. A small box in which the labels for letter pouches are carried.

Ladder. 24, Figs. 210, 211; 23, Fig. 260; Figs. 960, 962, 964, 966; Page 1315. Bars of wood or iron attached to the side or end of a freight car or caboose so as to form steps by which persons may climb to and from the top of the car. The individual bars, whether of wood or iron, and whether round or square, are termed ladder rounds. They are sometimes fastened at their ends to ladder side rails. The handles alongside of the ladder are termed grab irons, or hand holds, or sometimes corner handles; the one placed on the roof near the ladder is called the roof grab iron or ladder hand rail. See SAFETY APPLIANCES and UPPER BERTH LADDER.

Ladder Bolt. A bolt designed especially for securing the ladder rounds at the corner post when two rounds are directly in line on the side and end of the car.

Ladder Round. 31, Figs. 34, 35. A round cross bar or step of a ladder. See SAFETY APPLIANCES.

Ladder Side Rails. The vertical side pieces to which the ladder rounds are attached.

Lag Screw. An iron bolt with a square or hexagonal head, and with a wood screw thread cut on it, intended to screw into wood.

Lamp. See Alcove Lamp, Argand Lamp, Berth Lamp, Caboose Deck Lamp, Deck Lamp, Electric Lamp, Gas Lamp, Oil Lamp, Side Deck Lamp, Tail Lamp.

Lamp Alcove. A metal casing or lining for a recess in the side of a car to contain an alcove lamp.

Lamp Arms. Rods by which a lamp is attached to the ceiling of a car. Some lamp arms have bracket angles to support the shade, and are then called bracket arms.

Lamp Bottom. The lower portion of a lamp which is removable. Contains the wick, burner and oil.

Lamp Burner. That portion of a lamp by which the opening on the top of the reservoir is closed, which holds the wick, and by which the latter is adjusted. In gas lighting, the burner is the tip where the gas escapes and is ignited. See Burner.

Lamp Canopy. A large and elaborate Smoke Bell.

Lamp Chimney. A glass tube which incloses the flame of a lamp, conducts away the smoke and gases and produces the necessary draft.

Lamp Chimney Bracket. A projecting metal arm attached to the side of a car and carrying a chimney holder, by which a lamp chimney is held in place.

Lamp Chimney Reflector. Usually a reflector with a hole in the center in which the chimney is inserted.

Lamp Fount. The receptacle for the oil burned in a lamp. Also called lamp reservoir.

Lamp Globe. Figs. 2351, etc. A glass or porcelain case or vessel inclosing or surrounding the flame of a lamp or candle, and intended to protect the latter from wind. Lamp globes are approximately globular in form, in distinction from a lamp shade, which flares at the bottom, but are often made of different shapes, as round, pear-shaped, etc.

Lamp Globe Chimney. A metal tube attached to the top of a lamp globe for conducting away the smoke. A shade cap is an equivalent device for a lamp shade.

Lamp Hoop. A ring with an interior screw thread for attaching to cheap oil lamps to receive the burner.

Lamp House Hinge. Figs. 1994, 1996.

Lamp Jack. Page 1181. A cap or covering over a lamp vent on the outside of a car to exclude rain and prevent downward currents of air.

Lamp Key (Gas). Fig. 2249. A substitute for the ordinary cock of gas fixtures, used to prevent unauthorized tampering with the burners.

Lamp Panel. Figs. 2508, etc.; Page 1257. A small switchboard placed generally in some locker of an electrically lighted car, upon which are mounted switches for controlling the lamps and ventilating fans.

Lamp Reflector. Figs. 2347, etc.

Lamp Regulator (Electric Lighting). Figs. 2472, 2484. etc.; Pages 1167, 1257, 1295. An automatic electrical device for maintaining constant voltage upon the lamps or, more popularly expressed, a device for insuring the constant brilliancy or candle power of the lamps. The lamp regulator is usually mounted underneath the car body where the heat which is dissipated in it may be easily taken care of and radiated. The lamp regulator may be of the rheostatic or counter electro motive force type. As a rheostatic device it varies resistance in series with all the lamps, responding to variations in lamp voltage and having a tendency toward maintaining constant lamp voltage. If it is of the counter electro motive force type, it acts in the same way as far as the lamps are concerned, but varies a counter electro motive force in series with the lamps instead of varying a resistance. In either case, the lamp regulator is governed by an auxiliary relay or equivalent device, generally placed inside of the car with the other electrical apparatus. See Electric Lighting.

Lamp Regulator Relay (Electric Lighting). An automatic and very sensitive electrical device for controlling the action of the lamp regulator. Such device must be very sensitive in operation and robust enough in construction to withstand railway service. It is generally enclosed for protection against dust and accident, but when once adjusted should not require attention for long periods.

Lamp Reservoir. See Lamp Fount.

Lamp Shade. Figs. 2347, etc.; Page 1118. A conical shaped reflector placed over a lamp to reflect the light downward.

Lamp Socket. A socket which holds an electric lamp. A bracket for supporting a tail lamp. See Signal Lamp Socket.

Lamp Stay. A horizontal bar, usually reaching from side to side of the clere-story, by which a car lamp is steadied, and also made more ornamental.

Lamp Switch (Electric Lighting). A switch for controlling the lamp circuit of the car and which, by opening or closing, turns off or throws on all of the lights. This switch is generally mounted on or near the lamp panel.

Lamp Vent. An opening in the roof through which the gases from a lamp escape.

Lantern. Figs. 2212-2238; Pages 1163, 1185. A portable lamp the flame in which is protected from wind and rain by glass, usually in the form of a globe surrounded by wires, called guards. According to the number of these wires the lantern is called single, double or triple guard. The conductor's lantern is one with a large bail or handle, so as to be carried on the arm, leaving both hands free.

Lantern and Flag Holder. Figs. 2231, etc. A device for displaying signals on rear of trains. See Marker Bracket.

Latch. Figs. 1797-1846. The primary sense of this word is—to catch, to close, stop, or make fast; hence, an attachment to a door, window, etc., to hold it open or shut, is called a latch. The ordinary distinction between a latch and a lock is that a lock is closed and opened with a separate key, and usually has a square bolt; whereas, a latch has no separate key, and usually has a beveled bolt which snaps shut automatically by contact with the keeper or strike plate. The most exact distinction between a latch and lock seems to be the form of the bolt, and not the use or disuse of a key. See Sash Lock. Latches named from the use which they subserve are the following: Berth Latch, Deck Sash Latch, Safety Berth Latch, Spring Door Latch, etc.

A sliding door latch, or lift latch, has a beveled hook instead of a beveled bolt, but operates upon substantially the same principle. Nearly all forms of latches are spring latches. A night latch is a large and carefully made form of an ordinary latch, which can be opened from the outside by a key. A cupboard latch is any form of small latch. A rim latch, like a rim lock, is one attached simply to the inside of the door, in distinction from a mortise or rabbeted latch (both rarely used), which is boxed into the door.

Lateral Motion (Truck). Figs. 987, etc.; Pages 1275-1277. A movement sidewise. Rollers between the journal box and spring seat provide for this on pedestal trucks.

Lateral Motion Spring. A spring sometimes used to check lateral motion in trucks.

Lavatory. A room provided with washbowl, towels, combs, brushes, etc., in which passengers may make their toilet. Parlor and sleeping cars are provided with separate lavatories for men and women, which are separated from the saloons. The best and most modern coaches have a lavatory. A saloon is sometimes termed a lavatory. The term is also used in a more restricted sense to designate the wash basins and their equipment or the basin for dental purposes, which is termed a Dental Lavatory. See WATER SUPPLY and FOLDING LAVATORY.

Lead. See RED LEAD.

Lead-Lined Journal Bearing. A journal bearing which has its inner surface covered with a thin layer of lead, so that it may fit itself to the journal as soon as subjected to wear.

Leader (of Pile Driver). The long vertical timbers serving to guide the hammer in its fall.

Leader Cap (Pile Driver). A cross piece connecting the two leaders at the top and carrying the main sheave and pile hoisting sheave of the hoisting gear.

Leader Stay. An oblique diagonal brace, attached at the upper end to top stringers, serving to stiffen the leaders.

Leakage Groove (Air Brake Cylinder). A small passage past the brake piston to prevent application of the brakes by trifling leakages of air.

Leatheroid. A substance somewhat resembling leather, and somewhat similar to vulcanized fiber in its general character and appearance. It is made by treating paper with sulphate of zinc.

Leg Rest (Reclining Seats). A bracketed and adjustable shelf, which may be used on a chair seat to support the limbs when the seat or chair is in a reclining position. It is adjusted by a leg rest ratchet and leg rest pivot casting, or by a leg rest slide fitting in a leg rest socket casting.

Lens. An optical instrument for conveying rays of light upon a fixed path or fixed point. See FRESNAL LENS.

Letter Board (Passenger Equipment Car Exteriors). A horizontal board under the cornice, extending the whole length, on which the name of the company to which the car belongs is usually painted. The letter board occupies the frieze of the car, and is sometimes so called.

Letter Case (Postal Car). Figs. 2909, etc. Used for the distributing of letters.

Letter Drop (Postal Car). Fig. 2910. A plate with a spring flap for receiving letters for the post. A letter box lid.

Letter Drop Chute (Postal Car). Fig. 2910. The chute extending from the letter drop on the outside of a postal car to the floor inside of the car.

Lettering Cars (M. C. B. Standard). Sheets 26-26B. Figs. 2995, 2998, 3000.

In 1896 it was decided:

That on all box cars standing more than twelve (12) ft. from top of rail to eaves, the height and width at eaves be stenciled in 3-in. letters on side of car, as near the bottom as convenient.

That all classes of cars have size of coupler, style of rear attachments, kind of draft gear and style of brake beams stenciled in 2 or 3-in. letters on each side of car at opposite ends, or on each end of car directly above coupler, where design of car permits it. Where the kind of draft gear implies the style of rear attachments, the marking for the latter may be omitted.

That where the construction of the truck permits, trucks shall be stenciled on each side, giving the size of journal, and the letters "M. C. B." if the axle is M. C. B. standard axle. If the axle is not M. C. B. standard, use dimensions from center to center of journal in place of M. C. B. This stenciling to be in 1 or 2-in. letters, and to be put on end or side of bolster in Diamond trucks, and on side truck frame in center on pedestal type of trucks.

Initials of the road should also appear in letters 1 or 2 in. high on one side of bolster or transom of each truck.

In 1901 this was changed from Recommended Practice to Standard, as a result of letter ballot. Modified in 1906 by the elimination of fractional sizes of figures and letters. Modified in 1908 and 1909.

As a result of a special letter ballot in March, 1906, certain sized letters and numerals were adopted as Recommended Practice for the uniform lettering of cars, as follows:

1. That Roman letters and figures of the design shown on Sheet M. C. B. 26-B be used.
2. That the sizes of these letters and figures be confined to 1, 2, 3, 4, 7 and 9 in.
3. That 7 and 9-in. letters or figures be used for the initials, names and numbers for the sides of cars, and 4-in. letters or figures for the lettering on the doors and ends of cars.
4. That for other car-body markings on sides and ends, such as capacity, couplers, brake beams, class of car, date built, outside and inside dimensions, and markings inside of car, 2 or 3-in. letters and figures be used, with the following exceptions:

(a) All weight marks to be 3 or 4-in. letters or figures.

(b) Trust marks, patent marks and other private marks should be 1-in. letters or figures.

5. That all marks on trucks be confined to 1 or 2-in. letters or figures.
6. That stenciling on air-brake cylinders or reservoirs be 1-in. letters or figures.

In 1911 these letters and numerals were advanced to Standard.

A report will also be found in the M. C. B. Proceedings, 1913, page 558.

The first report of the committee on this subject appears in the 1908 M. C. B. Proceedings, page 258.

In 1909 the following was adopted:

1. Freight Equipment Cars that have a superstructure which will permit should be stenciled with markings on sides of car, in the following order:

Lettering (Initials or name of Road),

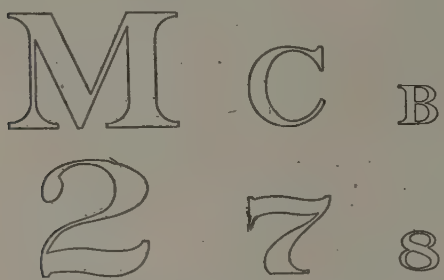
Number,

Capacity,

Light Weight.

This marking is to be located as nearly over the truck as the lettering will permit, preferably to the left of center line of side of car. On box and other house cars where doors slide to the left, the above

marking may be placed to the right of center line of side of car. On any other cars where the construction makes it necessary, this marking may be placed either to the right of center line of side of car, or in the center of side of car. The distance from the center line of coupler to the bottom of car number to be normally 2 feet 4½ inches, with a minimum dimension of 1 foot 10½ inches, and a maximum of 2 feet 10½ inches. The spacing of the remaining marking to be as shown on diagram.



The ends to show the initials or name of road, car number and light weight, in the upper half of end of car. On box or other house cars having end doors this lettering should be so located that it will not be obscured when doors are open.

In 1909 the following was adopted:

Flat and low-sided gondola cars should show the lettering (initials or name of road), number, capacity and light weight on the side of car in the best available location offered by the construction of the car. Suggestions as to the arrangement of this lettering are shown on the diagrams. When possible the sizes of lettering and figures should correspond with present Recommended Practice. The end marking on flat cars may be omitted.

Side and end doors should be stenciled with the initials or name of road either on the outside or inside of door. If placed on the inside the stenciling should be so located that it will not be defaced by the sliding of the door.

In 1909 the following was adopted:

Flat cars should be stenciled with the length of car over end sills, measured at the center. The stencil, "Length 00 ft." to be located on side of car.

Drop end gondola cars should be stenciled with length of car inside of drop end doors, measured at the center; this stencil, "Inside length 00 ft.," to be located on side of car.

In 1911 it was agreed that the "date weighed" should include the station symbol where weighed.

In 1911 designating marks for cars equipped with United States Safety Appliance Standards were adopted as follows:

For cars built on or after July 1, 1911:

UNITED STATES SAFETY APPLIANCES,
STANDARD.

For cars built prior to July 1, 1911:

UNITED STATES
SAFETY APPLIANCES.

The above markings to be used on each side of the car: letters, if stenciled, to be not less than 1 in. in height and as per M. C. B. standards for lettering for freight cars, Sheet M. C. B. 27; letters, if on a metal badge plate, to be not less than 1/16-in. and have not less than ⅛-in. bar or staff. The arrangement of the words to be as near as possible as shown above.

UNITED STATES
SAFETY-APPLIANCES
STANDARD

A metal badge plate, 3½ by 10 in., with the proper marking is preferred, one plate to be secured on each side of the car by four bolts or rivets, if on metal cars, and by four bolts or screws, if on wooden cars, the bolts, rivets or screws to be not less than ¼ in. diameter. The badge plate to be of metal as shown on above drawing.

In 1912 the minimum height of number on steel underframe gondola cars above the center line of the coupler was changed from 1 ft. 10½ in. to 1 ft. 5 in. and Sheet M. C. B.—G changed accordingly. Advanced to Standard in 1913 and shown on Sheet M. C. B. 26.

WEIGHING AND STENCILING CARS

A topical discussion on the intervals at which freight cars should be reweighed and stenciled will be found in the Master Car Builders' Proceedings, for 1900, page 61.

In 1912 the following paragraphs were incorporated under this head and the star indication added to Sheet M. C. B.—G:

"Wooden and steel underframe cars one year old should be reweighed and restenciled, the weight to be followed by one star; cars two years old should be again weighed and stenciled, the weight to be followed by two stars; cars three or more years old should be again weighed and stenciled, the weight to be followed by three stars, which will indicate final weight.

"Steel cars should be reweighed and restenciled after they have been in service twelve months, the weight to be followed by three stars, indicating final weight."

In 1913 the above method of weighing and stenciling cars was modified as follows:

"(a) Each new car must be weighed separately and the light weight, capacity in pounds,‡ station symbol and the date (month and year) must be marked thereon at the car works, under the supervision of the owner's inspector. The accuracy of the scales used must be certified to by a railroad scale inspector appointed by the car owner.

"These provisions to be incorporated in the contract covering the purchase of the equipment.

"(b) Wooden and steel underframe cars should be reweighed and remarked at least once every twelve months during the first two years the car is in service, and thereafter once every twenty-four months. All-steel cars should be reweighed and restenciled at least once every thirty-six months. A car must be clean when weighed for marking.

"The station symbol and the date (month and year) of each reweighing should be marked the same as provided for new cars in paragraph (a).

‡ *and cubical capacity, except for flat and tank cars.*

"(c) When a car is materially changed by repairs, alterations or repainting, it should be reweighed and remarked.

"(d) Any car without marking or which has not been reweighed and remarked within the prescribed period should be immediately reweighed and marked. If the car is reweighed at any time and is found to have a variation of over one per cent between the marked and the actual weight, it should be immediately remarked. When a car is remarked the car owner should be notified of the old and of the new weights with place and date. The proper officer to whom these reports should be made will be designated in 'The Official Railway Equipment Register.'

"(e) Whenever a weighmaster at a point not equipped for marking freight cars, as provided in paragraph (c), ascertains the light weight of a car which is not marked in accordance with this rule, he shall attach to car the prescribed 'Light Weight Card' with the light weight and send two copies of the card to the designated officer of the railroad on which the scale is located, one copy to be sent to the owner of the car. The presence of the Light Weight Card on the car shall be authority for remarking the car at first available station."

In 1913, in order to conform to the requirements of the American Railway Association Car Service Rule No. 11 as amended November 20, 1912, the word "new" was arranged to precede the word "weight" on Sheet M. C. B. 26.

In 1914 a note was added to Sheet M. C. B. 26 to provide that where latitudinal running board is flush with eaves, the height should be given to top of latitudinal running board.

In 1916 the following was adopted:

On tank cars the [illegible] of car and equipment markings shall be placed on the head of tank at each end of car below the initials and number.

Each tank car shall have the following stenciling, in the order given, located on each side of tank as nearly on the right-hand end thereof (when facing side of car) as the lettering will permit:

UNITED STATES SAFETY APPLIANCES—STANDARD

Or

UNITED STATES SAFETY APPLIANCES. M. C. B. CONSTRUCTION.

*Initial of car builder or owner who made inspection.	Date of inspection, month, day and year.	†Initial of railroad or company who made inspection, month, day and year.	Date of inspection, month, day and year.

SAFETY VALVES

(If car is equipped with safety valves.)

Tested ....

(Month, day and year.)

Pressure

(Lb. per sq. in.)

At

Place

By

Name of firm or railroad.

TANK

Tested

(Month, day and year.)

Pressure

(Lb. per sq. in.)

At ....

Place

By ....

Name of firm or railroad.

*For Classes [illegible] and [illegible] cars. †For Classes [illegible] and [illegible].

In 1916 the standards for marking freight equipment cars were revised.

In 1916 the following was adopted:

Tank cars shall be stenciled with the following markings on each side of tank, in the order given:

Initials and number.

Capacity in pounds.

Light weight.

This marking is to be located as nearly to the left-hand end of tank (when facing side of car) as the lettering will permit. The distance from the center line of coupler to the bottom of initials and number shall be normally three (3) ft. (6) in., with a minimum dimension of two (2) ft. (0) in. and a maximum dimension of three (3) ft. six (6) in. On each end of car each head shall be stenciled with the initials and number of car above center line of tank.

In 1917 the maximum dimension above mentioned was changed to 4 ft. 6 in.

BAGGAGE AND EXPRESS CARS

In 1917 a Standard was adopted that each baggage or express car shall have the marked capacity stenciled on the inside of the car, the stenciling to be placed over the side door on each side of the car.

Lever. In mechanics, a bar of metal, wood or other substance, turning on a support called a fulcrum. See BRAKE LEVER, UNCOUPLING LEVER, etc.

Lever Connection. See BRAKE LEVER CONNECTION.

Lever Faucet. A self-closing faucet, shut by a spring and opened by the movement of a handle or lever. Also called compression faucet. They are called vertical or horizontal according to the direction of the pipe or opening into which they are fastened.

Lever Frame (Hand Car). A wooden frame shaped somewhat like a letter A, on top of a hand car, which supports the lever shaft and lever.

Lever Frame Cap (Hand Car). A short horizontal piece of timber, to which the lever journal bearings are fastened.

Lever Frame Tie Rod (Hand Car). A vertical rod by which the lever frame cap is joined to the floor frame.

Lever Guard. A guide on a platform rail for a platform uncoupling lever.

Lever Guide. See LEVER GUARD and DEAD LEVER GUIDE.

Lever Shaft (Hand Car). A short iron shaft to which the propelling levers are attached.

Levers, Marking of. See FOUNDATION BRAKE GEAR.

Library Car. Generally a parlor or observation car equipped with a small library containing books and periodicals for the use of passengers. See CAR.

Lift. A finger hold attached to windows and window blinds to grasp in raising or lowering them. See SASH LIFT.

Lift Latch or Sliding Door Latch. Page 1310. A lock, the bolt of which is lifted by turning a knob instead of drawing it backward.

Light Inspection Car. Fig. [illegible]

Light Weight of Car, Stenciling of. See FOUNDATION BRAKE GEAR.

Lighting. See M. C. B. Sheets [illegible] and [illegible].

See ACETYLENE GAS, ELECTRIC LIGHTING, PINTSCH GAS, [illegible] LIGHTING.

Lightning Arrester. Page [illegible], etc. A device for protecting the electrical apparatus from damage by lightning.

Lignomur. A decorative head lining made from strawboard or paper, with figures stamped or embossed upon it. The figures are usually light colored, while the background is darker. It is glued to a thin narrow matched ceiling or may be applied directly to an old veneered ceiling.

Limit Gage. A term applied to many forms of gages which are used for determining whether pieces do not exceed or fall below a certain specified range of dimensions. See AUTOMATIC CAR COUPLER.

Limit Gages for Round Iron (M. C. B. Recommended Practice).

In 1893 limit gages and diameters for round iron were adopted as a Recommended Practice; these had formerly been Standard of the Association. See Proceedings 1883, pages 37 and 38, 116-118; Proccedings 1893.

In 1911 the limiting dimensions for 1½ inch and 1⅝ inch round iron were modified and limits for 1¾ inches and larger sizes added.

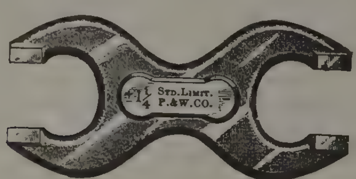


FIG. 17.

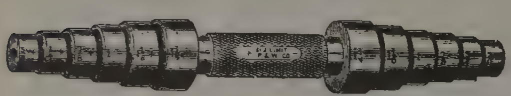


FIG. 18.

Limit gages such as shown herewith for 1¼-inch iron are recommended for use in procuring round iron to take the Sellers' standard screw threads; round iron used to be of such size as will enter the large or + end of the gage intended for that size, in any way, and also of such size as will not enter the small or — end in any way.

The limiting diameters for certain nominal sizes of iron, together with the maximum variation allowable by such use of these gages, are given in the following table:

SIZES OF LIMIT GAGES FOR ROUND IRON.

Nominal Diameter of Iron.— Inches.	Large Size, + End. Inches.	Small Size, — End. Inches.	Total Variation. Inches.
¼	.2550	.2450	.010
5/16	.3180	.3070	.011
⅜	.3810	.3690	.012
7/16	.440	.4310	.013
½	.5070	.4930	.014
9/16	.5700	.5550	.015
⅝	.6330	.6170	.016
¾	.7585	.7415	.017
⅞	.8840	.8660	.018
1	1.0095	.9905	.019
1⅛	1.1350	1.1150	.020
1¼	1.2605	1.2395	.021
1⅜	1.3860	1.3640	.022
1½	1.5115	1.4885	.023
1⅝	1.6370	1.6130	.024
1¾	1.7625	1.7375	.025
1⅞	1.8880	1.8620	.026

Round iron 2 inches in diameter and over should be rolled to nominal diameter.

Limit Gages for Inspecting Second-Hand Wheels. See WHEELS, LIMIT GAGES FOR INSPECTING.

Line Car. A short term to designate cars belonging to the various fast freight lines which run over several roads between the leading shipping points east and west.

Line Switch. Figs. 2604, etc.; Page 1177. A combination of one or two unit-switches, assembled in a case, for handling main power currents.

Lining. 29, Figs. 34, 35; 27, Fig. 260; Fig. 968. The lining which is nailed to the insides of the posts of freight, baggage and other cars. In box cars it extends half way up only, to the girth. Inside lining becomes sometimes inside sheathing when it is carried up to the roof, and is the only sheathing for the car, the frame being left exposed.

See SIDING, FLOORING, ROOFING AND LINING; also LUMBER SPECIFICATIONS.

Lining for Outside-Framed Cars (M. C. B. Recommended Practice). M. C. B. Sheet 27. Fig. 2997.

In 1913 a section for lining for outside-framed cars was adopted as Recommended Practice.

In 1915 two additional sections, 1½ in. and 1¾ in. thick, respectively, were adopted.

Revised in 1917 and advanced to Standard.

Lining Strips. Wooden or metal strips put on the inside of freight or baggage cars to protect the inside of the car from being injured by freight or baggage.

Lining Stud. Vertical studs placed between the posts and over or under the braces, and to which the lining is nailed. See NAILING STRIP.

Link. A short connecting piece, of circular or other equivalent shape; as one of the oval rings for divisions of a chain."

Link Hanger. A Swing Hanger in the form of a link.

Link Hanger Eye Bolt. A bolt passing through the truck transoms, from which a short swing hanger is suspended.

Link Pin. A coupling pin.

Link and Pin Coupler. An old type of drawbar by which cars were connected by a link and a pin.

Link Suspension (Electric Lighting). A system in which the axle generator is suspended on a pair of parallel links supported on the truck frame, the adjusting of the driving belt or chain being accomplished by a device which swings the links slightly. See SUSPENSION.

Linoleum. A form of floor covering manufactured from linseed oil, prepared by a special process, mixed with ground cork and backed with canvas. Another floor covering of substantially the same nature as linoleum is known as corticine.

Lintel. The horizontal part of a door or window frame above the sash.

Lip Lamp Chimney. One with an indented ring near the bottom, for use with screw lamp burners.

Liquid Soap Fixture. Figs. 1748, 1752, 1753. A container placed above the wash basin for holding the liquid soap.

Live Lever. The one of a pair of truck brake levers to which the brake power is applied from the cylinder.

Loading Gage (British). American equivalent. CLEARANCE. The limiting dimensions of carriages or wagons as to height and width, in order that they may clear tunnels, bridges, station platforms, etc.

Loading Materials, Rules for. See RULES FOR LOADING MATERIALS.

Lock. Figs. 1795-1846, Pages 1118, 1200. Generally, a fastening of any kind operated by a key. Specificially, one having a dead bolt as distinguished from one having a spring latch bolt, the latter being technically termed

a latch. A rim lock is one applied to the surface of a door. A mortise lock is one designed to be mortised into the edge of a door. A rabbeted lock is one with an offset front to conform in shape to a rabbeted door. A dead lock is one in which a bolt is moved by a key and not a spring. A latch is a lock with a spring bolt. A night latch is a lock with a spring bolt operated from the outside only by a key and from the inside usually by a knob. A padlock is a detached lock provided with a shackle adapted for engagement with a hasp or staple. According to their uses, locks are divided into berth locks, door docks, freight car locks, grain door locks, seat locks, sliding door locks, etc. See also SASH LOCK.

(M. C. B. Automatic Coupler.) The catch which drops in front of the knuckle horn and holds it shut, thus locking the couplers together.

Lock Case. The outside or covering part of a lock, more particularly a padlock.

Lock Chain. A chain by which a padlock is fastened to prevent its being lost.

Lock Keeper. See KEEPER.

Lock Lift. (M. C. B. Standard.) In 1905 a recommendation was adopted that the knuckle lock lift be in the central longitudinal vertical plane of the coupler, located between the striking horn and contour lines and operate from the top by an upward movement. Advanced to Standard in 1907.

In 1908 the following notes were added to Sheet M. C. B. 11:

That the total lift of locking pin be not more than 6 inches.

That all couplers must have a 1 1/16-inch eyelet for locking device located immediately above locking pin hole.

In 1912, by letter ballot, the underneath uncoupling arrangement was adopted as an alternate standard of the Association.

In 1916 the "D" coupler, as shown on M. C. B. Sheet 23 was adopted as Standard.

Lock Lifter. See COUPLER LOCK LIFTER.

Lock Nut. Figs. 1571-1600, Pages 1132, 1151, 1284. The outer one of a pair of nuts on one bolt, which, by screwing up separately to a tight bearing locks the inner one. A large number of special forms of lock nuts and nut locks, which serve the same purpose, are in use which are not strictly included under the above definition.

Lock Seal. A piece of glass, lead or paper, which forms a seal for a lock, so that the latter cannot be opened without its being known.

Lock Set. (M. C. B. Standard.) In 1903 a recommendation was made that for new equipment purchased after January 1, 1904, only such couplers as have a lock set on or within the head and which do not depend upon the uncoupling lever to hold up the lock should be specified. By letter ballot this was adopted as a Standard.

In 1916 the "D" coupler, as shown on M. C. B. Sheet 23 was adopted as Standard. See COUPLER LOCK SET.

Lock Washer. Figs. 1593, 1594. A washer for locking the nut in place while it is being tightened or drawn up.

Locker. A small compartment or closet for storage.

Locomotive Crane. Figs. 450-454; Pages 1134, 1135, 1202, 1220-1225, 1232, 1233. A self-propelling car with a crane mounted upon it. See also WRECKING CRANE.

Locomotive Valve (Steam Heating). The valve on the locomotive which admits live steam to the train line.

Lodging Car. A passenger or box car fitted up with sleeping accommodations for men at work on the line of a road. More commonly called boarding car.

Log Bunk. See BUNK.

Logging Car. Figs. 429-431, 433, 2814, Page 1215. A special type of car for hauling or carrying logs, usually consisting of two trucks and a skeleton frame, but sometimes provided with machinery and power for hauling by means of a cable. See CAR.

Logging Truck. Fig. 432; Page 1215. A truck used in logging cars. The member corresponding to the body bolster in other types of trucks is called a Bunk and is so arranged that timber or logs may be chained in place on it.

Lookout (Caboose). See CUPOLA.

Loose Berth Hinge. A berth hinge, the two part of which are detachable.

Lorry. Fig. 2818. Small push cars used in construction for moving rails, ties, etc.

Lounging Car. Figs. 335, 366. A term applied by some railways to a special type of parlor car arranged in two or more compartments, such as reception room, smoking room, etc., and generally having movable instead of fixed seats. Also called Club Car.

Lower Berth (Sleeping Cars). 1, Figs. 1626, 1627. The bed nearest the floor made up by pulling out the seats and dropping down the seat backs. The mattress for it is carried by day in the pocket formed by the upper berth. See BERTH.

Lower Brake Shaft Bearing. An eye or guide for a vertical brake shaft, near the lower end. The support at the lower end is preferably called the brake shaft step.

Lower Chord (of a Truss). The lower outside member. In the side trussing of a freight or passenger car the side sill is the lower chord.

Lower Deck. The main roof of a passenger equipment car on each side of the clere-story or upper deck.

Lower Deck Carline. A short carline extending under the lower deck or main roof only.

Lower Deck Headlining. The inside finish of the lower deck. It forms the top finish for the upper berth in sleeping cars. See HEADLINING.

Lower Deck Roof Support. See LOWER DECK CARLINE.

Lower Wainscot Rail (Passenger Car Interiors). A longitudinal rail immediately above the truss plank. The upper wainscot rail comes directly below the window.

Lubricator. An instrument used for applying a lubricant to a journal or other moving part. Also called oiler.

Lug. A projecting stud or ear to afford a bearing or point of attachment.

Lug Bolt. A strap bolt with a lug turned up at one end to enter a mortise in the timber and in part to relieve the attaching bolts from strain.

Lumber Specifications. (M. C. B. Recommended Practice.) In 1910 a joint committee of the American Railway Master Mechanics' Association and this Association working in conjunction with the Railway Storekeepers' Association and the various Lumber Manufacturers' Associations, submitted the following

specifications and grading rules for car and locomotive lumber, which, on motion, were ordered submitted to letter ballot and adopted as Recommended Practice:

In order to have standard descriptions of the various woods used by railroads, the following standard names for car and locomotive lumber were agreed upon by the Joint Committee:

LUMBER SPECIFICATIONS

Description of various woods used by railroad companies for car and locomotive lumber.

1. *Ash* .... To cover White, Black, Blue, Green and Red Ash.
2. *Basswood* .... To cover Linden, Linn, Lind or Lime-tree.
3. *Beech* .... To cover Red and White Beech.
4. *Birch* .... To cover Red, White, Yellow and Black Birch.
5. *Buckeye* .... To cover wood from Horse-chestnut tree.
6. *Butternut* .... To cover wood from tree of that name, also known as White Walnut.
7. *Cherry* .... To cover Sweet, Sour, Red, Black and Wild Cherry.
8. *Chestnut* .... To cover wood from tree of that name.
9. *Cottonwood* .... To cover wood from tree of that name. (Do not confuse with Popple or Poplar.)
10. *Cypress* .... To cover Red, Gulf, Yellow and East Coast Cypress, also known as Bald Cypress.
11. *Elm—soft* .... To cover White, Water, Gray, Red or Slippery and Winged Elm.
12. *Elm—rock* .... To cover Rock or Cork Elm.
13. *Douglas Fir* .... To cover Yellow, Red, Western, Washington, Oregon, Puget Sound Fir or Pine, Norwest and West Coast Fir.
14. *Gum* .... To cover Red Gum, Sweet Gum or Satin Walnut.
15. *Hemlock* .... To cover Southern and Eastern Hemlock; that is, Hemlock from all States east of and including Minnesota.
16. *Western Hemlock* .... To cover Hemlock from the Pacific Coast.
17. *Hickory* .... To cover Shellbark, Kingnut, Mockernut, Pignut, Black, Shagbark and Bitternut.
18. *Western Larch* .... To cover the species of Larch or Tamarack from the Rocky Mountain and Pacific Coast regions.
19. *Maple—soft* .... To cover Soft and White Maple.
20. *Maple — hard* .... To cover Hard, Red, Rock and Sugar Maple.
21. *White Oak* .... To cover White, Burr or Mossy Cup, Rock, Post or Iron, Overcup, Swamp Post, Live, Chestnut or Tan Bark, Yellow or Chinquapin and Basket or Cow Oak.
22. *Red Oak* .... To cover Red, Pin, Black, Water, Willow, Spanish, Scarlet, Turkey, Black Jack or Barn and Shingle or Laurel Oak.
23. *Pecan* .... To cover wood from tree of that name.
24. *Southern Yellow Pine*. To cover Long-leaf and Short-leaf Yellow Pine grown in the Southern States.
25. *White Pine* .... To cover wood from tree of that name grown in Maine, Michigan, Wisconsin, Minnesota and Canada.
26. *Norway Pine* .... To cover Norway or Red Pine grown in Michigan, Minnesota, Wisconsin and Canada.
27. *Idaho White Pine*..... To cover variety of White Pine grown in western Montana, northern Idaho and eastern Washington.
28. *Western Pine* .... To cover timber known as White Pine grown in Arizona, California, New Mexico, Colorado, Oregon and Washington; sometimes known as Western Yellow or Ponderosa Pine, or California White Pine or Western White Pine.
29. *Poplar* .... To cover wood from the Tulip Tree, otherwise known as Whitewood, Yellow Poplar and Canary Wood.
30. *Redwood* .... To cover wood from tree of that name.
31. *Spruce* .... To cover Eastern Spruce; that is, the Spruce timber coming from points east of and including Minnesota and Canada, covering White, Red and Black Spruce.
32. *Western Spruce* ...... To cover the Spruce timber from the Pacific Coast.
33. *Sycamore* .... To cover wood from tree of that name, otherwise known as Buttonwood.
34. *Tamarack* .... To cover Tamarack or Eastern Tamarack, grown in States east of and including Minnesota.
35. *Tupelo* .... To cover Tupelo Gum and Bay Poplar.
36. *Walnut* .... To cover Black Walnut (for White Walnut, see Butternut).

In 1916 the following schedule of lumber, indicating the kind and grade that should be used in each part, was adopted.

EXHIBIT E.

SCHEDULE OF LUMBER.

Detail Part.	Kind of Lumber.	Grade. (M. C. B. Specifications.)
Battens, Door	White Pine....... / Yellow Pine.......	No. 1, Common.
Bolsters, Truck..........	Oak	Car Timber.
Bolsters, Body	Oak	Car Timber.
Beams, Bumper	Oak	Car Timber.

Beams, Needle	Oak Longleaf Pine	Car Timber.
Belt Rail	Oak Yellow Pine	Car Timber.
Braces	Yellow Pine	No. 1, Common Heart, New. No. 1, Common Heart, Repairs
	Oak Poplar	Car Timber.
Boards: Card, Legend, Number	White Pine Cypress	No. 1, Common. C. and Better.
Boards for Solid Coke Racks	Oak Yellow Pine	Car Timber [Heart.
Boards, Deck for Stock Cars	Oak Yellow Pine	Car Timber [Heart. No. 1, Common
Carline	Oak Yellow Pine	Timber [Heart. No. 1, Common
Decking or Flooring	Yellow Pine and Oak (open cars) Yellow Pine (box cars)	All Heart and Heart Face, Car Timber. Heart Face and No. 1 Common.
	Yellow Fir	Edge Grain.
Door Header	Yellow Pine	No. 1, Common Heart.
	Oak Yellow Fir	Car Timber.
Door, Grain	May be made of any kind of wood sufficiently sound to prevent leakage of Grain. Only 10 per cent in any shipment to be less than 6 in. wide	

Detail Part.	Kind of Lumber.	Grade. (M. C. B. Specifications.)
Door, Side	Yellow Pine Cypress Yellow Fir	B. and Better, New. No. 1, Common, Repairs. C. and Better.
Draft Timbers	Oak	Car Timbers.
Dust Guards	Bass Wood	
Fascia	White Pine	B. & Better, New. C. & Better, New. No. 1, Common, Repair.
	Cypress	C. and Better.
	Fir	No. 2, Clear and Better, Flat Grain.
	Poplar	No. 2.
Framing, Car	Oak Fir Yellow Pine	Car Timber. No. 2, Clear and Better, Edge and Flat Grain.
Frame for Box Car Side Door	Oak Yellow Pine	Car Timber No. 1, Com. Heart.
Lining: Refrigerator and Box Car without Siding	Yellow Pine	B. and Better. No. 1, Common.
	Fir	No. 2, Clear & Better, Flat Grain.
	Cypress	C. and Better.
Lining: Refrigerator and Box Car with Siding	Yellow Pine Fir Cypress	No. 1, Common. No. 3, Clear. Car Lining.
Lagging	White Pine	No. 1, Common.
Plank: Side	Yellow Pine	No. 1, Common Heart.
Plank: End	Oak Yellow Pine	Car Timber. No. 1, Common Heart.
Plank: Spring	Oak	Car Timber.
Plank: Platform	Oak	Car Timber.
Plank: Truss	Oak	Car Timber.
Roofing: Single Board and outside Double Board	White Pine Norway Pine Eastern Spruce	No. 1, Common.
	Yellow Pine	B. and Better.
	Fir	No. 2, Clear & Better, Flat Grain.
	Cypress	C. and Better.
Roofing: Double Board Inside	White Pine Norway Pine Eastern Spruce	No. 3, Common.
	Yellow Pine	No. 1, Common.
	Fir	No. 3, Clear.
	Cypress	Car Lining.

Detail Part.	Kind of Lumber.	Grade. (M. C. B. Specifications.)
Running Boards	Yellow Pine White Pine	No. 1, Common. B. and Better.
Ridge Pole	Oak Yellow Pine	Car Timber. No. 1, Common Heart.
Rack, Slats for Coke	Oak Yellow Pine	Car Timber.
Siding	Yellow Pine	B. and Better. No. 1, Common.
	Fir	No. 2, Clear and Better, Flat Grain.
	Cypress	C. and Better.
	Poplar	No. 2.
Sills: Center, Intermediate, Side, Center Filling, Nailing, Deck	Yellow Pine Fir	Heart Face. No. 2, Clear & Better, Edge Grain.
Stakes	Oak Yellow Pine	Car Timber. No. 1.
Steps, Brake	Oak	Car Timber.

CLASSIFICATION, GRADING AND DRESSING RULES FOR NORTHERN PINE CAR MATERIAL, INCLUDING WHITE AND NORWAY PINE AND EASTERN SPRUCE

1. *Norway Pine.* To cover Norway or Red Pine grown in Michigan, Minnesota, Wisconsin and Canada.

White Pine to cover wood from tree of that name grown in Maine, Michigan, Wisconsin, Minnesota and Canada.

Spruce to cover Eastern Spruce; that is, the Spruce timber coming from points east of and including Minnesota and Canada, covering White, Red and Black Spruce.

2. *Northern Pine Lumber* shall be graded and classified according to the following rules and specifications as to quality, and dressed stock shall conform to the subjoined table of standard sizes, *except where otherwise expressly stipulated between buyer and seller.*

3. Recognized defects in Northern Pine are knots, knotholes, splits, shake, wane, wormholes, pitch pockets, torn grain, loosened grain, sap, sap stain, checks and rot.

KNOTS

4. Knots shall be classified as pin, small and large or coarse, as to size, and round or spike, as to form, and as sound, loose, encased, pith and rotten, as to quality.

5. A pin knot is sound and shall not exceed ½ inch in diameter.

6. A small knot is larger than a pin knot and shall not exceed 1½ inches in diameter.

7. A large or coarse knot is one of any size over 1½ inches in diameter.

8. A round knot is oval or circular in form.

9. A spike knot is one sawn in a lengthwise direction.

The mean or average diameter of knots shall be considered in applying and construing these rules.

10. A sound knot is one solid across its face; is as hard as the wood it is in and is so fixed by growth or position that it will retain its place in the piece.

11. A loose knot is not firmly set, but still retains its place in the piece.

12. A pith knot is a sound knot with a pith hole not more than ¼ inch in diameter.

13. An encased knot is one surrounded wholly by bark or pitch.

14. A rotten knot is one not as hard as the wood it is in.

PITCH

15. Pitch pockets are openings between the grain of the wood containing more or less pitch or bark, and shall be classified as small, standard and large pitch pockets.

16. A small pitch pocket is one not over ⅛ of an inch wide.
17. A standard pitch pocket is one not over ⅜ of an inch wide, or 3 inches in length.
18. A large pitch pocket is one over ⅜ of an inch wide or over 3 inches in length.
19. A pitch pocket showing open on both sides of the piece ⅛ of an inch or more in width shall be considered the same as a knothole.

WANE

20. Wane is bark, or the lack of wood, from any cause, on edge.

SAP

21. White or bright sap shall not be considered a defect in any of the grades provided for and described in these rules, except where stipulated.

MISCELLANEOUS

22. Defects in rough stock caused by improper manufacture and drying will reduce grade, unless they can be removed in dressing such stock to standard sizes.
23. All lumber for uses described in these rules shall be inspected on the face side to determine the grade, and the face side is the side showing the best quality or appearance.
24. Chipped grain consists in a part of the surface being chipped or broken out in small particles below the line of the cut, and as usually found should not be classed as torn grain, and shall not be considered a defect.
25. Torn grain consists in a part of the wood being torn out in the dressing. It occurs around knots and curly places, and is of four distinct characters; slight, medium, heavy and deep.

Slight torn grain shall not exceed 1-32 of an inch in depth, medium 1-16 of an inch, and heavy ⅛ of an inch. Any torn grain heavier than ⅛ of an inch shall be termed deep.
26. The grade of all regular stock shall be determined by the number, character and position of the defects visible in any piece. The enumerated defects herein described admissible in any grade are intended to be descriptive of the coarsest pieces *such grades may contain*, but the average quality of the grade shall be midway between the highest and lowest pieces allowed in the grade.
27. Lumber and timber sawed for specific purposes must be inspected with a view to its adaptability for the use intended.
28. *All dressed stock shall be measured strip count, viz.: Full size of rough material necessarily used in its manufacture.*
29. Lumber must be accepted on grade in the form in which it was shipped. Any subsequent change in manufacture or mill work will prohibit an inspection for the adjustment of claims, except with the consent of all parties interested.
30. The foregoing general observations shall apply to and govern the application of the following rules. The rules referred to under Sections 31, 32, 33, 34 and 35 govern 4 or 6 inch strips, and are intended to cover strips used for car siding, car lining and car roofing.

B and Better White Pine

31. Material of this grade shall be practically clear and free of all defects, except will admit of not exceeding four pin knots, and bright sap not to exceed 25 per cent of the face of the piece.

C and Better Norway Pine

32. Bright sap is no defect in this grade and stained sap will be admitted to the extent of not exceeding 1-5 the surface of the face of the piece, if not in combination with other defects. This grade shall be free from shake, rot and splits, but will admit of not exceeding four pin knots.

No. 1 Common White Pine, Norway Pine and Eastern Spruce

33. This grade admits of small sound knots, but shall be free from large or coarse knots, knotholes, should have practically no shake, wane or rot, but will admit of bright sap to any extent.

No. 2 Common White Pine, Norway Pine and Eastern Spruce

34. This grade is similar to No. 1, described above, except that it will admit of spike knots, bright or stained sap, slight shake, slight wane on reverse side, but not a serious combination of any of these defects.

No. 3 Common White Pine, Norway Pine and Eastern Spruce

35. This grade, in addition to the defects mentioned in No. 2, described above, will also admit of large or coarse knots, more shake, sap, wane on reverse side that does not affect the tongue or groove and torn or loosened grain, checks, pin wormholes and splits, but no loose knots or knotholes, nor a serious combination of the defects named.

No. 1 Common Norway Pine Car Decking or Flooring

36. This grade will admit of sound knots, any amount of sap, and shall be free from shake, wane, rot and large or coarse spike knots.

37. STANDARD LENGTHS

CAR SIDING—8, 9, 10 and 12 feet or multiples.
CAR ROOFING—5 feet or multiples.
CAR LINING—8, 9, 10, 12, 14, 16, 18 and 20 feet or multiples.
CAR DECKING—9 and 10 feet or multiples.

All orders shall be shipped in standard lengths, unless otherwise specified, but no lengths of either car siding, lining or roofing shall be shipped except in the lengths specified or multiples thereof. Those who do not desire stock shipped in multiple lengths should so specify.

CLASSIFICATION, GRADING AND DRESSING RULES FOR SOUTHERN YELLOW PINE CAR MATERIAL

1. *Southern Yellow Pine.*—To cover Long-leaf and Short-leaf Yellow Pine grown in the Southern States.
2. *Southern Yellow Pine Lumber* shall be graded and classified according to the following rules and specifications as to quality, and dressed stock shall conform to the subjoined table of standard sizes, *except where otherwise expressly stipulated between buyer and seller.*
3. Recognized defects in Southern Yellow Pine are knots, knotholes, splits (either from seasoning, ring hearts or rough handling), shake, wane, red heart, pith, rot, rotten streaks, dote, red heart, wormholes, pitch streaks, pitch pockets, torn grain, loosened grain, seasoning or kiln checks and sap, sap stains and imperfect manufacture.

KNOTS

4. Knots shall be classified as pin, standard and large, as to size; and round and spike, as to form; and as sound, loose, encased, pith and rotten, as to quality.

5. A pin knot is sound and not over ½ inch in diameter.

6. A standard knot is sound and not over 1½ inches in diameter.

7. A large knot is one any size over 1½ inches in diameter.

8. A round knot is oval or circular in form.

9. A spike knot is one sawn in a lengthwise direction.

The mean or average diameter of knots shall be considered in applying and construing these rules.

10. A sound knot is one solid across its face; is as hard as the wood it is in and is so fixed by growth or position that it will retain its place in the piece.

11. A loose knot is one not held firmly in place by growth or position.

12. A pith knot is a sound knot with a pithhole not more than ¼ inch in diameter.

13. An encased knot is one surrounded wholly or in part by bark or pitch. Where the encasement is less than ⅛ of an inch in width on both sides, not exceeding one-half the circumference of the knot, it shall be considered a sound knot. (See Sections 10 and 17.)

14. A rotten knot is one not as hard as the wood it is in.

PITCH

15. Pitch pockets are openings between the grain of the wood containing more or less pitch or bark, and shall be classified as small, standard and large pitch pockets.

16. A small pitch pocket is one not over ⅛ of an inch wide.

A standard pitch pocket is one not over ⅜ of an inch wide or 3 inches in length.

A large pitch pocket is one over ⅜ of an inch wide or over 3 inches in length.

17. A pitch pocket showing open on both sides of the piece ⅛ of an inch or more in width shall be considered the same as a knothole.

18. A pitch streak is a well-defined accumulation of pitch at one point in the piece, and when not sufficient to develop a well-defined streak, or where fibre between grains is not saturated with pitch, it shall not be considered a defect.

19. A small pitch streak shall be equivalent to not over one-twelfth the width and one-sixth the length of the piece it is in.

A standard pitch streak shall be equivalent to not over one-sixth the width and one-third of the length of the piece it is in.

WANE

20. Wane is bark, or the lack of wood, from any cause, on the edge.

SAP

21. Bright sap shall not be considered a defect in any of the grades provided for and described in these rules, except where stipulated.

SHAKE

22. Shakes are splits or checks in timbers which usually cause a separation of the wood between annual rings.

Through Shake: A shake which extends between two faces of a timber.

Ring Shake: An opening between the annual rings.

MISCELLANEOUS

23. Defects in rough stock caused by improper manufacture and drying will reduce grade, unless they can be removed in dressing such stock to standard sizes.

24. All stock except car sills and framing shall be inspected on the face side to determine the grade. Stock surfaced one side, the dressed surface shall be considered the face side. Stock rough or dressed two sides, the best side shall be considered the face, but the reverse side of all such stock shall not be more than one grade lower.

25. Pieces of siding, lining or roofing with 3-16 of an inch or more of tongue will be admitted in any grade, provided it does not run more than one-third the length of the piece.

26. In all grades lower than B and better, wane on the reverse side, not exceeding one-third the width and one-sixth the length of any piece is admissible; provided the wane does not extend into the tongue, or over one-half the thickness below the groove.

27. Chipped grain consists in a part of the surface being chipped or broken out in small particles below the line of the cut, and as usually found shall not be classed as torn grain and shall not be considered a defect.

28. Torn grain consists in a part of the wood being torn out in dressing. It occurs around knots and curly places, and is of four distinct characters—slight, medium, heavy and deep.

Slightly torn grain shall not exceed 1/32 of an inch in depth; medium, 1/16 of an inch; heavy, ⅛ of an inch; any torn grain heavier than ⅛ of an inch shall be termed deep.

29. Loosened grain consists in a point of one grain being torn loose from the next grain. It occurs on the heart side of the piece and is a serious defect, especially in flooring.

30. *Rot, Dote and Red Heart:* Any form of decay which may be evident either as a dark-red discoloration not found in the sound wood, or the presence of white or red rotten spots, shall be considered as a defect.

Firm red heart shall not be considered a defect in any of the grades of Common Lumber.

31. The grade of all regular stock shall be determined by the number, character and position of the defects visible in any piece. The enumerated defects herein described admissible in any grade are intended to be descriptive of the *coarsest* pieces *such grades may contain,* but the average quality of the grade shall be midway between the highest and lowest pieces allowed in the grade.

32. Lumber and timber sawed for specific purposes must be inspected with a view to its adaptability for the use intended.

33. *All dressed stock shall be measured strip count, viz.: Full size of rough material necessary used in its manufacture.*

34. Equivalent means equal, and in construing and applying these rules, the defects, whether specified or not, are understood to be equivalent in damaging

effect to those mentioned applying to stock under consideration.

35. Lumber must be accepted on grade in the form in which it was shipped. Any subsequent change in manufacture or millwork will prohibit an inspection for the adjustment of claims, except with the consent of the parties interested.

36. The foregoing general observations shall apply to and govern the application of the following rules:

37. *B and Better Car Siding, Lining and Roofing, Car Siding for Double-Sheathed Cars, Lining for Cabin and Refrigerator Cars, Lining for Box Cars with Outer Steel Posts, and Roofing such as old-style Winslow roof,* will admit any two of the following, or their equivalent of combined defects: Sap stain not to exceed five per cent; firm red heart not to exceed fifteen per cent of the face; three pin knots; one standard knot; three small pitch pockets; one standard pitch pocket; one standard pitch streak; slight torn grain, or small kiln or season checks. Where no other defects are contained, six small pin wormholes will be admitted.

38. *Select Car Siding* will admit of one standard pitch streak, one standard pitch pocket, or their equivalent; and in addition, will admit of not exceeding five pin knots and two standard knots, or their equivalent; ten per cent sap stain; firm red heart; slight shake; heavy torn grain; defects in manufacture or seasoning checks. Pieces otherwise good enough for B, but containing a limited number of pin wormholes shall be graded *select.* This grade is intended to be accumulated from running B and Better stock, and will consist of all the droppings which do not contain defects in excess of those mentioned in this paragraph.

39. *Select Car Lining and Roofing* will admit of one standard pitch streak; one standard pitch pocket, or their equivalent, and, in addition, sound knots not over one-half the width of the piece in the rough; ten per cent sap stain; firm red heart; slight shakes; heavy torn grain; defects in manufacture, or seasoning checks. Pieces otherwise good enough for B. but containing a limited number of pin wormholes shall be graded *select.* This grade is intended to be accumulated from running B and Better stock, and will consist of all the droppings which do not contain defects in excess of those mentioned in this paragraph.

40. *No. 1 Common Car Lining and Roofing* will admit of the following defects or their equivalent: Sound knots, not over one-half of cross section of the piece at any point throughout its length or width; three pin knots or their equivalent; wane ½ inch deep on edge not exceeding 1½ inches wide and one-half the length of the piece; torn grain; pitch pockets; pitch; sap stains; seasoning checks; slight shakes; firm red heart and a limited number of pin or small wormholes well scattered. This grade is intended to be worked from fencing stock, either kiln or air dried.

41. *No. 2 Common Car Siding, Lining and Roofing* will admit the following defects or their equivalent: Knots not necessarily sound, the mean or average diameter of any one knot shall not be more than one-half the cross section if located on the edge and shall not be more than two-thirds of the cross section if located away from the edge; one split one-fourth the length of the piece; worm holes; rotten streaks one-fourth the length of the piece, or the equivalent of unsound red heart; shake or wane, but must not cut to waste. Pieces of Siding, Lining or Roofing with one-eighth of an inch or more of tongue will be admitted in this grade, provided it does not run more than one-third the length of the piece.

Note.—For material furnished in accordance with Sections 43 to 47, the following "Density Rule" may be applied where so specified by the purchaser:

(a) Dense southern yellow pine shall show on either end an average of at least six annual rings per inch and at least one-third summer wood, or else the greater number of the rings shall show at least one-third summer wood, all as measured over the third, fourth and fifth inches on a radial line from the pith. Wide-ringed material excluded by this rule will be acceptable, provided that the amount of summer wood as above measured shall be at least one-half.

The contrast in color between summer wood and spring wood shall be sharp, and the summer wood shall be dark in color, except in pieces having considerably above the minimum requirement for summer wood.

(b) Sound southern yellow pine shall include pieces of southern pine without any ring or summer-wood requirement.

43. *All-heart Car Decking or Flooring* will admit sound knots not over one-third of the cross section of the piece at any point throughout its length, provided they are not in groups; pitch pockets; firm red heart; shake and seasoning checks which do not go through the piece; loose or heavy torn grain, or other machine defects, which will lay without waste or will not cause a leakage in cars when loaded with grain. Must be strictly *all heart* on both sides and both edges.

44. *Heart Face Car Decking or Flooring* will admit of sound knots not over one-third the cross section of the piece at any point throughout its length; provided they are not in groups; pitch pockets; firm red heart; shake and seasoning checks which do not go through the piece; loosened or heavy torn grain, or other machine defects, which will lay without waste, or will not cause a leakage in cars when loaded with grain. Will admit of any amount of sap provided all of the face side of the piece is strictly all heart.

45. *No. 1 Common Car Decking or Flooring* will admit of sound knots not over one-half the cross section of the piece at any point throughout its length, provided they are not in groups; pitch pockets; sap stain; firm red heart; shake and seasoning checks which do not go through the piece; a limited number of pin wormholes; loosened or heavy torn grain, or other machine defects, which lay without waste, or will not cause a leakage in cars when loaded with grain.

46. STANDARD LENGTHS:

Car Siding—8, 9, 10 and 12 feet or multiples.

Car Lining—8, 9, 10, 12, 16, 18 and 20 feet or multiples.

Car Roofing—5 feet or multiples.

Car Decking or Flooring—9 and 10 feet or multiples.

All orders shall be shipped in standard lengths, unless otherwise specified, but no lengths of either car siding, lining or roofing shall be shipped, except in the lengths specified or multiples thereof. Those who

do not desire stock shipped in multiple lengths should so specify.

CAR SILLS AND FRAMING

47. *No. 1 Common Heart Car Sills and Framing* will admit of sound knots, provided they are not in groups, the mean or average diameter of which shall not exceed two (2) inches; pitch; pitch pockets; slight shake; seasoning checks or other defects which will not impair its strength more than the defects aforementioned. Must be sawed from sound timber, free from doty or rotten red heart and true to measurements, or at least the measurements at no point on the sill shall be less than the size required.

Measurement of the girth at any point throughout the length of the piece must show at least 75 per cent heartwood.

Cubical contents shall not be used as basis for obtaining percentage of heartwood under this rule.

48. *No. 1 Common Car Sills and Framing* will admit of sound knots, provided they are not in groups, the mean or average diameter of which shall not exceed two (2) inches; pitch; pitch pockets; slight shake; seasoning checks; sap; sap stain, or other defects which will not impair its strength more than the defects aforementioned. Must be sawed true to measurements and from sound timber free from doty or rotten red heart; must be square cornered, except that one (1) inch of wane on one corner or one-half (½) inch of wane on two corners is admissible.

49. *Sizes* up to 6 inches in width shall measure full when green, and not more than ⅛ inch scant when dry or part dry. Sizes 6 to 12 inches in width shall measure full when green and not more than ¼ inch scant when dry or part dry. Sizes 12 to 16 inches in width shall measure full when green and not more than ⅜ inch scant when dry or part dry. Unless otherwise specified, one-fourth inch shall be allowed for each side which is to be dressed. In pieces 3 by 6 inches and under when ordered in lengths exceeding 30 feet, sound knots shall not exceed one-quarter the width of the face through which they project, and the grain shall not cross sufficiently to impair the strength.

CLASSIFICATION AND GRADING RULES FOR LOCOMOTIVE, FREIGHT AND PASSENGER CAR OAK

GENERAL INSTRUCTIONS

Those who are not familiar with the anatomy of the oak tree should, when reading over these rules, take into consideration that the rule describes the poorest piece that goes into the grade and that a large percentage is above the grade described.

DEFINITION OF OAK FOR CONSTRUCTION PURPOSES

The term "Construction Oak" means all such products of Oak in which the strength and durability of the timber is the controlling element in its selection and use. The following is a list of products which are recommended for consideration as "Construction Oak":

I. CONSTRUCTION OAK

(A)
(B)
(C) } Cover Maintenance of Way Material.

(D) *Locomotive Timbers:* Sills, End and Truck Timbers.

(E) *Car Timbers:* Car Framing, including Upper Framing, Car Sills, End and Truck Timbers, Car Decking, Inside Lining.

(F)
(G)
(H)
(I)
(J)
(K)
(L) } Cover Maintenance of Way Material.

II. STANDARD DEFECTS

Definition of "Defect."—Fault, Blemish, Mark of Imperfection that will materially injure the strength.

Measurements which refer to the diameter of knots or holes shall be considered as referring to the mean or average diameter.

II.—(A) KNOTS

(1) *Sound Knots.* A sound knot is one which is solid across its face, and which is as hard as the wood surrounding it; it may be any color and contain checks.

(2) *Loose Knot.* A loose knot is one not firmly held in place by growth or position.

(3) *Pith Knot.* A pith knot is a sound knot with a pith hole not more than ¼ inch in diameter in the center.

(4) *Rotten Knot.* A rotten knot is one that is not sound and not as hard as the wood surrounding it.

(5) *Pin Knot.* A pin knot is a sound knot not over ¾ inch in diameter.

(6) *Standard Knot.* A standard knot is a knot not over 2 inches in diameter.

(7) *Large Knot.* A large knot is a sound knot more than 2 inches in diameter.

(8) *Round Knot.* A round knot is one which is oval or circular in form.

(9) *Spike Knot.* A spike knot is one sawn in lengthwise direction. The mean or average width shall be considered in measuring this knot.

(10) *Bird Peck.* Bruises apparently caused by bird pecks during the growth process of the timber. Considered no defect.

II.—(B) WORM DEFECTS

(1) *Pin Wormholes.* Pin wormholes are very small holes caused by minute insects or worms. These holes usually are not over 1-16 inch in diameter, or smaller, and the wood surrounding them is sound and does not show any evidences of the wormhole having any effect on the wood other than the opening.

(2) *Spot Worm Defects.* (Also known as Flag Worm Defects.) Spot worm defects are caused, like pin wormholes, by minute insects or worms working on the timber during its growth. The size of the hole is about the same as pin wormholes, but the surrounding wood shows a colored spot as evidence of the defect. This spot is usually sound and does not affect the strength of the piece.

(3) *Grub Wormholes.* Grub wormholes are usually from about ⅛ to 3-16 inch in width and vary in length from about 3-16 inch to 1 inch, and are caused by grub worms working in the wood.

(4) *Wooden Rafting Pinholes.* This defect sometimes appears on river timber which has been rafted and holes bored in the solid wood for tying the timber, and a solid plug or pin driven in the hole filling it completely. These defects must be treated and con-

sidered the same as knot defects. Ordinary metal rafting pin or chain dog hole is considered no defect.

II.—(C) SAP

Definition of "Sap."—The alburnum of a tree—the exterior part of the wood next to the bark; sap wood not considered a defect.

Sound Heart. The term sound heart is used in these rules whenever heart of piece is split or opened and shows on outside of piece and its condition is sound and solid, not decayed. Openings between annual rings are checks not considered a defect.

II.—(D) WANE

Wane is bark or lack of wood from any cause on edges of timber.

II.—(E) SHAKES

Definition of "Shakes."—Shakes are splits or checks in timber which usually cause a separation of the wood between the annual rings.

(1) *Ring Shakes.* Ring shakes are openings between the annual rings usually showing only on the end of the timber.

(2) *Through Shakes.* Through shakes are shakes which extend between two faces of the timber.

(3) *Checks.* A small crack in the wood due to seasoning; not considered a defect.

II.—(F) GRAIN

Crooked or Cross Grain. Crooked or cross grain occurs where the grain crosses the piece within a section of 24 inches in running length of the piece. This is only considered a defect in certain smaller sizes of dimension for specific purposes.

II.—(G) ROT

Any form of decay which may be detected as giving the timber a doty or rotten texture is a rot defect, including what is commonly known as dry rot. Water stain, or what are sometimes called scalded or burned spots, usually caused by timber lying in the water under certain conditions before it is sawed, and burned spots where the timber is improperly piled green, not considered defects, as they do not affect the strength of the piece.

III.—STANDARD NAMES FOR CONSTRUCTION OAK

Standard names for Construction Oak timbers; White Oak and Red Oak. Unless specially mentioned, these terms include the following:

White Oak.	*Red Oak.*
White Oak.	Red Oak.
Burr or Mossy Cup Oak.	Pin Oak.
Rock Oak.	Black Oak.
Post or Iron Oak.	Water Oak.
Overcup.	Willow Oak.
Swamp Post Oak.	Spanish Oak.
Live Oak.	Scarlet Oak.
Chestnut or Tan Bark Oak.	Turkey Oak.
Basket or Cow Oak.	Black Jack or Barn Oak.
Yellow or Chinquapin Oak.	Shingle or Laurel Oak.

Term: Mixed Oak means any kind of oak.

IV.—STANDARD SPECIFICATIONS FOR STRUCTURAL OAK TIMBERS

(1) *General Requirements.* Except as noted, all structural timbers shall be white oak, to be sound timber and sawed specified sizes; free from ring shakes, crooked grain, rotten knots, large knots in groups, rot, dote and wane in amounts greater than allowed in these specifications.

(2) *Boxed Hearts.* Boxed hearts are permitted in pieces 5 by 5 square and larger. The center of the heart shall be boxed as near the center of the piece as practical, and not to exceed 30 per cent of the pieces can have the center of the heart nearer than 1½ inches from any face; 20 per cent may show one heart face, corner or edge, not to exceed 75 per cent of the length of the piece.

IV.—(3) WANE

EXPLANATION

The term 20 per cent of number of pieces or amount shipped refers to each item and size of each car shipped.

(a) Pieces 5 by 5 to 8 by 8 square may show 1 inch wane, side measurement on any two corners or edges, and this wane not to exceed more than 25 per cent of the length of the piece singly, or 50 per cent in aggregate. In the absence of wane on all corners excepting one, the one corner may contain wane 50 per cent of the length of the piece as above described; not to exceed 20 per cent of number of pieces may have this defect.

(b) Pieces over 8 by 8, including 12 by 12, square may show 1½ inches wane, side measurement, edge of any two corners or edges, and this wane not to exceed more than 33⅓ per cent of the length of the piece singly, or 66⅔ per cent in aggregate. In the absence of wane on all corners excepting one, the one corner may contain wane 66⅔ per cent of the length of the piece as above described; not to exceed 20 per cent of number of pieces may have this defect.

(c) Pieces over 12 by 12 square may show 1¾ inches, side measurement, any two corners or edges, and this wane not to extend more than 40 per cent of the length of the piece singly, or 80 per cent in aggregate. In the absence of wane on all corners excepting one, the one corner may contain wane 80 per cent of the length of the piece as above described; not to exceed 20 per cent of number of pieces may have this defect.

(d) In event that pieces have two faces as wide as above described and two faces narrower, the proportion of the amount of wane is admissible.

(e) Pieces 1 inch to 5 inches thick, not exceeding 8 inches wide, are governed by defect specifications above mentioned, with the exception that they shall not contain wane, and not to exceed 20 per cent of pieces 2 inches and thicker may show sound heart on one face; pieces under 2 inches thick must be free of heart. Pieces 8 inches and wider may contain wane as per paragraphs b and d.

(f) Rough sizes of structural timber shall not vary more than ¼ inch scant of specified size. Dressed sizes may be ½ inch scant after dressing.

V.—(B) LOCOMOTIVE TIMBER OAK. PASSENGER CAR DIMENSION OAK. REFRIGERATOR CAR DIMENSION OAK

Thickness cut to order, widths cut to order, lengths cut to order. Unless otherwise noted, must be cut from white oak. This stock, wherever practical, should be cut outside the heart and must be free of heart shake in pieces under 6 by 6 square. No attempt should be made to box the heart in pieces smaller than 5 by 7, unless heart is very small and tight. When heart is well boxed it must be firm and tight, and the center of the heart must not be nearer than 2 inches from any face. Must be sawed full to sizes with square edges, and cut from sound timber and free from wormholes.

with the exception of a few small pin wormholes well scattered, and an occasional spot worm. None of these defects, however, to affect the serviceability of the piece for the purpose intended. Must be free from split, rot or dote, large, loose, rotten or unsound knots, or, in other words, free of all defects affecting the strength and durability of the piece. Sound standard knots well scattered not considered a defect.

V.—(C) FREIGHT CAR TIMBER

Freight car dimensions, including all cars other than refrigerator and passenger cars. Sizes cut to order. Unless otherwise ordered, must be sawed from good merchantable white or red oak timber. This stock must be free of rot, shakes and splits, large, loose, rotten or unsound knots, any of which will materially impair the strength and durability of the piece for the purpose intended. This stock is intended to work full size and length without waste for side posts, braces and end sills, end plates, drafting timbers, cross ties, etc., used in the construction of ordinary freight or stock cars. On pieces 3 by 4 inches or equivalent girth measurement and larger (nothing under 2 inches thick), heart check showing on one corner, admitted on twenty per cent of the pieces in each car shipment. Well-boxed, sound hearts admitted in this material in pieces 5 by 6 and larger.

On pieces 3 by 4 to 6 by 6, inclusive, or equivalent girth measurement and larger (nothing under 2 inches thick), in absence of heart defects, wane on one corner, ¾ inch side measurement, admitted on not to exceed twenty per cent of the number of pieces in each car shipment.

Pieces over 6 by 6 square may contain 1 inch wane, side measurement, on one corner, with other conditions same as 3 by 4 to 6 by 6 sizes.

CLASSIFICATION AND GRADING RULES FOR DOUGLAS FIR CAR AND LOCOMOTIVE MATERIAL

1. The term "Douglas Fir" will cover the timber known likewise as Yellow, Red, Western, Washington, Oregon or Puget Sound Fir or Pine, Norwest and West Coast Fir.

2. *Douglas Fir Lumber* shall be graded and classified according to the following rules and specifications as to quality, and dressed stock shall conform to the subjoined table of standard sizes, *except where otherwise expressly stipulated between buyer and seller.*

3. Recognized defects in Douglas Fir are knots, knotholes, splits, checks, wane, rot, rotten streaks, wormholes, dog or picaroon holes, pitch seams, shake, pitch pockets, chipped grain, torn grain, loose grain, solid pitch, stained heart, sap stain and imperfect manufacture.

KNOTS

4. Knots shall be classified as pin, small, standard and large, as to size; round and spike, as to form, and tight, loose and rotten, as to quality.

5. A pin knot is tight and not over ½ inch in diameter.

6. A small knot is tight and not over ¾ inch in diameter.

7. A standard knot is tight and not over 1½ inches in diameter.

8. A large knot is tight and any size over 1½ inches in diameter.

9. A round knot is oval or circular in form.

10. A spike knot is one sawn in a lengthwise direction.

The mean or average diameter of knots shall be considered in applying and construing these rules.

11. A tight knot or sound knot is one solid across its face, is as hard as the wood it is in, and is so fixed by growth or position that it will retain its place in the piece.

12. A loose knot is one not held firmly in place by growth or position.

13. A rotten knot is one not as hard as the wood it is in.

PITCH

14. Pitch pockets are openings between the grain of the wood, containing more or less pitch and surrounded by sound grain wood; they shall be classified as small, standard and large pitch pockets.

15. A small pitch pocket is one not over ⅛ of an inch wide.

16. A standard pitch pocket is one not over ⅜ of an inch wide, or 3 inches in length.

17. A large pitch pocket is one over ⅜ of an inch wide or over 3 inches in length.

18. A pitch shake or seam is a clearly defined opening between the grain of the wood and may be either filled with granulated pitch or not, but in either case is considered a defect in any of the grades hereinafter described.

19. A pitch streak is a well-defined accumulation of pitch at one point in the piece, and when not sufficient to develop a well-defined streak, or where fiber between grains is not saturated with pitch it shall not be considered a defect.

20. A small pitch streak shall be equivalent to not over one-twelfth the width and one-sixth the length of the piece it is in.

21. A standard pitch streak shall be equivalent to not over one-sixth the width and one-third of the length of the piece it is in.

WANE

22. Wane is bark, or the lack of wood, from any cause on edge.

SAP

23. Bright sap shall not be considered a defect in any of the grades provided for and described in these rules, except where stipulated.

24. Sap stain shall not be considered a defect, except as provided herein.

25. Discoloration of the heart of the wood, or stained heart, must not be confounded with rot or rotten streaks. The presence of rot is indicated by decided softness of the wood where it is discolored or by small white spots resembling pin wormholes.

MISCELLANEOUS

26. Defects in rough stock caused by improper manufacture and drying will reduce grade, unless they can be removed in dressing such stock to standard sizes.

27. All stock, except car sills and framing, shall be inspected on the face side to determine the grade. Stock surfaced one side, the dressed surface shall be considered the face side. Stock rough or dressed two sides, the best side shall be considered the face, but the reverse side of all such stock shall not be more than one grade lower.

28. Chipped grain consists in a part of the surface being chipped or broken out in small particles below

the line of the cut, and as usually found, should not be classed as torn grain, and shall be considered a defect only when it unfits the piece for use intended.

29. Torn grain consists of a part of the wood being torn out in dressing. It occurs around knots and curly places, and is of four distinct characters—slight, medium, heavy and deep.

30. Slight torn grain shall not exceed 1-32 of an inch in depth; medium 1-16 of an inch, and heavy ⅛ of an inch. Any torn grain heavier than ⅛ of an inch shall be termed deep.

31. Loosened grain consists in a point of one grain being torn loose from the next grain. It occurs on the heart side of the piece, and is a serious defect, especially in flooring.

32. The grade of all regular stock shall be determined by the number, character and position of the defects visible in any piece. The enumerated defects herein described admissible in any grade are intended to be descriptive of the *coarsest* piece *such grades may contain*, but the average quality of the grade shall be midway between the highest and lowest pieces allowed in the grade.

33. Lumber and timber sawed for specific purposes must be inspected with a view to its adaptability for the use intended.

34. *All dressed stock shall be measured strip count, viz.: Full size of rough material necessarily used in its manufacture.*

35. Equivalent means equal, and in construing and applying these rules, the defects allowed, whether specified or not, are understood to be equivalent in damaging effect to those mentioned applying to stock under consideration.

36. Lumber must be accepted on grade in the form in which it was shipped. Any subsequent change in manufacture or millwork will prohibit an inspection for the adjustment of claims, except with the consent of all parties interested.

37. The foregoing general observations shall apply to and govern the application of the following rules:

The rules referred to under Sections 38, 39 and 40 govern 4-inch or 6-inch strips, and are intended to cover strips used for car siding, car roofing and car lining.

The term "Edge Grain" is here used as synonymous with vertical grain, rift-sawn, or quarter-sawed. The term "Flat Grain" is synonymous with slash grain or plain sawed.

No. 2 Clear and Better Edge Grain

38. Material of this grade shall be well manufactured, with angle of grain not less than forty-five degrees. This stock shall be kiln-dried and practically free from all defects, but will admit of bright sap on the face; not exceeding three small close pitch pockets not over 2 inches long, one pin knot, slight roughness in dressing, but not a serious combination of these defects.

No. 2 Clear and Better Flat Grain

39. Material of this grade shall be well manufactured. The stock shall be kiln-dried and practically free from all defects, but will admit of bright sap on the face; not exceeding three small close pitch pockets not over 2 inches long, one pin knot, slight roughness in dressing, but not a serious combination of these defects.

No. 3 Clear

40. Material of this grade shall be sound common lumber and will admit of roughness in dressing, bright sap, and also may contain five pin, three small and one standard knot and five pitch pockets in any continuous 5 feet of length of the piece; or any combination of tight knots or pitch pockets equivalent to those mentioned above. This grade particularly refers to stock used for inside lining of freight cars.

Standard Car Decking or Flooring

41. Material of this grade shall be well manufactured from sound live timber and shall be free from splits, shakes, rot, bark or waney edges, and unsound knots, or pitch pockets, pitch seams or large knots which would weaken the piece for the use intended. This grade will admit of sound knots not to exceed one-third width of the piece, provided they are not in clusters, and sap.

Common Car Sills and Framing

42. Material of this grade shall be well manufactured from sound live timber, sawed full size to sizes ordered and free from rot, unsound knots, cross grain, bark or waney edges or shakes, but will admit of sap and any number of sound knots, provided they are not in clusters, and do not exceed one-third width of piece; pitch pockets or pitch seams that would not weaken the piece for the purpose intended.

43. *Sizes* up to 6 inches in width shall measure full when green, and not more than ⅛ inch scant when dry or part dry. Sizes 6 to 12 inches in width shall measure full when green and not more than ¼ inch scant when dry or part dry. Sizes 12 to 16 inches in width shall measure full when green and not more than ⅜ inch scant when dry or part dry. Unless otherwise specified, ¼ inch shall be allowed for each side which is to be dressed. In pieces 3 by 6 inches and under when ordered in lengths exceeding 30 feet, sound knots shall not exceed one-quarter the width of the face through which they project, and the grain shall not cross sufficiently to impair the strength.

44. STANDARD LENGTHS

CAR SIDING—8, 9, 10 and 12 feet or multiples.

CAR ROOFING—5 feet or multiples.

CAR LINING—8, 9, 10, 12, 14, 16, 18 and 20 feet or multiples.

CAR DECKING—9 and 10 feet or multiples.

All orders shall be shipped in standard lengths, unless otherwise specified, but no lengths of either car siding, lining or roofing shall be shipped, except in the lengths specified or multiples thereof. Those who do not desire stock shipped in multiple lengths should so specify.

CLASSIFICATION AND GRADING RULES FOR CYPRESS CAR MATERIAL

1. *Cypress* to cover Red, Gulf, Yellow and East Coast Cypress, also known as Bald Cypress.

2. *Cypress Lumber* shall be graded and classified according to the following rules and specifications as to quality, and dressed stock shall conform to the subjoined table of standard sizes, *except where otherwise expressly stipulated between buyer and seller.*

3. Recognized defects in Cypress are knots, knotholes, sap, wormholes, shake, season checks, splits and wane.

KNOTS

4. Knots shall be classified as standard and small, as to size, and sound or rotten, as to quality.

5. A standard knot is sound and not to exceed 1¼ inches in diameter.

6. A small knot is one not exceeding ¾ inch in diameter.

7. A sound knot is one solid across its face, is as hard as the wood it is in.

8. A rotten knot is one not as hard as the wood it is in.

SAP

9. Stained sap or bright sap shall not be considered a defect in the material specified in these rules.

SEASON CHECKS

10. Ordinary season checks are such as occur in lumber properly covered on yard or season checks of equal size in kiln-dried lumber.

WANE

11. Wane is bark or lack of wood from any cause on edge.

MISCELLANEOUS

12. The grade of all regular stock shall be determined by the number, character and position of the defects visible in any piece. The enumerated defects herein described admissible in any grade are intended to be descriptive of the *coarsest* pieces *such grade may contain,* but the average quality of the grade shall be better than the coarsest pieces allowed in the grade.

13. Lumber sawed for specific purposes must be inspected with a view to its adaptability for the use intended.

14. *All dressed stock shall be measured strip count, viz.: Full size of rough material necessarily used in its manufacture.*

15. Lumber must be accepted on grade in the form in which it was shipped. Any subsequent change in manufacture or millwork will prohibit an inspection for the adjustment of claims, except with the consent of all parties interested.

16. The foregoing general observations shall apply to and govern the application of the following rule. The rule referred to in the following section is intended to govern 4-inch or 6-inch strips and to cover strips used for car siding, car roofing and car lining.

CAR ROOFING AND SIDING

"C and Better" Grade.—This grade will admit sound knots, stained sap, pin worm holes, very slight shake and other defects, but none that will prevent the use of each piece in its full width and length for car roofing and car siding; may be random or specified lengths and may be worked to pattern specified and graded from pattern side or S2S and C. M. and graded from the better side.

CAR LINING

Shall be specified widths and 8 to 20 inches in length. Will admit tight knots, stained sap, pin wormholes, slight shake and other defects, but none that will prevent the use of each piece in its full width and length for car-lining purposes.

Lunch Counter Car. Figs. 327, 328. A passenger equipment car fitted up with a lunch counter for serving light meals.

M

Magazine (Base Burning Stove). A general term for a receptacle for coal before it reaches the fire-pot proper, usually situated directly above the latter.

Magnets, Application and Release. Used in connection with electro-pneumatic brakes. See ELECTRO-PNEUMATIC BRAKE.

Mail Apartment. Figs. 2895, etc. Similar to an alley apartment, but extending the full width of the car. See ALLEY APARTMENT.

Mail Bag Hook (Postal Car). Fig. 2912. A hook for securing the mail bags to the mail bag rack.

Mail Bag Rack (Postal Car). Figs. 2912, 2920-A. A rack for mail bags, etc.

Mail Car. See POSTAL CAR.

Mail Car Lamp. A lamp used for lighting mail or postal cars.

Mail Catcher. Fig. 2901. A device, attached to the outside of a postal car, provided with a movable arm to take a mail pouch from a post at the side of the track while the train is in motion.

Mail Catcher Bracket. Fig. 2901. The brackets or sockets on either side of the postal door which hold the mail catcher.

Main Cock (Pintsch Gas Lighting). Fig. 2249. A cock usually placed in the saloon for the control of the low pressure supply. It regulates all the burners at once, in addition to which there are separate cocks to each.

Main Cock Cover (Pintsch System), Fig. 2249. A cast-iron cover with hinged lid to fit over the key shaft of the main cock. It is screwed to the side of a car or to a bulkhead.

Main Floor (Refrigerator Car). The top layer of boards in the floor of the car.

Main Reservoir (Air Brake). Figs. 1373, 1454. A cylindrical tank, carried on the locomotive, or motor car, to hold a supply of compressed air. So called in distinction from the auxiliary reservoirs under each car.

Main Roof (Refrigerator Cars). The outside roof. See CAR ROOF. On cars with clere-stories, the lower deck, or that part of the roof over the sides of the car and on either side of the deck or clere-story.

Making up Trains. See AIR BRAKES.

Male Center Plate. The body center plate is sometimes called a male center plate. See CENTER PLATE.

Malleable Iron. Cast iron which has been annealed and the brittleness greatly decreased by packing the castings in iron pots containing forge scale, hematite ore or some other oxide of iron and subjecting them to a continued red heat for from four to six days. They are then allowed to cool slowly. The change which takes place is internal, and while little or no carbon is removed its physical condition is changed from graphitic to amorphous or cement carbon and the iron is rendered less brittle. Malleable castings can be bent within moderate limits, but are not truly malleable like wrought iron.

Malleable Castings for Passenger and Freight Equipment Cars, Specifications for (M. C. B. Recommended Practice).

In 1915 the following specifications were adopted:

I. MANUFACTURE

1. *Process.*—Malleable-iron castings may be made by either the open-hearth, air furnace or electric furnace process.

2. *Annealing.*—Malleable castings shall be neither over nor under annealed.

II. PHYSICAL PROPERTIES AND TESTS

3. *Tensile Test.*—The tensile strength of the standard test bar shall not be less than 38,000 lb. per sq. in. with an elongation, measured in 2 in., of not less than five per cent.

4. *Transverse Test.*—The standard transverse test bar, tested cope side up and on supports 12 in. apart, with the load applied at the center, shall show the following deflection:

900 lb. with 1.25 in. deflection in ½ in. specimen
1400 lb. with 1.00 in. deflection in ⅝ in. specimen
2000 lb. with 0.75 in. deflection in ¾ in. specimen

NOTE.—The test specimen shall be 14 in. long, 1 in. wide and either ½, ⅝ or ¾ in. thick, these thicknesses to be proportioned to the thickness of the material which they represent.

5. *Special Tests.*—In addition to the above tests, the inspector shall have the right to satisfy himself of the suitability of the metal used for malleable castings made under these specifications, by breaking a reasonable number of castings from the sand, to examine for excessive mottling or graphite spots. In the case of castings of special design or importance, the inspector may also call for suitable test lugs, bearing a proper relation to thickness, to be left on the castings for final inspection, not over ¾ in. by ⅝ in. in section.

6. *Test to Destruction.*—If the purchaser or his representative desires, a casting may be tested to destruction. Such casting shall show good, tough malleable material.

7. *Standard Test Bars.*—All test bars shall be cast without chills, and with the ends left perfectly free in the molds, using heavy risers of sufficient height at each end to insure sound bars. Of the bars selected, two tensile and two transverse test bars shall be cast in one mold. Where the full heat goes into castings which are subject to specifications, two molds shall be poured within five minutes after tapping into the first ladle and two from the last iron of the melt. Molds shall be suitably stamped to insure identification of the bars, the bars being annealed with the castings. Where only a partial melt is required for work in hand, two molds shall be cast from the first ladle used and two after the required iron has been tapped.

(a) *Tensile Test Bars.*—The test bar as cast shown in Fig. 1 shall be used for all tensile tests.

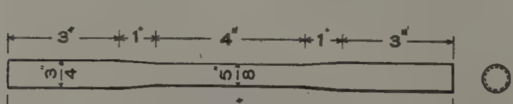


FIG. 1.

(b) *Transverse Test Bars.*—The purchaser and the manufacturer may agree upon a transverse test bar, as cast, the width of which shall be 1 in., the thickness ½ in., ⅝ in. or ¾ in., depending upon the thickness of the castings represented, and the length to be 14 in.

(c) *Test Bars from Finished Castings.*—If the purchaser or his representative so desire, a test specimen may be cut from the finished casting if possible.

8. *Number of Tests.*—Of the test bars required for each melt, two shall be tested for tensile strength and elongation and two for transverse deflection; these bars shall be taken from the hottest and coldest parts of the annealing furnace. The remaining bars are reserved for either the tensile or transverse test in case the other two bars fail to come up to the requirements through shrinkage spots.

III. FINISH

9. *Finish.*—(a) Castings shall be true to patterns, free from blemishes, scale or shrinkage cracks. A variation of 3/32 in. per ft. shall be permissible.

(b) Irregular castings shall be cast with shrinkage prints so that they will be equally strong at all points. Castings failing to withstand the strains produced by riveting into place will be rejected, and shall be replaced by the manufacturer.

IV. MARKING

10. *Marking.*—Such markings as indicated by the purchaser shall be put on the castings in such a way as not to interfere with the casting.

V. INSPECTION AND REJECTION

11. *Inspection.*—(a) The inspector representing the purchaser shall have free entry at all times, while work on the contract of the purchaser is being performed, to all parts of the manufacturer's works which concern the manufacture of the material ordered. The manufacturer shall afford the inspector, free of cost, all reasonable facilities to satisfy him that the material is being furnished in accordance with these specifications.

(b) The purchaser may make the tests and inspection to govern the acceptance or rejection of the material in his own laboratory or elsewhere. Such tests and inspection shall be made at the expense of the purchaser.

(c) All tests and inspection shall be so conducted as not to interfere unnecessarily with the operation of the works.

12. *Rejection.*—(a) Material which, subsequently to above tests at the mills or elsewhere and its acceptance, does not conform closely to the blue-print, or if distorted by improperly matched flasks, improper annealing, undue wrapping or any other defects, or fails to satisfy requirements as herein specified, will be rejected.

(b) All rejected material shall be replaced by the manufacturer at his own expense.

13. *Rehearing.*—Samples tested in accordance with this specification, which represent rejected material, shall be preserved for 14 days from date of test report. In case of dissatisfaction with results of tests the manufacturer may make claim for a rehearing within that time.

Manhole. An opening in a boiler or tank to enable a man to enter and make inspection or repairs.

Manhole Cover. 11, Fig. 173. A plate or lid to close a manhole.

Manhole Cover Chain. A chain with which a manhole cover is fastened to a tank to prevent it from falling when the manhole is open.

Manhole Hinge. A hinge by which a manhole cover is attached to the manhole ring.

Manhole Ladder (Tank Cars). An iron ladder extending down into the tank under the manhole to allow workmen to descend for purposes of cleaning, inspection or repairs.

Manhole Ladder Brace (Tank Cars). A wrought iron piece attached to the inside of the tank and to the manhole ladder to keep the latter in a vertical position.

Manhole Ring. A metal ring riveted around a manhole, and forming a seat for the cover.

Manifold. See Three-Pipe Manifold.

Mansell Retaining Ring. A mode of connecting steel tires to the wheel centers by a ring of an approximate L or U cross-section, which secures the tire to the wheel, so that every part of the tire is securely held, into however many pieces it may be ruptured. This ring is almost universally used in English passenger service. See Wheel and Car Wheel.

Mantle. Figs. 2251, 2255; Page 1257. A device used as a burner in mantle gas lamps, so constructed that when the gas is ignited the mantle becomes incandescent. See Pintsch Mantle Lamp.

Mantle Lamp. See Pintsch Mantle Lamp and Vapor System.

Marker. A lamp or flag used to indicate the rear end of a train. See Tail Lamp.

Marker Bracket. Figs. 2229, 2230. A term used to indicate both the bracket or socket on a car which supports marker or tail lamps as well as flags; and the bracket or arm which fits into the socket and supports the tail lamp.

Capacity of Cars, Marking. Reports will be found in the 1912 M. C. B. Proceedings, page 466, and 1913 Proceedings, page 554.

Marking on Freight Equipment Cars. Figs. 2995, 2998, 3000. (M. C. B. Standard.) Fig. M. C. B. 26-A. See Lettering Cars.

Master Car Builders' Association Pamphlet and Stationery Sizes (M. C. B. Standard).

REPORTS M. C. B. (M. C. B. STANDARD)

In 1893 a standard size of 6 inches by 9 inches was adopted for M. C. B. reports. See Proceedings 1893.

In 1894 standard sizes for publications of this nature were adopted and the size of postal card circular was changed in 1895 so that they are now as follows:

For postal card circulars, 3½ inches by 5½ inches.

For pamphlets and trade catalogues. { 3½ inches by 6 inches. 6 inches by 9 inches. 9 inches by 12 inches.

For specifications and letter paper, 8 inches by 10½ inches.

In connection with these standards it was decided that a standard practice should be to have the proper standard dimensions, and the word "standard" printed on the upper left-hand corner of title-page or cover whenever practicable.

In 1912 the standard size of specifications and letter paper was changed to the Government standard, namely, 8 by 10½ inches.

Master Controller. See Control System.

Master Key. A key which commands many locks of a certain set, the keys of which are not interchangeable.

Match Box Holder. Fig. 2013.

Match Striker. Figs. 2012-2016. A metal plate with a rough surface.

Match Striker Frame. A metal frame for holding a piece of sand or emery paper on which to strike matches.

Materials, Rules for Loading of. See Rules for Loading Materials.

Meat Timbers (Refrigerator Car). The vertical and horizontal timbers inside the refrigerating chamber on which the meat is suspended.

Menu Card Holder. Fig. 2014.

Mercury Vapor Lamp. A lamp consisting of a tube containing mercury through which the electric current is passed, vaporizing the mercury and giving out a greenish light.

Metal Hose. Fig. 1508. See Hose.

Metal Screw Thread. A form of screw thread used when both the male and female screws are made of metal. Metal threads are made of the same size as the spaces between them, whereas the spaces between wood screw threads are made wider than the projections. See also Sellers System of Screw Threads.

Meter. See Condensation Meter, Flow Meter.

Metric System. The application of this system to railroad measurements was considered in an individual paper by Angus Sinclair; 1903 M. C. B. Proceedings,

Mica Chimney (Pintsch Lamp). A chimney for use on all center lamps, being placed immediately above the ring reflector, allowing a portion of the light to be directed toward the roof of the car.

Micrometer Gage. A form of gage for very minute and exact measurements.

Middle Door Rail. A horizontal bar in a door frame intermediate between the top and bottom rails. See Door Frame.

Middle Transom (Six-Wheel Trucks). The term applied to the two transoms nearest the center of the truck, in distinction from the two outside transoms.

Milk Car. Figs. 241, 244. A car similar to a refrigerator car, but generally built for operation in passenger trains for carrying fresh milk in cans.

Miller Coupler. A form of automatic coupler for passenger cars largely in use before the general adoption of the M. C. B. type of vertical plane coupler. It consisted of a shank and a head with a fixed projection or hook which engaged with a corresponding hook when cars were brought together, by side displacement of the drawbars. To uncouple, one or both of the drawbars were pulled to one side by an uncoupling lever and chain operated from the platform. A strong spring kept the drawbars normally in the center line of draft.

Mine Car. Figs. 438-441; Pages 1123, 1189, 1209, 1215. A small car for carrying minerals in mines, usually having four wheels, and provided with a dumping device by which the load may be quickly and completely discharged.

Mineral Wool. A substance having much the appearance which its name implies, manufactured from the slag of iron furnaces by throwing against it

while in the molten state a strong blast of air. It is used for deadening in passenger cars and also largely as a non-conductor for coating steam pipes and boilers.

Molding. Figs. 1610, etc.; Page 1164. A mode of ornamentation by grooved or swelling bands or forms, following the line of the object. Small moldings are often termed beads and also fillets. A cove molding is one of concave section. There are a great variety of other special technical terms for different forms of moldings. Moldings are either straight or waved. See also Deck Eaves Molding, Eaves Molding, Window Cove Molding, Window Molding, Window Sill Molding.

(For Car Seats.) Also called seat back bands or seat molding. A metal band to finish the edge of the seat back. Plush or leather covered strips are also used.

Molding Joint Cover. A piece of wood or metal in some ornamental form for covering the joints of two pieces of molding.

Monitor Top. A Clere-Story.

Mortise Lock. Figs. 1806, 1832, etc. A lock adapted to be inserted into a mortise in the edge of a door, so as only to expose the selvage or edge plate. See Lock.

Motor (Electric). Figs. 2050, etc.; Figs. 2585, etc.; Pages 1176-1178. A machine for converting electrical energy into mechanical energy of rotation. May be operated by either alternating or direct current.

(Gasolene). An internal combustion engine, using gasolene as the means of power.

Motor Bearing. See Fig. 2584 for the details of railway electric motor bearing.

Motor Cut-Out. A switch in the bottom of a controller which, when opened, cuts out one motor of a two-motor equipment or two motors of a four-motor equipment.

Motor Car. Figs. 385-400; 2738-2741, etc. A car driven by some form of motor which is carried by the car itself. The common types of motor cars are electric, which receive current from a third rail, trolley wire or storage batteries; gasolene, which are propelled by internal combustion engines; gasolene-electric or gas-electric, which obtain power from an electric generator driven by an internal combustion engine carried in the car; and steam, which obtain power from a steam boiler and engine located in the car. See Car, and Self-Propelled Car.

Motor Controller. See Controller.

Motor-Driven Air Compressor (Air Brake). An air compressor driven by a motor for use on electric cars. See Air Compressor.

Motor Inspection Car. A small four-wheel car with seats, propelled by a gasoline engine. See Inspection Car.

Motorman's Air Brake Valve. See Brake Valve.

Motor Trucks. Fig. 390.

Muck Bar. Bar iron which has passed once through the rolls. It is usually cut into lengths, piled, and rerolled. Certain grades of iron axles are made directly from muck bars and contain no scrap.

Muffler (Vacuum Brake). A device to render noiseless the emission of steam at the ejector when brakes are applied. It is simply a collection of beads or shot, through the interstices of which the steam forces its way.

Muffler Exhaust. See Exhaust Muffler.

Muley Axle. An axle without collars.

Mullion. A bar between panes of glass or panel work. See Door Mullion.

Multiple Unit Control (Westinghouse). With the Westinghouse unit-switch system of automatic multiple-unit control the unit-switches, which perform the same functions as contactors, are operated by compressed air at 70 lbs. per sq. in., taken from the air-brake system, the pistons being controlled by electro-magnetic needle valves. These switches are interlocked and automatically make the proper combination of motor connections with the resistances. A limit relay is used for arresting the sequence of switch movements when the main motor current valve rises above a safe amount. The master controller consists of a small box containing a horizontal drum or roller and suitable contact fingers. The operating handle revolves in a vertical plane, and when moved to the right the motors accelerate forward to full speed; when moved to the left the motors accelerate to full speed reverse. There are three points or positions in each direction. The first is the switching point and throws all motors in series with full resistance in circuit. The second point is the series position and the motors can be operated continuously in series at half speed with the handle in this position. The third point is the parallel position and the motors are connected in multiple with full power. To cut off the current, the pressure on the controller handle is released and a spring returns it to the "off" position. Current for the control circuit is obtained from a small storage battery of 7 cells, giving 14 volts. Multiple-unit control apparatus for single-phase equipments differs but slightly from that used for direct-current motors. The contactors control circuits of varying voltage taken from taps on the auto-transformer. The speed of the motors is thus regulated by varying the voltage impressed on them.

Multiple Unit Control System (Sprague-General Electric). See Electric Motor Car. A system of control where one or more controllers are operated from a distance.

This system has been developed with special reference to the operation of a train consisting of several motor cars coupled together, all motors being controlled simultaneously by a single operator. Each motor car is equipped with a motor controller, one or two master controllers, and control couplers, together with such other apparatus as switches, fuses, rheostats, etc., as constitutes a complete operative motor car equipment.

The motor controller consists of a number of electrically operated switches, called "contactors," which close the various power and motor circuits, and which carry only the current for the operating coils of the contactors. These latter are designed to open the motor circuit contacts by gravity, and are provided with an efficient magnetic blowout for quickly and positively disrupting the arc thus formed. The motor controller also includes an electrically operated reversing switch, called "reverser," the function of

which is to connect the motor armatures and fields in the proper relations for giving forward or backward movement of the car. The reverser consists of a drum having two positions and carrying the necessary contacts for engaging fixed contact fingers, together with two operating coils, one for throwing the reverser to each position. The operation of this reverser is also effected by the master controller.

The master controller is similar in construction to the ordinary hand controller, but very small and easily operated. It is provided with separate operating and reversing interlocked handles, and has a magnetic blowout for disrupting the arcs formed on opening the control circuit connections.

The combinations of motors, rheostats, etc., effected by the motor controllers are the same as those accomplished by ordinary hand controllers, giving series and parallel operation of motors and two economical running speeds. (See CONTROLLER.)

Where several cars are coupled in a train the control circuits of the various cars are joined by means of couplers located at the end of each car, so that all motor controller operating circuits and all master controllers are connected together, making all of the motor controllers operative from any master controller. The cars may be coupled into a train without reference to their relative positions, and either end of any car may be coupled to any other car in the train.

The couplings for connecting the control circuits between cars consist of a coupler socket fixed to the end of the car, and a jumper consisting of two coupler plugs connected by a multiple cable. The coupler sockets and plugs contain corresponding metal contacts for the connection of the electrical circuits.

A cut-out switch is provided on each car, by means of which damaged motors or motor controllers may be disconnected from the energizing circuits.

Multiplier (Electric Lighting). A device used in connection with a lamp regulator to prevent variations in the current supply to the lamps.

N

Nail. A small pointed piece of metal, usually with a head, to be driven into a board or other piece of timber, and serving to fasten it to the other timber.

The common nails of commerce are divided into cut nails, clinch nails, and wire nails. They are distinguished in size by the number of pennies, as 10d., 20d., etc., nails.

Nailing Sill. See NAILING STRIP and FLOOR NAILING STRIP.

Nailing Strip. 53, Figs. 34, 35; 14, Fig. 147; 2, Fig. 260; 9, 10, 11, Fig. 348. A strip of wood laid over a metal frame and bolted to it, to which the boards are nailed in a combined wood and steel car. In refrigerator cars, where there is generally more than one floor course, nailing strips are also used. They are also used in some cases for fastening insulation. See also SIDE NAILING STRIP and FURRING.

Nailing Strip Bracket. A bracket secured to the sills to hold in place the NAILING STRIP.

Nailing Strip Cross Ties. Light members of a metal underframe extending across the sills for the purpose of supporting the nailing strips.

Nailing Strip Silencer. 17, Fig. 348. Serves a purpose similar to that of a NAILING SILL BRACKET.

Name Plate. See DOOR NAME PLATE and NOTICE PLATES.

Narrow Gage. The distance in the clear between the heads of the rails of a railroad when less than 4 ft. 8½ in. See GAGE.

Narrow Vestibule. See WIDE VESTIBULE.

Needle Beam. 28, Fig. 260; Fig. 509. The transverse members of the underframe of a car between the body bolsters which support the truss rod queen posts. Also act as crossties for the longitudinal sills. The term needle beam is sometimes applied to what is more properly a cross bearer or cross tie.

Needle Beam Bottom Tie Plate. A plate which extends across the bottom of a needle beam of the built-up type and ties the various members together.

Needle Beam Center Filler. A casting between the center sills, forming a part of a needle beam of the built-up type.

Needle Beam Truss Rod. A truss rod used in a built-up form of needle beam. Such a needle beam consists of the Cross Tie Timber Queen Posts and Truss Rod. See also CROSS TIE TIMBER TRUSS ROD.

Negative. An arbitrary term used in electrical engineering to distinguish the pole or connection toward which current is considered to flow, from the positive pole or connection away from which current flows. Thus direct current always flows from the positive pole or brush of a battery or dynamo through the external circuit and back to the negative pole or brush. Positive poles are distinguished on drawings by a plus (+) sign, and negative poles by a minus (—) sign. In a ground return system the ground connection is always negative.

Nest Spring. A spiral spring with one or more coils of springs inside of it. See HELICAL SPRING.

Night Latch. Figs. 1808, etc. A spring door lock which requires a key to be opened from the outside, but which can be opened from the inside without one. See LATCH and LOCK.

Nipple (Pipe Fittings). Figs. 2385, etc. A short pipe with a screw thread cut on each end, used for connecting couplings, tees, etc., together or with some other object, as a tank or heater. See AIR BRAKE HOSE NIPPLE.

Non-Pressure Head (Brake Cylinder). The cover for the end of the brake cylinder opposite to that having air pressure against it. It has an opening in the center for the piston rod.

Non-Vestibuled Car (Passenger Equipment). A car having either open platforms, with hoods, or having dummy ends.

Nosing (of a Lock). A KEEPER.

(Of Steps.) The part of a tread board which projects beyond the riser, hence the metallic moldings used to protect that part of the tread board. The nosings should be distinguished from the step facings.

Notice Plate. Fig. 2004. Varieties are the platform notice plate, saloon notice plate, etc.

Nozzle. See TANK NOZZLE.

Nut. A small block of metal or wood containing a concave or female screw. Nuts take their name from the bolts, rods or other parts to which they are attached. They are usually either square or hexagonal. See SCREW THREADS.

Nut Fastener. See NUT LOCK.

Nut Lock. Figs. 1571-1600; Pages 1132, 1151. A device for locking the nut in place on the bolt after it has

been drawn up. See also LOCK NUT. Also called nut fasteners.

Nuts. See SCREW THREADS, BOLT HEADS and NUTS.

O

Oakette. An artificial leather used for curtains and upholstering. It is made by coating a cloth fabric with a compound which gives it the appearance of leather.

Observation-Buffet Car. See BUFFET CAR and OBSERVATION CAR.

Observation Car. Figs. 312, 313, 332, 345, 347. A car equipped with an observation end. See CAR and OBSERVATION END.

A special type of observation car is also in limited use in mountainous regions and generally has open sides and seats arranged in tiers.

Observation End or **Observation Room.** Figs. 175, 179. That end of a car which is fitted with an extended platform and large windows for the purpose of affording passengers an unobstructed view. Commonly applied to parlor, sleeping and business cars, which are run as the last car in a train, from which passengers may get a view of the country, and especially of the track and structures.

Observation Parlor Car. A parlor car with an observation end. See OBSERVATION END.

Observation Platform Railing. Figs. 615-618.

Observation Sleeping Car. Figs. 345-347. A sleeping car with an OBSERVATION END. See OBSERVATION END.

Officers' Car. A BUSINESS CAR.

Oil, Boiled Linseed, Specifications for, (M. C. B., Recommended Practice.)

In 1916 the following Specifications were adopted for Boiled Linseed Oil:

1. *Scope.*—These specifications apply to boiled linseed oil to be used in mixing paint for M. C. B. equipment cars.

I. PROPERTIES AND TESTS

2. *Properties.*—Boiled linseed oil shall conform to the following requirements:

	Max.	Min.
Specific gravity at $\frac{15.5°}{15.5°}$ C.	0.945	0.937
Acid number	8	.....
Saponification number	195	189
Unsaponifiable matter, per cent.	1.5	.....
Refractive index at 25° C.	1.484	1.479
Iodine number (Hanus)	....	178
Ash, per cent.	0.7	0.2
Manganese, per cent.	....	0.03
Calcium, per cent.	0.3	.....
Lead, per cent.	....	0.1
Flash point	....	260 C.

II. METHODS OF TESTING

3. *General.*—The sample should be thoroughly agitated before the removal of a portion for analysis.

4. *Specific Gravity.*—Use a pyknometer, or Westphal balance, accurately standardized and having a capacity of at least 25 cc., or any other equally accurate method, making a test at 15.5° C., water being 1 at 15.5° C.

5. *Acid Number.*—Expressed in milligrams of KOH per gram of oil. Follow the method described in Bulletin No. 107, revised 1908, Department of Agriculture, Bureau of Chemistry, page 142.

6. *Saponification Number.*—Expressed as with acid number. Blanks should also be run to cover effect of alkali in glass. Follow method given in Bulletin No. 107, revised 1908, Department of Agriculture, Bureau of Chemistry, pages 137-138.

7. *Unsaponifiable Matter.*—Follow Boemer's method taken from his Ubbelohde Handbuch der Ole u. Fette, pages 261-262. "To 100 g. of oil in a 1000 to 1500 cc. Erlenmeyer flask add 60 cc. of an aqueous solution of potassium hydroxide (200 g. KOH dissolved in water and made up to 300 cc.) and 140 cc. of 95 per cent alcohol. Connect with a reflux condenser and heat on the water bath, shaking at first until the liquid becomes clear. Then heat for one hour with occasional shaking. Transfer while yet warm to a 2000-cc. separatory funnel to which some water has been added, wash out the Erlenmeyer with water, using in all 600 cc. Cool, add 800 cc. of ether and shake vigorously one minute. In a few minutes the ether solution separates perfectly clear. Draw off the soap and filter the ether (to remove last traces of soap) into a large Erlenmeyer and distill off the ether, adding, if necessary, one or two pieces of pumice stone. Shake the soap solution three times with 400 cc. of ether, which add to the first ether extract. To the residue left after distilling the ether add 3 cc. of the above KOH solution, and 7 cc. of the 95 per cent alcohol, and heat under a reflux condenser for 10 minutes on the water bath. Transfer to a small separatory funnel, using 20 to 30 cc. of water, and after cooling shake out with two portions of 100 cc. of ether; wash the ether three times with 10 cc. of water. After drawing off the last of the water, filter the ethereal solution so as to remove the last drops of water, distill off the ether, dry residue in water oven and weigh."

Or, any accurate method involving the extraction of the dried soap may be used.

8. *Refractory Index.*—Use a properly standardized Abbe Refractometer at 25° C., or any other equally accurate instrument.

9. *Iodine Number (Hanus):* Follow the Hanus method as described in Bulletin No. 107, revised 1908, Department of Agriculture, Bureau of Chemistry, page 136.

10. *Ash.*—The determination of the percentage of ash and the constituents thereof may be made by any method which gives accurate results.

Oil, Raw Linseed, Specifications for (M. C. B. Recommended Practice).

In 1916 the following Specifications were adopted for Raw Linseed Oil:

1. *Scope.*—These specifications apply to linseed oil to be used in mixing paint for M. C. B. equipment cars.

I. PROPERTIES AND TESTS

2. *Properties.*—The material should be good, pure oil of a pale yellow color, made from No. 1 flaxseed, well clarified by settling and age, and unmixed with any foreign substance whatever. The raw linseed oil shall conform to the following requirements:

	Max.	Min.
Specific gravity at $\frac{15.5°}{15.5°}$ C.	0.936	0.932
or		
Specific gravity at $\frac{25°}{25°}$ C.	0.931	0.927
Acid number	6.00	.....
Saponification number	195	189
Unsaponifiable matter, per cent.	1.50	.....
Refractive index at 25° C.	1.4805	1.4790
Iodine number (Hanus)	....	178
Flash point	....	260

II. METHODS OF TESTING

3. *General.*—All tests are to be made on oil which has been filtered at a temperature of between 60 and 80° F. through paper in the laboratory immediately before weighing out. The sample should be thoroughly agitated before the removal of a portion for filtration or analysis.

4. *Specific Gravity.*—Use a pyknometer, or Westphal balance, accurately standardized and having a capacity of at least 25 cc. or any other equally accurate method, making a test at 15.5° C., water being at 15.5° C., or a test at 25° C., water being 1 at 25° c.

5. *Acid Number.*—Expressed in milligrams of KOH per gram of oil. Follow the method described in Bulletin No. 107, revised 1908, Department of Agriculture, Bureau of Chemistry, page 142.

6. *Saponification Number.*—Expressed as with acid number. Blanks should also be run to cover effect of alkali in glass. Follow method given in Bulletin No. 107, revised 1908, Department of Agriculture, Bureau of Chemistry, pages 137-138.

7. *Unsaponifiable Matter.* — Follow Boemer's method taken from his Ubbelohde Handbuch der Ole u. Fette, pages 261-262. "To 100 g. of oil in a 1000 to 1500 cc. Erlenmeyer flask add 60 cc. of an aqueous solution of potassium hydroxide (200 g. KOH dissolved in water and made up to 300 cc.) and 140 cc. of 95 per cent alcohol. Connect with a reflux condenser and heat on the water bath, shaking at first until the liquid becomes clear. Then heat for one hour with occasional shaking. Transfer while yet warm to a 2000-cc. separatory funnel to which some water has been added, wash out the Erlenmeyer with water, using in all 600 cc. Cool, add 800 cc. of ether and shake vigorously one minute. In a few minutes the ether solution separates perfectly clear. Draw off the soap and filter the ether (to remove last traces of soap) into a large Erlenmeyer and distill off the ether, adding if necessary one or two pieces of pumice stone. Shake the soap solution three times with 400 cc. of ether, which add to the first ether extract. To the residue left after distilling the ether add 3 cc. of the above KOH solution, and 7 cc. of the 95 per cent alcohol, and heat under reflux condenser for 10 minutes on the water bath. Transfer to a small separatory funnel, using 20 to 30 cc. of water, and after cooling shake out with two portions of 100 cc. of ether; wash the ether three times with 10 cc. of water. After drawing off the last of the water, filter the ethereal solution so as to remove the last drops of water, distill off the ether, dry residue in water oven and weigh."

Or, any accurate method involving the extraction of the dried soap may be used.

8. *Refractive Index.*—Use a properly standardized Abbe Refractometer at 25° C. or any other equally accurate instrument.

9. *Iodine Number (Hanus):* Follow the Hanus method as described in Bulletin No. 107, revised 1908, Department of Agriculture, Bureau of Chemistry, page 136.

Oil Box. A Journal Box.

Oil Car. A car made especially for the transportation of mineral oil. Some oil cars are built for carrying barrels of refined oil. Crude oil and refined oil are usually carried in Tank Cars.

Oil-Electric Car. See Motor Car.

Oil Lamp. Figs. 2239, etc. A lamp for burning oil. See Tail Lamp.

Open Door Stop. A block of iron or wood fastened to the side of a freight car to prevent a sliding door from sliding too far when opened.

Open Platform. A platform covered by a hood or canopy but not enclosed by a vestibule.

Ore Car. Figs. 84-94. Page 1251. A hopper car made especially for carrying iron or other ores. Because of the great weight of ore relative to its bulk, ore cars are generally shorter and consequently of less cubic capacity than other forms of hopper cars. See also Car.

Ormolu. A style of bronzing.

Ottoman. A carpet-covered movable cushion serving as a foot rest.

Outer Intermediate Sill. A term applied to the two intermediate sills next to the side-sills, to distinguish them from the two intermediate sills adjacent to the center sills, which are the inner intermediate sills.

Outlet Valve (Tank Cars). 14, Fig. 173; Fig. 2023; Page 1122. The valve by means of which the tank is emptied.

Outside Body Truss Rod. When two or more truss rods are used under each side of a car body those farthest from the center are called outside body truss rods, in distinction from the inside truss rods.

Outside End Piece (of Wooden Truck Frame). The end piece nearest the end of the car, in distinction from the inside end piece. See End Piece.

Outside End Sill. A type of box car framing in which the end sill projects outside the sheathing, forming a narrow platform at the ends of the car.

Outside Hung Brake. Brake gear hung so that the shoes bear on the outer side of the wheels, or the side of the wheels away from the bolster.

Outside Sills. The side sills.

Outside Transom (Six-Wheel Trucks). The term applied to the two transoms farthest from the center of the truck, in distinction from the middle transoms.

Outside Wheel Piece Plate. An iron plate fastened to the outside of a wheel piece to strengthen it.

Outside Window Sill. A horizontal piece of wood or iron under a window on the outside of a car on which the sash rests.

Outside Window Stop. A wooden or metal strip attached to a window post on the outside of a sash to hold the latter in its place.

Overhang (of a Roof). The projection beyond the sides. (Of a Car Body.) That part of a car body between the body bolster and end.

Overhang Brace Rod (Passenger Equipment Car Framing). A truss rod extending over the side sills and between the sheathing and wainscoting. Its office is to sustain and stiffen that part of the underframe which overhangs at the ends and outside the bolsters.

Overhead Equalizer Spring (Vestibule). A façe plate buffer spring is a more appropriate term, as it corresponds to the side stem buffer spring of a platform equipment.

Overhead Lining (Refrigerator Cars). See Ceiling

Overhung Door. A sliding door which is hung from or supported on a rail above the door.

P

P. C. Brake Equipment. Figs. 1368, 1369.

Package Rack. A basket rack.

Packing. Page 1174. Any substance used to fill a gland to make a tight joint around valve stem or spindle. Leather, rubber, or metal rings are used. Also the oiled waste for lubricating journals. See JOURNAL PACKING AND WASTE.

Packing Blocks. Rectangular blocks gained into the center sills and draft timbers, and serving the purpose of connecting them firmly together longitudinally. The term is borrowed from bridgework, in which the form of packing block is very common. They are called key blocks.

Packing Expander (Air Brake). A spring wire ring for spreading out the leather packing of the brake piston so as to make it fit air-tight.

Packing Leather (of Journal Boxes). A dust guard is sometimes called packing leather.

(Air Brake.) A ring of leather used in connection with brake cylinder pistons to make an air-tight fit. When so used it is always accompanied with a packing leather expander. A packing leather for a piston rod is called a cup leather, and is compressed by a piston spring. See PISTON PACKING LEATHER.

Packing Ring (Triple Valve). A circular metallic ring of variable rectangular cross-section which is placed in grooves in the edge of the piston to make it fit air-tight in the cylinder. The rings are turned slightly larger than the cylinder and cut apart diagonally at one point so that when compressed they will tend to spring open.

(Hose Coupling.) An India rubber ring in a coupling case which makes a tight joint between the two parts of the coupling.

Padlock. Figs. 1811, etc. A loose lock having a semicircular shackle jointed at one end so that it can be opened, the other end of the link being locked when desired by the entrance of the sliding bolt into it. Such locks are used to secure a hasp or the like on a staple or similar device by passing the link through the staple. A spring padlock is one which snaps shut and locks by pressure only. A dead padlock has no springs.

Painting (of Passenger Equipment Cars). Pages 1234-1237. Consists usually of the priming, rough stuff or scraping filling coats, color coats and varnishing. The care and expense devoted to the process and the order and number of the coats are varied.

Painting (Steel Cars). A report of a committee on protective coatings for steel cars; the method of application and the results of the experiments will be found in the 1908 M. C. B. Proceedings, page 371. See also SPECIFICATIONS FOR TURPENTINE, LINSEED OILS, IRON PASTE, DRIER, LEADS, etc.

Paint, Black, Specifications for (M. C. B. Recommended Practice).

In 1917 the following specifications for Black Paint were adopted as Recommended Practice:

1. *Scope.*—These specifications cover carbon black semi-paste, to be used as a protective paint for M. C. B. equipment cars.

I. CHEMICAL PROPERTIES AND TESTS.

2. *Chemical Composition.*—(a) Paste. The paste shall conform to the following:

Pigment.........43 to 47 per cent by weight.
Linseed Oil.......53 to 57 per cent by weight.

(b) Pigment. The pigment shall conform to the following:

*Lampblack or Carbon Black,
not less than 30 per cent.
Red Lead...........not less than 8 per cent
Oxide of Iron...........not over 15 per cent
China Clay or other approved pigment,
not over 44 per cent.

*The lampblack shall be of a good quality and of such a character as to produce the standard shade. Ground coal, etc., will not be considered.

In view of the great variety of inert materials available for use as constituents of paint pigments, some of which are undesirable, it has been deemed advisable to ask those desiring to use any other inert material in place of a part or the whole of the China clay called for in the formula to submit a sample of the material in dry form for examination. Such material shall be approved before using and shall not be changed after having been approved. Phosphates, barytes, sulphates of lime or gypsum, carbonate of lime or whiting, or any other carbonates or sulphates, will not be allowed as substitutes for silica.

(c) The presence of caustic substances, such as caustic lime or any soaps or other emulsifying material, will not be permitted.

3. *Oil.*—The linseed oil shall conform to the M. C. B. Specifications for Linseed Oil.

II. PHYSICAL PROPERTIES AND TESTS

4. *Shade.*—A sample of dry pigment showing the standard shade will be furnished, and shipments will be required to conform strictly to standard. The shade of paint being affected by the grinding, the railroad company's standard shade is that given by the dry sample furnished, mixed with the proper amount of oil and ground, or, better, rubbed up in a small mortar with pestle until the paste will pass the railroad company's test for fineness. It is best to use fresh samples of the dry pigment for each day's testing. The comparison should always be made by putting a small hillock of the standard paste and that to be compared near each other on glass, and then laying a thin piece of glass as a cover on the two hillocks and pressing them together until the two samples unite. The line where the two samples unite is clearly marked if they are not the same shade. It is recommended to use for the cover the thin glass commonly used by microscopists, since the thin glass does not change the shade perceptibly.

5. *Fineness.*—(a) The pigment shall be so fine that, after having separated from the oil and freed from hydroscopic moisture, and then thoroughly mixed again with pure linseed oil which has also been freed from moisture, in the proportion of two parts oil to one part of the pigment, by weight, it will stand the following test, viz.:

(b) Place a small amount of the above mixture on one end of a strip of glass, set the strip vertically where the temperature is maintained at 70° F. and allow it to remain undisturbed for thirty minutes. As the mixture runs down the glass, the fineness will be acceptable if the oil and pigment do not separate in the first inch.

6. *Sampling.*—A sample of the paste shall be taken

at random from any barrel, can or package in each shipment, at destination.

7. *Place of Making Tests.*—The purchaser may make the tests to govern the acceptance or rejection of the material in his own laboratory or elsewhere. such tests shall be made at the expense of the purchaser.

III. PERMISSIBLE VARIATIONS

8. *Weight.*—As quotations are made by the pound on the basis of the paint weighing not over 10.5 lb. per gallon, all paint received which weighs more than 10.5 lb. per gallon, but not over 11.5 lb. per gallon, will be accepted at the weight of 10.5 per gallon, the excess weight being at the expense of the manufacturer.

IV. PACKING AND MARKING.

9. *Packing.*—Standard black paste shall be put up in moisture-proof barrels, cans or packages, according to the railroad company's requirements.

10. *Marking.*—The manufacturer shall mark the black paste packages according to the railroad company's requirements.

V. INSPECTION AND REJECTION.

11. *Inspection.*—The inspector representing the purchaser shall have free entry, at all times while work on the contract of the purchaser is being performed, to all parts of the manufacturer's works which concern the manufacture of the material ordered. The manufacturer shall afford the inspector, free of cost, all reasonable facilities to satisfy him that the material is being furnished in accordance with these specifications.

12. *Rejection.*—Material represented by samples which fail to conform to the requirements of these specifications will be rejected.

13. *Rehearing.*—Samples tested in accordance with this specification, which represent rejected material, shall be preserved for fourteen days from date of test report. In case of dissatisfaction with results of tests, the manufacturer may make claim for a rehearing within that time.

Pamphlets, Catalogs, Specifications, etc. See MASTER CAR BUILDERS' ASSOCIATION REPORTS.

Panel. A board inserted in the space left between the stiles and rails of a frame or between moldings. Sometimes metal plates are used for this purpose. Door panels in passenger cars are usually only the middle and lower or twin door panels. The upper door panel is usually of glass. Window panels come between the windows, and are distinguished as outside and inside. Wainscot panels come below the windows, between the upper and lower wainscot rails. Other interior panels are deck side panels and end panels, the latter sometimes called ventilator panel, and the end roof panel over the door.

(Of a Truss.) The space between two vertical posts or braces and the two chords of a truss.

(Electric Lighting.) A board or support for electric switches and other apparatus.

Panel Back Seats. Fig. 1699. A car seat made with a loose panel in the back, pivoted and supported by springs set in the seat back frame. The panel pushes back and accommodates itself to the occupant's back.

Panel Ceiling. Any form of ceiling divided into panels. This term is commonly used synonymously with wood or Agasote ceiling.

Panel Furring. Nailing strips or blocks for panels.

Panel Lamp. An ALCOVE LAMP.

Pantagraph Trolley (Electric Motor Car). Figs. 386, 387, 2608, 2610. A current collecting device for an overhead conductor consisting of a diamond shaped jointed frame operated by springs or compressed air, and having a suitable collector at the top.

Pantasote. Page 1238. A substitute for leather used for upholstering and decorating cars and steamships. The material was first made by R. P. Bradley, a chemist, and the ingredients are secret. That it contains rubber or any animal substance is denied. It is made by sheeting two or more pieces of cloth or canvas together, with the warp running in different directions, to give strength. The sheet making the leather side is passed between heavy rollers many times, and each time it receives a very thin coat of pantasote material, and this is kept up until the cloth or canvas is thoroughly saturated and coated. The color is added to the pantasote material and is incorporated into the fabric. It is very like leather, and is not readily distinguished from it.

Paper Box (Postal Car). Fig. 2904. A box used for the distribution of papers.

Parallel. A method of connecting two or more pieces of electrical apparatus of a common circuit so that the positive poles of each are connected to a common positive conductor and the negative poles are connected to a common negative conductor. See SERIES.

Parallel Brake Hanger. See BRAKE BEAM ADJUSTING HANGER.

Parcel Rack. See BASKET RACK.

Parlor Car. Figs. 310, 311, 317, 354. A car for day travel but of a more luxurious character than a day coach, having revolving seats, smoking compartment and other conveniences, and on which an extra fare is charged. Operated on many roads by the Pullman Company and often referred to as Pullman cars. The term chair car is also sometimes used, but incorrectly, as a chair car is properly a day coach with reclining seats, on which no extra fare is charged. See CAR.

Parlor Car Chair. Figs. 1690, 1691, 1695-1700. The most common type of chair for parlor cars is a simple arm chair revolving on a pivot which enters a fixed pedestal. In observation cars, etc., ordinary chairs are commonly used.

Parlor-Café Car. See CAFÉ-PARLOR CAR, CAFÊ CAR and PARLOR CAR.

Parting Bead or **Parting Strip.** A strip which acts as a distance piece between two objects, as a window and a window blind.

Parting Rail (Door Frame). A vertical rail between the bottom and middle or middle and top rails of a door or partition, dividing a panel into twin panels.

Partition Stop (Door Holder). So called in distinction from a floor stop.

Passenger Car. Figs. 293-400, 2736-2741; Pages 1247, 1280, 1281, 1300. A car used for carrying passengers. This term is, however, generally confined to that class of passenger cars commonly known as day coaches, which are equipped with seats or reclining chairs for day travel. See CAR, COACHES, PARLOR CAR, and SLEEPING CAR.

Passenger Cars, Cleaning. A topical discussion on good methods for terminal cleaning of passenger cars and as to whether it is advisable to have oil in the cleaning mixture will be found in the Master Car Builders' Proceedings, 1900, page 199. A topical discussion on up-to-date cleaning of passenger equipment will be found in the 1907 M. C. B. Proceedings, page 263.

Passenger Car Journal Box. See JOURNAL BOXES and DETAILS.

Passenger Car Pedestals. (M. C. B. Standard.) Fig. 2982. For Journals, 3¾ by 7 inches. Sheet M. C. B. 21. The pedestal shown on this sheet was recommended in 1874. See Proceedings 1874, page 40; again approved as Standard in 1881; see Proceedings 1881, pages 14, 15 and 27. Also approved by the Master Mechanics' Association in the same year. Again adopted as Standard in 1893. Weight, 141 pounds.

For Journals, 4¼ by 8 inches. Sheet M. C. B. 22. Fig. 2984.

In 1898 a Recommended Practice was adopted for passenger car pedestal for journal box with 4¼ by 8 inch journal, and was formerly shown on Sheet M. C. B.—H. In 1901, as a result of letter ballot, this was changed to Standard, and is now shown on Sheet M. C. B. 22.

Passenger Car Pedestal (M. C. B. Standard.) Fig. 2983. For Journal Box, 5 by 9 inches. Sheet M. C. B. 22. Adopted as Recommended Practice 1903. Revised 1909. Adopted Standard 1911.

Passenger Equipment Cars, Steam and Air Connections for. See STEAM AND AIR CONNECTIONS FOR PASSENGER EQUIPMENT CARS.

Passenger Train Car or **Passenger Equipment Car.** A car usually operated in passenger trains. See CAR.

Paste. See IRON PASTE, OXIDE OF.

Patents. An individual paper by Paul Synnestvedt on the value of patents will be found in the M. C. B. Proceedings, 1915, page 411.

Pawl (Brake Ratchet Wheel). Figs. 1558, 1561. A pivoted bar adapted to fall into the notches or teeth of a wheel as it rotates in one direction, and to restrain it from back motion. Used in windlasses, capstans and similar machinery. See RATCHET WHEEL.

Pedestal (Postal Car). Fig. 2908. Standards which are used to carry the two longitudinal rods near the center of the car which support one side of the distributing tray, dumping tray or bridge. The pedestal fits in a socket in a base plate and is usually secured in place by bolts with wing nuts, so that it can be easily removed. Also called a center stand or standard.

(Truck.) 5, Fig. 1003. Fig. 1180. A casting of somewhat the form of an inverted letter U, bolted to the wheel piece of a truck frame to hold the journal box in its place, while permitting a vertical movement. The two projections of a pedestal are called pedestal legs, and the space between them a jaw, which is closed at the bottom by a pedestal tie bar. In Great Britain pedestals are called axle guards on cars and horn plates on locomotives.

(Revolving Chairs.) The stand by which the chair is supported; consists of three portions—base, column and seat frame.

Pedestal Jaw. The vertical side member of a truck pedestal. See PEDESTAL.

Pedestal Spring. A spring which rests on a journal box between the jaws of a pedestal.

Pedestal Stay Rod. 7, Fig. 1003. A transverse rod connecting the pedestal tie bars on each side of a truck to prevent them from spreading.

Also a rod connecting the pedestal tie bars on four-wheel caboose cars.

Pedestal Strap. A Pedestal Tie Bar.

Pedestal Tie Bar. 6, Fig. 1003. A bar extending across the mouth of a pedestal jaw underneath a journal box and bolted to the jaws of the pedestal. Also a bar sometimes called pedestal strap, connecting two or more pedestals on the same side of a truck or car.

Pedestal Timber (Four-Wheel Cabooses). A longitudinal member sometimes used on four-wheeled cars, which is placed under the floor or alongside the sill and to which the pedestals are bolted.

A term sometimes used to designate the Wheel Piece of trucks.

Pedestal Truck. Figs. 976-994-A, 998-1032. A truck which has its journal boxes held in and guided by pedestals which are either a part of or rigidly attached to the side frames. The axle and boxes can thus move vertically in the pedestals and shocks due to the unevenness of the track are not transmitted to the truck frames to the same extent as in a truck which has the side frames and journal boxes rigidly connected.

Pen Rack. Fig. 2008.

Pendant. Figs. 2377, etc. A small suspended lamp.

Perforated Veneer. A form of seat covering which consists of three, and sometimes four, layers of wood veneering, glued together and perforated.

Phosphor Bronze. A term applied to an alloy of bronze or brass, or to a triple alloy of copper, tin and zinc, which has been given special purity and excellence by skillful fluxing with phosphorus. It is supposed that the presence of phosphorus gives the tin a crystalline character which enables it to alloy more completely and strongly with the copper. Whether for this reason or not, the phosphor bronzes, when skillfully made, are greatly superior to unphosphorated alloys.

Pilaster. A square pier, like a flat column built against a wall, and having cap and base.

Pilaster, Cap Bracket and Base. A decorative feature of a car interior, placed between the windows and covering the window post.

Pile Driver. Figs. 459, 460. Pages 1221, 1233. A car used for driving piles in construction or maintenance-of-way repair work. Pile drivers are equipped with long bars, called leaders, which are held erect and act as a guide for a hammer or tup. In driving piles a pile is held between the leaders and driven by the hammer dropping on it after being hoisted by a cable and hoisting engine which are located on the car. For moving from place to place in trains the leaders fold back and the forward end is carried on a flat car. Pile drivers are usually self-propelling for short distances at low speeds, such as moving about yards, etc. See CAR.

Pile Hoisting Sheave (Pile Driver). A wheel placed at the side of the main sheave, for use in hoisting piles.

Pillar Crane. A style of crane having the mast supported from below, either by a mast pocket or a base plate.

Pillow Box (Sleeping Cars). The space under the seat in which pillows are stored when the berth is not made up.

Pinion. The smaller cog wheel of two wheels in gear.

Pintsch Gas Burner. Fig. 2249. Used on all Pintsch lamps other than the bracket lamps. It consists of a small lava tip of the "fish-tail" type, held in a special brass pillar.

Pintsch Gas Lamp. Figs. 2251-2292. Page 1257. A lamp for burning gas, the essential features of which are the closed globe at the bottom, the white porcelain reflector above the flames near the top of the globe, and the peculiar method of supplying air.

Various forms of cutter lamps are made, all on the regenerative principle, the inlet air being highly heated before reaching the flames, thereby producing extreme whiteness and steadiness of light.

Some of these lamps are supported by four ornamental arms, one of which forms the gasway. In all, the interior of the lamp is so constructed that a portion of the light is reflected outward and upward toward the roof of the car, illuminating it.

In all standard center lamps air is admitted to the lamp immediately above the upper dome, 101. Passing thence through the orifice in chimney, 313, it comes in contact with the sheet iron flues, 312, and in its downward passage becomes highly heated. It then issues into a space within the dome, 101, between the dome and the mica chimney, 109, and continuing its course is, by the diaphragm, 315, deflected and constrained to pass close to the mica chimney, where it is still further heated. It now passes outward between diaphragm, 315, and the ring reflector, 110, and through the orifices near the outer rim of this reflector into the bowl and to the flames. In its tortuous course the effect of drafts against the lamp is entirely nullified.

The products of combustion escape directly through the annular space between mica chimney, 109, and the cup reflector, 111. Thence by flues, 312, out through the crown at the top of the lamp, in the case of the four-arm lamps, and through the flues, 333.

In vestibule lamps, two- or four-flame, air is admitted to the annular space between the parts of ventilating chimney, 324, through the shielded opening above the roof, immediately below the ventilator. Becoming heated in its downward passage, it passes through the diaphragm, 323a, and through the orifices in the body, 320, to the flames. The products of combustion escape through the flues, 321, and the chimney, 324, to the outside air. Any excess of air over and above what is required for proper combustion of the gas will also be carried off by the ventilating chimney which the air reaches from the space above the body by means of the passage around the outside of the chimney, 321.

Pintsch Gas Lamps (Method of Securing and Connecting). (Four-Arm Lamps.) The arms are secured by means of nipples, passing through the roof; a water-tight joint around the nipples on the roof being made by bedding putty close around the nipple, with a rubber washer above the putty, and an iron washer above the rubber. Lock nuts are then put on and forced down until the excess putty is forced out and the arm drawn firmly up to its place. The gas arm nipple is then supplied with the reducing elbow, the three blank arms with caps. The elbow is then connected with the ⅛-in. pipe to the flange tee on the roof line. The roof around the smoke bell is protected with a tin thimble, large enough to give a ½-in. air space around the smoke bell flue. The upper end of this thimble is made of proper size to receive the ventilator.

Pintsch Mantle Lamp. Figs. 2258, etc. An improvement on the standard Pintsch gas lamp whereby the same gas is burned with an incandescent mantle enclosed in a bulb, Fig. 2277. The candle power of the lamps is greatly increased with the same consumption of gas. No change is necessary in the piping of the car, but the regulator is adjusted to give a higher pressure in the car piping. The form of lamp used is very similar to the standard Pintsch gas lamp.

Pintsch Pillar. Used on bracket lamps below the burner. Where no globe holder is used a mill check is placed immediately below the pillar.

Pintsch System of Gas Lighting. Fig. 2248. A system of car lighting which burns gas taken from a storage tank, where it is carried under a pressure of 150 lbs., or less, per square inch. The gas is an oil gas, made from crude petroleum or similar oils, and is able to withstand a high degree of compression without undue loss of luminosity. The pressure of 150 lbs. of the receiver tank is automatically reduced by the Pintsch regulator to a uniform pressure at the burners of about ½ oz., regardless of the pressure in the gas receiver.

The arrangement of the apparatus is shown in Fig. 2248. The receiver or gas holder, A, suspended beneath the car floor, is connected by a system of extra heavy ¼-in. pipes, with soldered joints and special fittings, to the regulator. The charging of the receiver is effected (from either side of the car) by means of hose, connecting the charging lines from the gas station with the filling valves. The gage communicating with the high pressure pipes connecting the various parts of the apparatus below the car, serves the double purpose of registering the amount of pressure in the receiver at any time and of showing the amount of gas consumed in lighting the car for any given period.

From the regulator the gas (with its pressure reduced to about ½ oz. per sq. in.) passes upward through the car toward the roof. At some convenient point, as in a saloon or locker, a main cock is placed, whereby the flow of gas to the lamps is controlled.

A ½-inch pipe is run along the roof, with ⅛-inch branches to each lamp or bracket. These branches are made by means of special flanged tees. Where ⅛-inch connections are necessary, passing downward from the ½-inch low pressure line on the roof to brackets or vestibule lamps, the flanged elbow or angle fitting is used.

For lamps and methods of suspending and connecting them see Pinstch Gas Lamps.

The burner is of the "fish-tail" type, and from one to six are used in each lamp or light, four being the number generally adopted. See Pintsch Gas Burners.

Pintsch Washers. These washers are of lead and rubber, in three sizes, and are always used in pairs. The rubber is always placed first on the fitting, the lead outside with the collar inward. When pressure is brought upon the washer, the lead collar protects the inner edge of the rubber, the body of the lead washer protects the outside surface of the rubber, and the rib

protects the outer edge of rubber. The rubber is entirely enclosed in metal, and protected from the action of the gas, which would otherwise destroy it. The scored surfaces of the flanges entering into the soft lead make a perfectly tight joint. These washers are used on all classes of flanged fittings, whether high or low pressure.

Pipe. A tube for conveyance of water, air, or other fluids. See BRAKE PIPE, etc.

Pipe Bracket. See PIPE CLAMP.

Pipe Bushing. See BUSHING.

Pipe Clamp. Figs. 1515-1518, 1520, 1521; Pages 1226, 1250, 1302. A clamp for holding the air brake, signal or steam pipes in place under the car.

Pipe Clip or **Strap.** An iron band for fastening a pipe against or to some other object. They are usually single, but sometimes double, for two or more pipes. See CLIP.

Pipe Coupling. A short tube with a thread cut on the inside of each end, which is screwed on the ends of two pipes and used for uniting them together, or uniting one pipe with another object, as a cock or valve. In some couplings the thread at one end is right hand and the other left hand, but generally they are both right hand threads.

Pipe Fittings. The connections for systems of wrought iron, gas, water, and steam pipes. The more usual pipe fittings are bushings, elbows, tees, return bends (close or open), reducers, couplings, nipples, plugs, etc.

Pipe Hanger. Fig. 1522. A hanger for supporting a pipe.

Piping. See Lavatory and Water Supply. See also illustration in section on Passenger Train Heating Apparatus and Air Brakes.

Pipe Reducer. See BUSHING.

Pipe Screw Threads. Screw threads used for connecting wrought iron pipes. Such screws are cut "tapered"; that is, the end of the pipe, or the inside of the coupling where the thread is cut, forms part of a cone, so that in screwing up the pipe a tight joint can be made. Pipe threads are of a V-shape, sharp at the top and bottom, and their sides stand at the angle of 60° to each other. The following is the number of threads per inch for pipes of different sizes. The size is given by the inside diameter, but the actual bore of the smaller sizes is considerably larger than the nominal. The exterior diameter of ordinary gas pipe is from .27 to .37 inches greater than the inside diameter.

American Standard System of Pipe Threads.

Size of pipe.	Outside Diameter. Ins.	Inside Diameter. Ins.	Inside Diam. Extra Strong. Ins.	Inside Diam. Double Extra Strong. Ins.	Threads Per Inch.	Whitworth's Thread.
⅛ in.	.405	.27	.205		27	28
¼ in.	.54	.364	.294		18	19
⅜ in.	.675	.494	.421		18	19
¾ in.	1.05	,824	.736	.422	14	14
1 in.	1.315	1.048	.915	.587	11½	11
1¼ in.	1.66	1.38	1.272	.884	11½	11
1½ in.	1.9	1.611	1.494	1.088	11½	11
2 in.	2.375	2.067	1.933	1.491	11½	11
2½ in.	2.875	2.468	2.315	1.755	8	
3 in.	3.5	3.067	2.892	2.284	8	
3½ in.	4.	3.548	3.358	2.716	8	
4 in.	4.5	4.026	3.818	3.136	8	
4½ in.	5.	4.508			8	
5 in.	5.563	5.045			8	
6 in.	6.625	6.065			8	
7 in.	7.625	7.023			8	
8 in.	8.625	7.982			8	
9 in.	9.688	9.001			8	
10 in.	10.075	10.019			8	

(The European standard is the Whitworth pipe thread, which is quite different.)

Taper of Thread ¾ in. per foot.

Pipe Shield (Steam Heating). A metal covering over the radiator pipes to protect surrounding parts or passengers' clothes from the heat of the pipes.

Pipe Unions (M. C. B. Standard).

In the M. C. B. Proceedings, 1902, page 288, a committee first reported on the design and dimensions.

In 1903 the dimensions for pipe unions as shown on accompanying table were adopted as standard.

In 1908 the following specifications were adopted:

DIMENSIONS FOR STANDARD PIPE UNIONS.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
⅛-inch	375	.270	105	.59	63	78	.80	.85	.89	1.05	.26	¼	27	.2225	.08	.5625	½	.59	.615	.006	.05
¼ "	496	.364	132	76	.80	96	.98	1.05	1.09	1.29	.33	5/16	18	.2625	10	.6925	9/16	.76	.78	.006	06
⅜ "	630	494	136	90	.95	1.11	1.13	1.20	1.24	1.45	.34	⅜	18	.2825	.11	.7325	⅝	.90	.905	.006	.07
½ "	783	.623	160	1.16	1 21	1.38	1.40	1.49	1.54	1.78	40	7/16	14	3025	.12	.8225	11/16	1.03	1.20	.006	08
¾ "	992	824	168	1.38	1 43	1 61	1.63	1.72	1 77	2.02	42	½	14	3225	13	8725	¾	1.24	1.43	.007	.09
1 "	1.246	1.048	198	1 74	1.79	1 98	2.01	2.13	2.19	2.49	49	9/16	11	3625	15	1.0025	13/16	1.565	1 76	.007	.10
1¼ "	1.592	1 380	212	2.12	2.18	2.37	2.40	2.52	2.58	2.90	63	6	11	3825	16	1.0725	9	1.91	2.15	.007	.11
1½ "	1.831	1 610	221	2.40	2.46	2.66	2.69	2.81	2.87	3.20	.55	7	11	4025	17	1.1225	1.0	2.18	2.40	.007	13
2 "	2.306	2.067	239	2.89	2.95	3.16	3.19	3.31	3.38	3.74	60	.8	11	4225	18	1.2025	1.1	2.66	2.90	.008	14
2½ "	2.775	2.468	307	3.39	3.45	3.67	3.70	3 86	3 93	4.39	77	.9	8	3225	23	1.5225	1.2	3.16	3.41	.008	.16
3 "	3.401	3.067	334	4.07	4.13	4.36	4.40	4.56	4.63	5 13	84	1.0	8	.5625	25	1.6525	1.3	3.81	4.08	.008	.18
3½ "	3.901	3.548	353	4.61	4.68	4.91	4.95	5.11	5.19	5 72	.88	1.1	8	6025	27	1.7525	1.4	4.31	4.63	.008	.20
4 "	4.4	4.026	.374	5.15	5.22	5.47	5.51	5.67	5 75	6.31	94	1.2	8	6225	28	1.8425	1 5	4.81	5.19	.008	.22

DESCRIPTION ACCOMPANYING TABLE OF MALLEABLE PIPE UNIONS

NUMBERS AT THE HEAD OF THE COLUMNS ABOVE ARE THOSE GIVEN IN THE DIMENSION LINES ON TABLE A.

Column No. 1 in table represents the nominal diameter of pipe.

Column No. 2 represents diameter of pipe at one-half the height of full thread nearest solid section of pipe.

Column No. 3 represents the internal diameter of the pipe.

Column No. 4 represents the difference between columns Nos. 2 and 3, and is equal to twice the thickness of metal in pipe measured from inside line to one-half the height of thread, as specified before.

Column No. 5 represents the outside diameter of end of pipe union and is taken as *No. 2, plus twice No. 4*, plus an arbitrary increment.

Column No. 6 is equal to No. 5 plus an increment varying from .04 to .07 of an inch. This increment was allowed for the purpose of being able to slip the nut over upper swivel end of union.

Column No. 7 is No. 6 plus an amount varying between .15 and .25. This lip created is considerably in excess of what exists on present pipe unions for the reason that we find the surface between the lip and the corresponding part of nut is often damaged, and the bearing surface, when the full strength of the man is used on the wrench, is sufficient. We assume that a man would pull about 30 pounds on a wrench, with a possibility of using less force on pipes of small diameters. For that reason we made a variation in the width of lip, which lip, theoretically, would be uniform for all sizes of pipe. The nut itself has been strengthened to prevent the lip from deflecting upward.

Column No. 8 is No. 7, plus an increment varying from .02 to .04 of an inch.

Column No. 9 is No. 8, plus twice the height of the thread.

Column No. 10 is No. 9, plus an increment varying between .04 and .08 of an inch.

Column No. 11 is No. 10, plus one and one-half times No. 4.

Column No. 12 is two and one-half times No. 4, and was figured especially for bearing surface, so that the thread would not wear away too rapidly when the nut is occasionally removed.

Column No. 13 has been assumed arbitrarily, but in all cases is greater than the length of full thread on standard pipe.

Column No. 14 represents the number of threads per inch in length of nut. This thread, we believe, should be United States Standard form and not sharp thread.

Column No. 15 is taken arbitrarily, but is based on the probable requirements of manufacturers for tapping out the nut.

Column No. 16 is three-fourths of No. 4.

Column No. 17 represents the full height of nut, and is equal to No. 12, plus No. 15, plus No. 16.

Column No. 18 is the amount of projection outside of nut.

Column No. 19 is No. 2, plus No. 4, plus an arbitrary increment.

Column No. 20 is No. 7, less No. 16, with slight modifications.

Column No. 21 represents the clearance at several points, as indicated on print.

Column No. 22 is assumed arbitrarily.

That all wrought iron pipe for car work be threaded with a standard total taper of ¾ in. in 1 ft., and that all pipe fittings be tapped to suit the standard pipe thread with a total taper of ¾ in. in 1 ft., so that the thread on pipe and fittings will be uniform and taper-tight.

Pipe, Welded, Specifications for. (M. C. B. Standard.)

In 1914, by letter ballot, specifications for welded pipe for passenger and freight equipment cars were adopted as Recommended Practice. Advanced to Standard in 1917.

I. MANUFACTURE

1. *Process.*—(a) Steel used in the manufacture of pipe shall be of a soft, weldable quality made by the Bessemer process.

(b) The wrought iron used in the manufacture of pipe shall be double-refined.

(c) All pipe 2 in. nominal diameter or under may be butt-welded, but all pipe larger shall be lap-welded.

II. PHYSICAL PROPERTIES AND TESTS

2. *Tension Test.*—The material shall conform to the following minimum requirements as to tensile properties:

	Steel.	W. I.
Tensile strength, lb. per sq. in.	50,000	45,000
Elastic limit, lb. per sq. in.	30,000	......
Elongation in 8 in.	18	12

3. *Hydrostatic Tests.*—All pipe shall be tested to the following hydrostatic pressures:

Size.	Standard Grade Pipe. Single Thickness. Butt.	Lap.	Extra Strong Pipe. Double Thickness. Butt.	Lap.
⅛	700	....	700	....
¼	700	....	700	....
⅜	700	....	700	....
½	700	....	700	....
¾	700	....	700	....
1	700	....	700	....
1¼	700	....	1500	....
1½	700	1000	1500	2500
2	700	1000	1500	2500
2½	....	1000	....	2000
3	....	1000	....	2000
3½	....	1000	....	2000
4	....	1000	....	2000

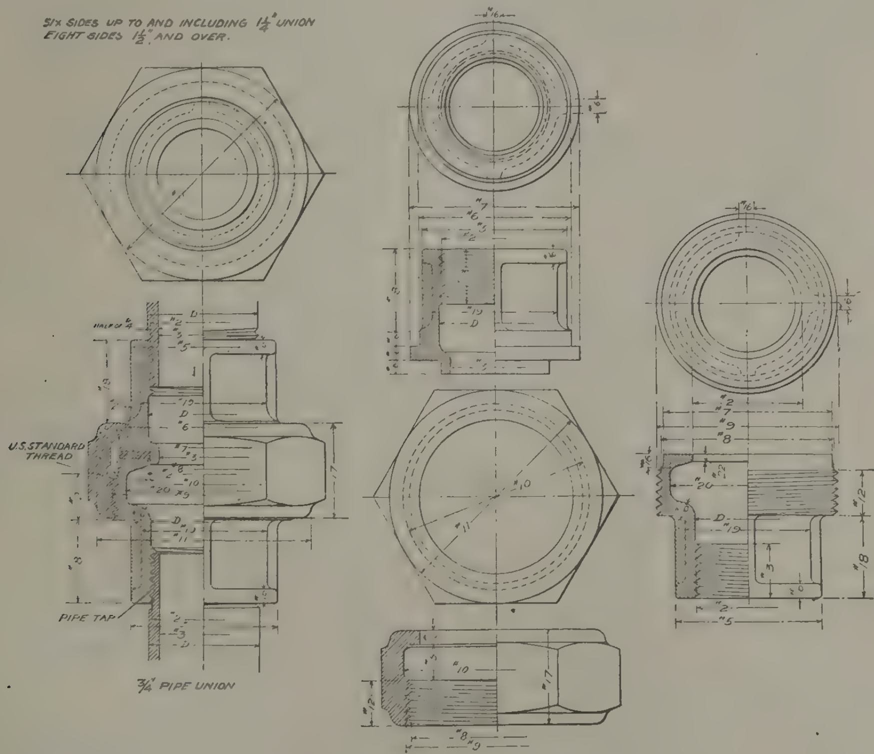
4. *Flattening Test.*—For steel pipe over 2 in. in diameter, a section 6 in. in length shall be flattened until the distance between the plates is one-third the outside diameter of the pipe, with the weld located 45 degrees from the line of direction of the applied force, without developing cracks.

5. *Fracture Test.*—For wrought-iron pipe, a section 6 in. in length shall be flattened until broken by repeated blows of a hammer or by pressure; the fracture developed shall have a fibrous appearance.

6. *Bend Test.*—For wrought iron or steel pipe 2 in. or under in diameter, a sufficient length of pipe shall bend cold through 90 degrees around a cylindrical mandrel, the diameter of which is 15 times the nominal diameter of the pipe, without developing cracks at any portion and without opening in the weld.

7. *Test Specimens.*—Test specimens shall consist of sections cut from a pipe; they shall be smooth on the ends and free from burrs.

8. *Number of Tests.*—One of each of the above tests shall be made from each diameter of pipe for each 2000 ft or less.



THREE-QUARTER INCH PIPE UNION WITH DIMENSIONS NUMBERED. SEE ALSO PAGE 156 FOR TABLE OF SIZES.

III. WEIGHTS

9. *Weights.*—The standard weights for pipes of various inside diameters are as follows:

	Standard Grade Pipe, Single Thickness.		Extra Strong Pipe, Double Thickness.		
Nominal Diameter, In.	Outside Diameter, In.	Weight of Pipe per Lin. Ft. threaded with Couplings.	Outside Diameter In.	Weight of Pipe per Lin. Ft. Plain Ends.	No. of Threads.
[illegible]	[illegible]	.25	.405	.31	27
[illegible]	[illegible]	.43	.540	.54	18
[illegible]	[illegible]	.57	[illegible]	[illegible]	18
[illegible]	[illegible]	.85	.840	1.09	14
[illegible]	[illegible]	1.13	1.050	1.47	14
[illegible]	[illegible]	1.68	1.315	2.17	11½
[illegible]	[illegible]	2.28	1.660	3.00	11½
[illegible]	[illegible]	2.73	1.900	3.63	11½
[illegible]	[illegible]	3.68	2.375	5.02	11½
[illegible]	[illegible]	5.82	2.875	7.66	8
[illegible]	[illegible]	7.62	3.500	10.25	8
[illegible]	[illegible]	9.20	4.000	12.51	8
[illegible]	4.500	[illegible]	[illegible]	[illegible]	8

Ten per cent of each lot shall be weighed and a comparison made with the sample. All pipe shall be rejected that varies more than 5 per cent from that given in the above table.

IV. WORKMANSHIP AND FINISH

10. *Workmanship.*—For pipe 1½ in. in diameter or under, the outside diameter at any point shall not vary more than 1/64 in. over nor more than 1/32 in. under the standard. For pipe 2 in. in diameter or over, the outside diameter shall not vary more than one per cent over or under the standard. All pipe shall be provided with the prevailing standard thread, which shall make a tight joint when tested to the internal hydrostatic pressure at the mills. The threads shall not vary more than 1½ turns either way when tested with a Pratt & Whitney standard gage. All burrs at the end of the pipe shall be removed.

11. *Finish.*—The finished pipe shall be reasonably straight and free from injurious defects.

V. INSPECTION AND REJECTION

12. *Inspection.*—(a) The inspector representing the purchaser shall have free entry, at all times while work on the contract of the purchaser is being performed, to all parts of the manufacturer's works which concern the manufacture of the material ordered. The manufacturer shall afford the inspector, free of cost, all reasonable facilities to satisfy him that the material is being furnished in accordance with these specifications.

(b) The purchaser may make the tests to govern the acceptance or rejection of the material in his own laboratory or elsewhere. Such tests, however, shall be made at the expense of the purchaser.

(c) All tests and inspection shall be so conducted as not to interfere unnecessarily with the operation of the works.

13. *Rejection.*—Material which, subsequent to above tests at the mills or elsewhere, and its acceptance develops weak spots, cracks or imperfections, or is found to have injurious defects, will be rejected and shall be replaced by the manufacturer at his own expense.

14. *Rehearing.*—Samples tested in accordance with this specification, which represent rejected material, shall be preserved for 14 days from date of test report. In case of dissatisfaction with results of tests, the manufacturer may make claim for a rehearing within that time.

Piston. A metal disk with packing, etc., made to fit in a cylinder, and transmit the power caused by the pressure of a working fluid to the external rod and working parts of some form of engine. In a brake cylinder the piston transfers the pressure of the air to the foundation brake gear. A piston consists of a piston head, attached to a piston rod. The piston follower or follower plate lies at the back of the piston head, inclosing between them the piston packing rings, or (in air brake cylinders) the piston packing leather, which latter is provided with a packing leather expander. The follower plate is secured to the piston with follower bolts.

Piston Packing Expander (Air Brake). Fig. 1507. A spring wire ring for spreading out the leather packing of the piston so as to make it fit air-tight against the cylinder walls.

Piston Packing Leather (Air Brake). Fig. 1505. A circular ring of leather used as a substitute for piston packing rings, pressed into the cylinder so as to have an L-section. It is attached to and surrounds the piston and bears against the inside surface of the cylinder, being pressed against it by a piston packing expander.

Piston Packing Ring. See PACKING RING.

Piston Rod (Brake Cylinder). A rod attached to the piston of a passenger brake cylinder, by which the pressure against the piston is transmitted to the brake levers and shoes.

A tube attached to the piston of a freight brake cylinder to act as a guide to the piston as it is forced outward by the air pressure. In this case a Push Rod is attached to the levers and is inclosed by the tube. The push rod transmits the pressure on the piston to the levers and brake shoes, while it allows an application of the brakes by hand without pulling out the piston.

Piston Travel (Air Brakes). The amount of movement of the piston when forced outward as the brakes are applied. Running piston travel is the piston travel obtained when the car is in motion and is always greater than the travel obtained when the car is at rest, due to the fact that the slack or lost motion in trucks and break gear as well as the elasticity of the car body is more easily taken up by the brake shoe pressure when the car is in motion. False travel is that due to some unevenness of the track or to some cause which occasions a momentary change.

Pitch (of a Screw). The advance made by the thread in one complete revolution, usually expressed by the number of threads in a given space, as (in U. S. and Great Britain) an inch.

(Of a Roof.) The ratio of the rise of a roof to the horizontal distance covered.

Pitching Roof. A roof formed of one or more inclined plane surfaces. When the pitch becomes steep, the term is used to distinguish a roof formed of plane surfaces from one formed of curved or arched surfaces.

Pivot. A pin or short shaft on which anything turns.

Pivot Pin (M. C. B. Coupler). Another name for the Knuckle Pin. It is so called from the fact that the knuckle when opening swings about the pin as a pivot. See AUTOMATIC CAR COUPLER SPECIFICATIONS.

Placard Boards for House Cars. (M. C. B. Recommended Practice.)

In 1914 by letter ballot the following was adopted: The space available for placards should be not less than 16 in. by 24 in, on each end and each side of car. House cars with sufficient space available on wood siding, or exposed lining, should have a rectangular space, painted black, on each side and each end. Other house cars should be provided with placard boards, made of soft wood, not less than 16 by 24 by 1 in. The The vertical edge should be reinforced with metal protection, and the bolts fastening the boards to the car should be not less than six in number, and should pass through the metal reinforcing pieces, three through each. The boards may be made of more than one piece, and should then be tongued and grooved. The distance from the floor line of car to bottom of board should be not less than 4 ft. 6 in.

Routing boards, preferably the same size as the placard boards described, should be placed on the side of the car, as near as possible to the door seal.

Plain Triple Valve (Air Brake). A triple valve which has no provision for making emergency applications. See TRIPLE VALVE.

Plane Gage for Solid Steel Wheels. See WHEELS, SOLID STEEL, PLANE GAGE FOR.

Plank. A board piece of sawed timber, differing from a board only in being thicker.

Plastic Car Roof. Figs. 924, 926, 935, 936. A roofing material the body of which is composed of a very heavy layer of woolen felt, thoroughly saturated with a compound which it is claimed preserves the roofing itself and also the upper and lower boarding with which it comes in contact. See CAR ROOF.

Plate (Architecture). A piece of timber which supports the ends of the rafters.

(Car Building.) A horizontal member on top of the posts of a car body supporting the roof carlines or rafters. Also called side plate, in distinction from an End Plate, which is a similar member across the end of the car. A deck plate is used to cap the deck posts of an upper deck.

(Of a Cast Iron Car Wheel.) The central portion connecting the hub and tread, sometimes single plate, sometimes double plate. The plate is stiffened by brackets.

Plate Facing. An inside cornice fascia.

Plate Rod (Freight Cars). A horizontal metal rod passing across the car through the two side plates to tie them together.

Plate Washer. Usually a wrought iron cut washer, in distinction from a cast washer, but also used to designate many forms of large washers or plates serving as double or triple washers. See WASHER.

Plate Wheel. A car wheel of which the center portion is formed of a disc or plate instead of spokes. See WHEEL.

Platform (Passenger and Caboose Cars). Figs. 527-572; Pages 1182, 1301. A floor at the end of a car, supported by projecting timbers below the car body, to facilitate ingress and egress. A narrow platform is sometimes added to freight cars for convenience of trainmen, but a platform proper is used only on passenger equipment cars and cabooses. The term platform is commonly applied to the frame which supports the platform proper in passenger equipment cars, together with its buffing devices. The term is also commonly used for buffing devices and their framing for non-vestibule cars, which have no platform proper.

Platform Car. A flat car.

Platform Chain. A chain connecting the inner platform railings, posts and rails, closing the passageway between the platforms of two cars coupled together. It is used only on the rear end of the last car, and the front end of the first car when the first car is a passenger car.

Platform Cover Plate. 26, Fig. 348. A steel cover plate over the platform sills.

Platform End Bracket. An ornamental casting attached under the platform roof on each side of the vestibule face plate on narrow vestibule cars.

Platform End Sill. 16, Fig. 260; 21, Fig. 348. The transverse end piece of the platform framing.

Platform End Timber or **Buffer Beam.** A cross timber at the outer end of a car platform. A platform end sill.

Platform Floor. The layer of boards over the platform sills.

Platform Gate. A gate used to close the side entrance to a platform, in general use only for private cars, suburban cars and street cars. See PLATFORM TAIL GATE.

Platform Hood. A cover or canopy formed by extending a car roof over the platform. Sometimes called CANOPY. It is made of wood, sheet iron or agasote.

Platform Hood Bow. A bent member which forms the outer edge of a platform hood and to which the platform hood carlines are fastened.

Platform Hood Bracket. A bracket or knee iron to connect the hood to the corner post.

Platform Hood Carlines. Transverse members which support the roof of a platform hood.

Platform Hood Ceiling. See PLATFORM HOOD SIDE PIECE.

Platform Hood Post. An upright iron bar or rod sometimes attached to the platform or platform railing, to support a platform hood.

Platform Hood Side Piece. The side piece to which the ceiling is attached.

Platform Lever. A lever for uncoupling cars from the platform.

Platform Lever Pin. The pin on which the platform lever pivots.

Platform Plate or **Buffer.** A steel angle plate bolted to the buffer stems and overlapping the platform end sill. When in contact with the like plate of another car, it makes a continuous floor between them. Being pivoted at the platform end sill, it adjusts itself to all curves of the road. The platform plate also acts as a buffer, and is sometimes so called. See VESTIBULE.

Platform Railing. 7, Fig. 260; Figs. 615-618. An inclosure consisting of iron or brass posts and rails on the end of an open platform to prevent persons from falling off and also to act as a hand hold.

Platform Roof. That portion of a car roof which projects over the platform. See PLATFORM HOOD.

Platform Roof Carline. A carline supporting the platform roof. See CARLINE.

Platform Roof End Carline. The carline at the extreme end of the platform roof. See CARLINE.

Platform Short Sills. Short longitudinal pieces of timber, not extending under the car proper, which are framed into and bolted to the end sills and platform end timbers of a passenger car to sustain the floor of

the platform. The longer timbers which extend under the body of the car proper are called platform sills.

Platform Sill. A sill extending beyond the end of a car to support the platform.

Platform Steps. The stairs at each corner of a passenger equipment or caboose car which afford the means of ingress and egress. Forms of steps have been introduced, but are not in general use, which are folding or extensible, being dropped down into position when the car is stationary, and removed or elevated when the train starts. In modern passenger cars the platform steps usually consist of three and sometimes four separate steps below the platform. Wooden steps are sometimes called box steps.

Platform Tail Gate. Figs. 619-624; Page 1165. A gate used to close the passageway at the rear of the last car of a train which is ordinarily used for passage from one car to the other.

Platform Tail Lamp. Figs. 2213, etc. A signal lamp which stands on the rear platform of a train.

Platform Tie Rods. Horizontal rods passing through the platform end timber and end sill or body bolster, for the purpose of holding them and the other portions of the frame of the car securely together.

Platform Timber. See PLATFORM SILL.

Platform Trap Door. Figs. 589-597; Pages 1170,1288. A door which covers the space occupied by the steps, and thus extends the platform out to the side of the car. It is used on wide vestibuled cars, private cars equipped with open platforms, and suburban, elevated and subway train cars, which commonly make stops at station platforms which are level with the car platform.

Platform Trap Door Bumper. Fig. 642. A stop for a trap door to prevent its striking the vestibule wall when opened.

Platform Trap Door Lift. A metal device attached to trap doors, with a recess for inserting the fingers to pull the door open.

Platform Trap Door Fixtures. Figs. 634, 645, 647; Pages 1170, 1288.

Plow. See SNOW PLOW and BALLAST PLOW.

Plug. See REFRIGERATOR CAR PLUG.

Plug Connector. Fig. 1450. The term applied to the jumper and receptacle used in connection with electro-pneumatic signal and brake equipments, and which provides flexible electric connections between cars for the electric operation of these equipments.

(Pipe Fittings.) A short, solid metal cylinder, with a screw on the outside and a square or hexagonal end to take hold of with a wrench, screwed into the end of a pipe or hole in a plate, to close the opening.

Plush. Page 1146, 1216. A fabric so constructed that the nap or face presents a "pile" of closely woven fibres in a straight-standing or slanting position.

Plush may be made of silk, cotton, wool, mohair or other fibres, but the plush most used in American railroad passenger cars is made of mohair—the hair of the Angora Goat.

The pile of mohair plush is springy or elastic and retains a standing position so that the wear comes on the ends of the fibres, and if the fibres are firmly secured, endures through a severe and continual service of from seven to twenty-five years.

The mohair fibres take dyes so fast as to retain their original color almost unimpaired during the life of the fabric and carefully conducted physical and chemical tests have proven it to be a sanitary upholstery fabric.

Plumbago. Graphite; one of the forms of pure carbon from which pencils, etc., are manufactured.

Pneumatic Jack. A jack operated by compressed air. See JACK.

Pocket (Drawbar Attachment). A yoke.

(Sleeping Car.) A receptacle for the clothing and small baggage of occupants of sleeping berths. Known as the head board pocket for the lower berth and upper berth pocket.

Any object having a cavity or opening which forms a receptacle to hold anything in its place. See PUSH POLE POCKET.

Pole Changer (Electric Lighting). Figs. 2495, etc. An automatic device for preserving the polarity of an axle generator. It is made generally in one of three types: rotating, mechanical or electrical type. The rotating type employs the principle of shifting the brushes of the generator automatically when the direction of rotation changes through an angle equal to the pole pitch; that is, the angle between two poles of the generator. If it is a two-pole machine, the brushes must be shifted 180 degs.; if a four-pole machine 90 degs. The latter is the general arrangement. The rotating type employs no switches or contacts that might interfere with the continuity of the armature circuit, and it permits the brushes taking a "lead," advantages not possessed by the other types which necessarily employ fixed brushes. The mechanical type consists of a reversing switch operated mechanically by the rotation of the armature shaft in one direction or the other. When the armature rotates in one direction the switch is automatically closed to make proper connections under these conditions and vice versa. The electrical type consists of a reversing switch, generally operated by solenoids, the entire mechanism being placed inside of the car, with the other electrical apparatus. This reversing switch is automatically thrown one way or the other, depending upon the direction of the rotation of the generator armature.

Poling Car. See CAR.

Pop Safety Valve. A valve set with a spring so as to open suddenly with a wide opening at a fixed pressure.

Port. An opening in a valve for the passage of steam or air.

Positive. An arbitrary term used in electrical engineering to denote a pole or connection away from which current flows towards a negative pole or conductor. See NEGATIVE.

Post. A piece of timber or metal set upright and intended to support something else, as the posts of a house. See QUEEN POST, SIDE POST, etc.

Post Cap. See POST POCKET.

Post Office Car. See POSTAL CAR.

Post Pocket. 17, Figs. 34, 35; Fig. 971. A casting attached to the top of the side or end sill or the bottom of the side or end plate of a car to receive and hold a post or a post and a brace, in distinction from a stake pocket which is bolted to the outside of the side sill. Such pockets are commonly used with box and stock cars. The post pockets used below the plates are sometimes called post caps. See POCKET.

Postal Car. Figs. 275-281. A passenger equipment car for carrying mail. Some postal cars are fitted with

pigeon holes, etc., for the distribution of mail, and others are for storage only. See CAR and POSTAL CARS, U. S. GOV'T SPECIFICATIONS.

Postal Car Details and Floor Plans. Figs. 2891-2922.

Postal Car Specifications and Floor Plans. (M. C. B. Recommended Practice.) Pages 1006-1016. See POSTAL CARS, U. S. GOVERNMENT SPECIFICATIONS.

Postal Cars. United States Government Specifications. In 1912 the United States Government, after a series of conferences with a committee of mechanical engineers appointed by the railroads, issued the specifications given below for postal cars and fixtures. These specifications cover 60 ft., 50 ft., 40 ft. and 30 ft. postal or mail cars; 30 ft., 25 ft., 20 ft., 15 ft., 12 ft., 10 ft. and 8 ft. mail apartments; and 15 ft., 12 ft., 10 ft., 8 ft. and 6 ft. alley apartments. The floor plans shown give the representative sizes of cars and apartments, the others being similar.

In 1915 the United States Railway Mail Service full postal car specifications and floor plans were adopted, but owing to their bulk and the large number of illustrations they are omitted from the Proceedings. Copies of these plans and specifications may be had upon application to the General Superintendent, Railway Mail Service, Washington, D. C.

Floor plans and drawings referred to herein bear date of November 30, 1914, redrawn or revised on December 10, 1914. The following specification, dated March 28, 1912, and corrected to March 17, 1915, is for the construction of steel full postal cars. Modifications of these plans were issued in September, 1917, and are shown on page 1006.

GENERAL.

1. TYPE.—Postal cars may be built according to any of the following types of construction:

I. Heavy center-sill construction, the center sills acting as the main carrying member.

II. Side-carrying construction, the sides of the car acting as the main carrying members, having their support at the bolsters.

III. Underframe construction in which the load is carried by all the longitudinal members of the lower frame. The superstructure framing shall be of steel.

IV. Combination construction in which the side frames carry a part of the load, transferring same to the center sills at points remote from the center plate for the purpose of utilizing uniform center-sill area.

Steel castings may be used as parts of the underframe in any of the above types.

2. MATERIALS.—(a) All rolled-steel plates and shapes used in the car framing shall be made by the open-hearth process.

(b) The physical and chemical properties of all material used in the car framing shall be in accordance with the latest standard specifications of the American Society for Testing Materials, as follows: The standard specification for structural steel for cars; the standard specification for wrought iron, for iron bars and plates, and the standard specifications for steel castings.

3. WORKMANSHIP.—All workmanship throughout the car shall be first class. The jointing of the car framing shall be made so that the structure as a whole shall be built to dimensions specified, and all joints exposed to the weather shall be made tight against leakage.

4. LIVE LOADS.—(a) The car body shall be designed to carry the specified live load in addition to its own dead weight under service conditions. Where no live load is specified by the railroad company, the maximum capacity of car, as determined by journal loads given in section 36, shall be used as a basis for calculations.

(b) For distributing cars the following shall be assumed as the minimum live-load capacity: 40-foot cars, 10,000 pounds; 50-foot cars, 15,000 pounds; 60-foot cars, 20,000 pounds. Where postal cars are used for storage cars or under unusual load conditions, live-load capacity shall be from 40,000 to 50,000 pounds, depending upon the character of the mail to be handled.

5. BUFFING.—The maximum end shock due to buffing shall be assumed as a static load of 400,000 pounds applied horizontally at the resultant line of the forces acting at the center line of the buffing mechanism and at the center line of draft gear, respectively, and shall be assumed to be resisted by all continuous longitudinal underframe members below floor level, provided such members are sufficiently tied together to act in unison. Calculations for resistance to buffing shocks shall be based only on underframe members below floor level. These underframe members may be considered supported against buckling vertically by the superstructure between center plates at cross bearers to the extent that the strength of superstructure, cross bearers, and attachments is available for this purpose.

NOTE.—For electric cars operated on lines where electricity is the only motive power and the total weight of trains does not exceed 600,000 pounds, the static load may be assumed to be 200,000 pounds. This does not apply to cars run in electric trains on railroads using both steam and electric power.

6. DETAILS.—(a) All connections, except those specified for end construction in section 18, shall be designed by the maximum load to which the member connected shall be subject; and secondary stresses in any members caused by eccentric loads shall be combined with the direct stresses in such members. The maximum fiber stresses in any member subject to both direct and secondary stresses may be taken at 20 per cent greater than those given in section 20; but the direct stresses considered alone must not exceed the allowable stresses given in said section.

(b) The distance between centers of rivet holes shall be not less than three diameters of the rivet and not more than 24 times the thickness of the thinnest outside member. The minimum distance between the center of the rivet hole and a sheared edge shall be not less than 1½ times the diameter of the rivet.

(c) Below the floor line, framing connections of floor beams, posts, etc., may be of rolled steel, pressed plate, or cast steel, and above the floor line such connections may also be of malleable iron. Connections for I beams, channels, or tees may also be made by coping the flanges and bending the web to form a knee, and for angles by coping one leg and bending the other.

(d) The use of fillers in the underframe and superstructure shall be avoided wherever possible.

(e) All holes for rivets or bolts in the underframe, superstructure, or outside finish shall be drilled or punched and reamed to size and fairness. No drifting of holes will be allowed. In deducting rivet or bolt holes to obtain the net area of any section they shall be taken at one-sixteenth inch larger than the diameter of the rivet or bolt. The effective area of a rivet shall be taken as its area before driving.

(*f*) All rivets, when driven, must completely fill the holes and have full concentric heads or countersunk when required.

7. Center Sills.—The center sills may be built up or composed of rolled or pressed shapes, either with or without cover plates, and cast-steel draft sills or end construction may be used in connection with any of the above types, with suitable riveted connections at splices. Built-up center sills may be either of uniform depth or of the fish-belly shape, and may be composed of rolled shapes, web plates, flange angles, and cover plates. If preferred, the web plates may be flanged and angles omitted. When flange angles are used they shall be connected to the webs with a sufficient number of rivets to transfer the total shear at any point in a distance equal to the depth of the sill at that point. When cover plates are used they must extend at least two rows of rivets at each end beyond their theoretical length.

8. Bolsters and Cross Bearers.—The body bolsters and cross bearers may be of either cast-steel or built-up construction, with ample connections at center and side sills to transmit the calculated vertical shear.

9. Floor Beams.—Transverse floor beams may be of rolled or pressed shapes, with suitable connections at center and side sills.

10. Floor Supports.—Longitudinal floor supports shall be supported at each transverse floor member.

11. End Sills.—The end sills may be either of rolled or pressed shapes, built-up construction or cast steel, with ample connections at center and side sills. They must be designed for the maximum vertical loads to which they may be subject and also for the assumed horizontal loads transferred from vertical end members as specified in section 18.

12. Side Frame—General.—In calculating the stresses in the side frame, its effective depth when designed as a truss or girder may be taken either as the distance between centers of gravity of the side plate and side sill or as the distance between centers of gravity of belt rail and side sill. At the side-door openings the bending moment caused by the vertical shear at door posts shall be considered as being resisted by the section above and below door openings, and the sum of the direct stresses and those due to bending at such sections shall not exceed the stresses specified in section 20. A sufficient proportion of any reinforcing members added to these sections shall be extended far enough beyond the door posts at each side that their reaction can be taken care of by the side frame without exceeding the limit specified for stresses.

13. Posts.—The sum of the section moduli taken at any horizontal section between floor line and top line of windows, of all posts and braces on each side of car located between end posts, shall be not less than 0.30 multiplied by the distance in feet between the centers of end panels, a panel length being considered as the distance between lines of rivets in adjacent vertical posts.

14. Sheathing.—Outside sheathing plates of steel or iron shall be not less than ⅛ inch in thickness. Additional outer finish may be used.

15. Roof—General.—The roof may be of either the clere-story or trurtleback type. In the clere-story type, the deck plates shall be in the form of a continuous plate girder or equivalent construction extending from upper-deck eaves to deck sill, and either built-up of pressed or rolled shapes or pressed in one piece from steel plates. The carlines may be of either rolled or pressed steel shapes extending in one length across car from side plate to side plate or may extend only across upper deck. In the latter case, the lower-deck carlines may be formed by cantilever extensions of the side posts or by independent members of pressed or rolled shapes. In the turtleback type the carlines may be of either pressed or rolled shapes, extending in one length across car between side plate and side plate or may consist of cantilever extensions of the posts.

16. Carlines.—The projected area of the portion of roof in square feet supported by carlines divided by the sum of the section moduli of the carlines must not be more than 100.

17. Roof Sheets.—Roof sheets, if of steel or iron, shall be of a minimum thickness of 0.05 inch and either riveted or welded at their edges.

END CONSTRUCTION

18. Vertical End Members.—(*a*) The sum of the section moduli of all vertical end members at each end shall be not less than 65, and the section moduli of the main members, either forming or adjacent to the door-posts, shall be not less than 75 per cent of this amount. Any excess of section moduli over 65 may be distributed at the discretion of the railroad for whose service the cars are built.

(*b*) The horizontal reactions of all vertical end members at top shall be calculated from an assumed external horizontal force, applied 18 inches above floor line, to all vertical members in proportion to their respective section moduli, such force being of sufficient amount to cause bending of all vertical members acting together, and top connections of vertical end members shall be designed for these reactions. The bottom connections of the vertical end members shall be sufficient to develop the full horizontal shearing value of such members.

(*c*) Except where vertical end members shall bear directly against or be attached directly to longitudinal members at either top or bottom, the assumed reactions shall be considered as loads applied to whatever construction is used at end sill or end plate, and both these last-named members shall have section moduli, respectively, sufficient to prevent their failure horizontally before that of the vertical end members.

Note.—For electric cars operated on lines where electricity is the only motive power and the total weight of trains does not exceed 600,000 pounds, the sum of the section moduli of the vertical end members shall be not less than 40 and the section moduli of the main members, either forming or adjacent to the doorposts, shall be not less than 75 per cent of this amount. This does not apply to cars run in electric trains on railroads using both steam and electric power.

Note 2.—In mail cars having vestibules at one or both ends, similar in form to vestibules of passenger cars, the requirements of the preceding paragraph that "the sum of the section moduli of all vertical end members at each end shall not be less than 65" may be considered as applying to the vertical body end members and the main vertical members of the vestibule taken together. The requirement that "the section moduli of the main members, either forming or adjacent to the door posts, shall not be less than 75 per cent of this amount (65)" may be considered as complied with if the sum of the section moduli of the main vertical body end members and the main vestibule vertical members is not less than 75 per cent of 65.

19. End Plate.—The end plate may be a rolled or pressed section or of built-up construction and shall extend across end of car from side plate to side plate,

with ample connections at ends, or shall be of other satisfactory construction to withstand the assumed loads given above.

20. STRESSES.—All parts of the car framing shall be so proportioned that the sum of the maximum unit stresses to which any member is subject shall not exceed the following amounts in pounds per square inch, except as modified in sections 6 and 18. These stresses, unless otherwise stated below, are for steel having an ultimate tensile strength of from 50,000 to 65,000 pounds per square inch. Where other materials are used, they shall bear the same proportion to the ultimate strength of the material used.

Bolsters of rolled steel.—Stress shall not exceed 12,500 pounds per square inch.

Sills and framing of rolled steel.—Stress shall not exceed 16,000 pounds per square inch.

When cast steel is used, the allowable stresses may be the same as for rolled steel, except tension stresses, which must be at least 20 per cent less than those allowed for rolled steel as specified above.

For members in compression the stresses shall be determined by the following formula:

$$\text{Steel } 16{,}000-70\frac{L}{R}$$

In the above formula L equals length in inches.

R equals least radius of gyration in inches.

Rivets (rivet steel).

	Pounds Per Square Inch.
Shear, other than buffing	10,000
Bearing, other than buffing	20,000
Shear, buffing	12,000
Bearing, buffing	24,000

21. FLOOR.—*(a)* Subfloor of postal cars to be of iron or steel, flat or corrugated plate, upper or wearing surface to be of matched wooden flooring, maple or rift-sawed yellow pine or fir, laid longitudinally, or composition, preference in order named. If composition is used, the wearing surface between doors and the standing surface in front of letter tables and paper racks shall be of wood, cork or other suitable material. Proper insulation, including air space, shall be provided. Floor strips for wood upper course shall be secured by bolts or rivets. Composition flooring may be secured by corrugated, keystone or equivalent style of plate or by wire fastening securely anchored.

(*b*) Where composition floor is used, wearing surface between doors and standing surface in front of letter tables and paper racks, as stated in above paragraph, is defined as follows:

Wearing surface between doors is the full width of the door opening between side doors. Standing surface in front of paper racks shall extend from the center of car to point directly under rod No. 4 on each side. In front of the letter tables, standing surface shall extend at least 2 inches back of a point directly under the front line of table.

Where a single-course main floor is used, the same shall be 1¼ inches thick. In cars for service in extremely cold sections or elsewhere, when desired by owners, two courses of not less than ¾-inch wood flooring, with one course of building paper between, is preferable. Where two courses of main flooring are used, the lower course shall be laid either diagonally or transversely and the upper course longitudinally.

22. INTERIOR FINISH.—Inside, side and end linings and head lining of postal cars to be of flat or corrugated steel plate, composition board, or wood, properly secured to the car framing.

23. INSULATION.—*(a)* The car shall be insulated throughout, including floors, sides, ends and roof (except pier panels), with material of such a nature that it can be securely fastened so as to withstand the vibration incident to railway service. The insulating material must be such that it will not support combustion, will not absorb moisture beyond its own weight, and when wet will not become corrosive.

(*b*) Side and end wall and roof insulating material shall be securely fastened. Where the nature of the material permits, it shall be cemented and also mechanically clipped, if necessary, for proper support. Floor insulation shall extend the entire distance between side walls either in one full width or in sections fitted between floor supports and be secured in place.

(c) The construction of side and end walls and roof of car shall be such as to avoid or reduce to a minimum continuous metal connection from outside to the inside of the car.

(d) To insure maximum of insulating and sound-deadening efficiency, the construction at the junction of side and end walls and floors shall be such as to prevent the circulation of air through the side and end walls or through the floor or into the car.

(*e*) The thermal efficiency of the materials in side and end walls, in roof and in floor must be such that a test duplicate section through walls, roof or floor (duplicate with the exception of framing members, such as posts, braces, carlines or stringers, which are to be omitted) will not transmit, when subjected to the test hereinafter described, more than the following amount of heat per square foot of surface in 24 hours for each degree Fahrenheit difference in temperature between the inside and outside walls of the section.

	B. t. u.
For side walls, end walls, and roof	8
For floor	7

The method of testing shall be as follows:

A calorimeter, as illustrated and described in Railway Mail Service drawing sheet 18, shall be used in all tests. It shall be carefully constructed and of the materials indicated and before used must be standardized for its thermal loss factor. The sections to be tested shall truly represent the materials as used and disposed in the car.

The heat must be supplied by direct electric current of constant voltage, measured by standardized instruments. The difference between inside and outside temperatures must be held as nearly 70 degrees Fahrenheit as possible. Readings of temperature and current shall not be recorded until 48 hours after heat is turned on and test begins, in order to insure thorough heat saturation of calorimeter and test sections. The duration of actual test shall be eight (8) hours, during which time temperature and electric readings shall be made and recorded each hour or more frequently if considered necessary. The average of all readings thus recorded shall be taken as the final result. All differences regarding results which may arise between the Post Office Department and the railroad companies affected shall be referred to the United States Bureau of Standards for decision.

24. DOORS, WINDOWS AND SKYLIGHTS.—(*a*) Postal cars shall be equipped with side doors not less than 6 feet in height from floor, end doors, side windows and skylights as shown on the standard plans of the Railway Mail Service. Storm or double windows shall be provided where required.

Doors and windows may be of wood, combination wood and metal, or metal, preference in order named, and when glazed, the glass shall be double strength. Windows shall be made of two sash sections. The upper section shall preferably be divided into approximately two equal portions—the lower half to be fitted with glass and the upper half screened—so suspended that glass or screened section may be used as desired. Where side framing makes this impracticable, equivalent screen application will be allowed. Where storm windows are applied, they shall be hinged or made easily removable to allow cleaning. Doors and windows shall have suitable weather stripping. Trimmings and locks shall be the railway company's standard. Hasp and staple for outside of side doors shall be in accordance with Railway Mail Service details, modified to suit shape of doorpost.

(*b*) Skylights shall have 5 square feet of glass admitting light, glazed with not less than ¼ inch rough wire glass or ⅛-inch rough plain glass; fixtures and suitable shades shall be provided. For curtain shades below skylights, 10-ounce duck or good quality of buff or light yellow holland shall be used; spring roller fixtures shall be provided, or if canvas is used, it may be strung on wires so as to be easily adjusted according to service requirements.

25. Lighting.—(*a*) Lighting of postal cars primarily to be with electricity or gas, where feasible; mantles to be used on gaslights where practicable; provision shall be made for emergency lighting as hereinafter specified. Fixtures, wiring, battery boxes and their equipment, gas piping, and all other accessories in connection with the lighting system shall be railway company's standard practice. Each electrically lighted car equipped for axle generator or head-end system of lighting shall be equipped with storage battery of sufficient capacity to furnish for 12 hours the intensity of illumination specified hereinafter. Each car using gas or straight storage electricity as the primary system of lighting shall be equipped with storage capacity sufficient to furnish light for 36 hours at the intensity of the illumination specified hereinafter.

Lights are to be located by the railway companies or car builders to produce results called for under the specifications. The Railway Mail Service will not suggest or recommend location of lights. This applies to new or changed installation where the specifications apply.

(*b*) *Location of light units.*—Body of car. The light units for illuminating the bag-rack and storage portions of the car shall be located on the center line of the car. Direct lighting units in the bag-rack section shall be located at such uniform height that the shadow of the paper boxes is not cast on any bag-rack label, nor higher than approximately 3 inches above the back rod of rack. In no case shall any light unit except oil lamps (the lowest point of which may be 6 feet 9 inches from the floor) be mounted at a height of less than 7 feet measured from the floor to the lowest point of the light unit. Spacing between adjacent units in the bag-rack portion of the car shall not exceed 8 feet 6 inches in case of any direct system of lighting, nor 14 feet in case of any indirect system.

(*c*) *Letter cases.*—Light units for illumination of the letter case shall be mounted at a uniform height from the floor, but not lower than the units in the bag-rack section, and as far from front of the face of the letter case as possible without the body of the distributor throwing any shadow on his work. In standard construction the above distance is 20 inches. Where the car construction does not permit the above distance, a lesser distance, but not less than 16 inches, may be employed. Separation between adjacent letter-case units shall be such as to provide an illumination intensity at all points within the requirements hereinafter specified.

(*d*) If an indirect lighting system be employed, the provisions of the above paragraph will be waived. In such case, the only requirements imposed for location of units at letter cases are those involved in providing for sufficient vertical and horizontal illumination intensities to meet the provisions of these specifications as hereinafter stated, all units in the car burning. For the purpose of these specifications, an indirect system is here defined as any system in which at least 85 per cent of the horizontal illumination on the 46-inch plane of utilization is received, either directly or indirectly, by reflection of the light from the deck of the car.

(*e*) *Special features of light units.*—In the case of incandescent electric or gas lamps, the design of light unit, except letter-case units, shall be such that no portion of the bare lamp filament or the bare mantle is visible to the eye when the unit is observed at an angle of 70 degrees or greater from the nadir. (In general, light units are preferred which emit no light or only a small amount of light between the angles of 50 and 100 degrees from the nadir.)

(*f*) The control of the lights in the postal apartment shall be in that apartment and independent of any other lights in the car and the letter-case units shall be controlled independently of any other light units in the postal apartment. Knife and snap switches only shall be placed in mail apartment; all other mechanism to be placed in adjoining apartment.

(*g*) *Initial illumination values.*—All horizontal illumination values shall be taken on plane 46 inches above floor line. Vertical illumination values shall be taken on the vertical plane on the face of letter case as specified below. New lighting installations shall be such as to give initial illumination values within the following limits:

Location.	Minimum. F. C.	Maximum. F. C.
Bag-rack portion:		
Center of car, horizontal	4.70	10.00
Mouth of bags, illumination measured 18 inches from side of car, horizontal	2.50	10.00
Letter cases:		
Over table, horizontal	4.70	16.00
Face of case, vertical	2.08	16.00
Storage portion, not behind obstructions, horizontal, measured 30 inches from side or end of car	2.50	10.00

(*h*) Illumination requirements at letter cases as above specified shall be entirely fulfilled by letter-case units, other units in the car not burning, but letter-case units may be considered as contributing to the specified illumination values for the body of the car.

(*i*) If globes or reflectors of opal glass, rough crystal glass, prismatic glass, or aluminumized metal, and those giving similar results (excluding heavy density opal with glazed reflecting surface, mirrored glass, porcelain enameled metal, and those giving similar results) be employed, the minimum values specified in the above table may be reduced 20 per cent and the maximum values increased 20 per cent.

(*j*) Above illumination values are based on an allowance of 40 per cent for depreciation in service. Less efficient maintenance must be compensated for by increased initial installation.

(*k*) If an indirect lighting system be employed, the minimum and maximum values in the above table may be respectively decreased and increased 40 per cent in the bag-

rack and storage portions of the car and 25 per cent at the letter case locations specified in above table.

(*l*) *Emergency lighting.*—An emergency lighting system consisting of candle lamps will be required on all cars lighted primarily by electricity or gas. A more adequate system of emergency lighting as defined hereinafter, may be required. (See floor plans for location of candle lamp holders.) A candle lamp should be furnished for each holder. Boxes to contain candle lamps when not in service should be located at some convenient and acceptable point in the car. Suggestion is made that such boxes be located in connection with electric light control boxes when available, either above or below, as may be practicable, or the candle lamp box may be located in the storage end of the car above the brakewheel, clearing the latter. In 30, 25, 20 and 15 foot apartments, locate box over letter case on partition.

(*m*) *Electric switches.*—In apartment cars locker containing knife and snap switches controlling current and lights should be located on end of paper boxes when same will not project into doorway lower than 5 feet 8 inches above floor line. Where this would occur, locker should be located as high as possible on the bulkhead next to hopper, on hopper side.

(*n*) *Service illumination values.*—While the car is in active service the lighting installation shall be maintained at all times to give illumination values not less than the following minimum values:

Location.	Minimum F. C.
Bag-rack portion:	
Center of car, horizontal	2.80
Mouth of bags, illumination measured 18 inches from side of car, horizontal	1.50
Letter cases:	
Over table, horizontal	2.80
Face of case, vertical	1.25
Storage portion, not behind obstructions, horizontal, measured 30 inches from sides or ends of car	1.50

(*o*) Illumination requirements at letter cases as above specified shall be entirely fulfilled by letter-case units, other units in the car not burning; but letter-case units may be considered as contributing to the specified illumination values for the body of the car.

(*p*) If globes or reflectors of opal glass, rough crystal glass, prismatic glass, aluminumized metal, and those giving similar results (excluding heavy density opal with glazed reflecting surface, mirrored glass, porcelain enameled metal, and those giving similar results) be employed, the minimum values specified in the above table may be reduced 20 per cent.

(*q*) If an indirect lighting system be employed the minimum value in the above table may be decreased 40 per cent in the bag rack and storage portions of the car, and 25 per cent at the letter-case locations specified in the above table.

(*r*) *Light failure.*—A light failure is defined as the condition where for a period exceeding 30 minutes the primary lighting system fails to give sufficient illumination to permit distribution of mail matter to be continued. It will be considered that whenever the lamp voltage falls below 80 per cent of the normal operating lamp voltage such a condition of light failure has been reached.

(*s*) *Car movement.*—A car movement is defined as the use of a postal car by a crew of postal clerks over the length of their run in one direction. Where a car covers more than the run of one crew, each separate run shall be considered a car movement.

(*t*) *Percentage of failure.*—The percentage of failure of the lighting system is defined as the ratio of the total number of failures to the total number of car movements of each primary system of lighting (gas and electrically lighted cars to be considered separately) on each railway system. The determination of percentage of failure shall be based on the operating performance of each car for the preceding 12 months' period. Only such failures as are promptly reported by the Railway Mail Service to the operating railroad shall be considered in computing the percentage of failure.

(*u*) *Emergency lighting.*—If the percentage of failure of the primary system of electric or gas lighting does not exceed 1 per cent, candle lamps will be accepted as a suitable emergency light.

If the percentage of failure of the primary system of gas or electric lighting exceeds 1 per cent and is not greater than 4 per cent, an emergency system of suitable oil lamps, gas or electric lights, maintained by independent storage capacity, may be required. Such emergency system must provide illumination values not less than 50 per cent of the minimum operating illumination values specified above for the primary system, with the exception of letter cases and center line of car through bag-rack portion, where the illumination shall not be less than 60 per cent.

If the percentage of failure of the primary system of electric or gas lighting exceeds 4 per cent, a new installation or a second complete primary system of lighting will be required on cars so failing.

(*v*) The illumination values herein specified shall be determined by the usual and approved methods. Any differences regarding the same which may arise between the Post Office Department and the railway companies affected shall be referred to the Bureau of Standards for decision.

26. HEATING.—(*a*) Requirements of the department embody three main points: First, sufficient heat to keep the postal car or apartment comfortably warm; second, proper distribution of heat, particularly throughout that part of the car occupied by letter cases and bag-racks (care should be taken not to have excess of heat around letter cases), and third, an arrangement of pipes to avoid interference with distributing facilities.

(*b*) To obtain the results outlined above, the department will require postal cars and apartments to be equipped with sufficient amount of radiation to make the floor of the car comfortable and to obtain a temperature of 65 degrees between the side doors at a point 5 feet above the floor line and to maintain such temperature under the most adverse weather conditions to which the car is subjected when in service. Sufficient radiation should be provided in the end of the car containing hopper and washstand to maintain a temperature of at least 48 degrees in that location.

(*c*) Heating of postal cars primarily to be with steam or hot water. Pipes are to have suitable protection guards of wire or perforated metal. Pipes located behind bag-rack sections shall not occupy space exceeding 20 inches in height and 4½ inches from wall of car to outside of guard. All heating-pipe screens, whether of wire netting or perforated metal, should stop 2 or 2½ inches above the floor so as to permit of cleaning. All inlet and trap valves must be accessible when bag racks are hung with sacks or storage stalls are full of mail.

(*d*) Where perforated metal is used for heating-pipe covering behind bag racks, perforations should extend along the top as well as the side of the guard to permit radiation of heat. Preference is expressed for wire netting for this purpose.

Where feed pipes to these wall radiators extend along

the face of door pockets, and the screen over these pipes covers the opening at the back of the pocket, a section of the screen should be detachable so as to make opening accessible for the removal of dirt and snow.

(*e*) Where bulkhead radiators are used as part of the heating system, the inside line of same shall be not less than 21 inches from center of car, so that a clear aisle space of 42 inches will be provided where two radiators are installed oppositely. All radiators must be screened. Bulkhead radiators should be substantially supported and corresponding stanchions omitted.

(*f*) Where wall radiators are installed in storage end of cars, wire netting or perforated-metal covering should be reinforced every 18 inches and provision made to hold the screen at least 1 inch from the pipe. Considerable weight will rest against screen, and it should be substantially constructed.

(*g*) Where service conditions require, an auxiliary coal-burning stove shall be furnished, complete with coal box and firing tools, smokejack properly screened, and protection guards. The stove and coal box to be securely attached to floor. Stoves furnished must be of a safety pattern or design, properly guarded by metal casing so as to prevent overheating of closely surrounding objects and damage which might result therefrom. Protection guards should be built to height of stove and wire netting used above that point to permit better radiation of heat. Stove guards should extend toward center of car as far as the front line of stove. Front support of guard should be iron pipe.

(*h*) All exposed edges of wire netting or screen shall be bound.

(*i*) The train-pipe steam line to be applied and equipped with end valves, steam hose and couplings, as per M. C. B. requirements and the railway company's standard. All valves must be located so as to be readily accessible.

27. Deck of Car.—(*a*) Ventilation of postal cars of clere-story design to be accomplished preferably by means of self-acting ventilators, having intake and exhaust working in conjunction. Four such ventilators per side for 70 and 60 foot cars; three per side in 50 and 40 foot cars, and two per side in mail apartments placed to obtain maximum results. Other deck sash to have clear glass and to be placed in fixed position without screens. Trimmings of deck sash to be railway company's standard.

(*b*) Postal cars not having clere-story roofs are to have a sufficient equipment of self-acting ventilators in the roof.

(*c*) Where exhaust ventilators only are used, intake of air should be provided substantially equal to the capacity of the exhaust. If this is accomplished by means of swinging deck sash, they should be limited to the fewest number necessary. Such deck sash should be screened.

(*d*) As much clear glass surface as possible should be provided in deck of car for the purpose of admitting light, and deck piers should not be wider than necessary.

28. Vestibules.—Postal cars are to be equipped with the railway company's standard short vestibule, preferably with outside buffer springs, and with diaphragms when needed for communicating between cars.

29. Couplers and Draft Gears.—The details of the coupler and draft gear to be in accordance with Master Car Builders' and United States safety-appliance requirements and the practice of the railroad for which the cars are built.

30. Buffing Mechanism.—The details of the buffing mechanism to be in accordance with the practice of the railroad for which the cars are built.

31. Brake and Signal Equipment.—(*a*) Postal cars shall be equipped with automatic air brakes and signal equipment in accordance with railway company's practice. Hand brakes in accordance with United States safety-appliance standards. Brakes shall be applied to all wheels, and, on four-wheel trucks, preferably inside hung or clasp type.

(*b*) Brake wheels should be installed inside postal cars and apartments only so far as necessary to comply with Interstate Commerce regulations. One brake wheel in each full mail car is sufficient, located in clear storage end of car. One brake wheel in combination cars, to be located in baggage end, is acceptable where there is a creep or other door connecting the apartments.

(*c*) Suitable cord or attachments shall be furnished for convenient operation of the conductor's valve and train-signal system, which may be hung to safety rod, provided supports are placed at short intervals to prevent cord hanging loosely.

32. Steps, Handholds, Signal Brackets.—The details of the steps, handholds and signal brackets to be in accordance with United States safety-appliance and M. C. B. requirements and the practice of the railroad for which the cars are built. Side steps to be full width of door opening where possible. Handholds to be applied to each side door post. See R. M. S. drawings for detail step construction.

33. Stanchions and Screens.—Stanchions in storage ends and at ends of pouch racks, screen frames, and screens to be located as per standard Railway Mail Service plans.

34. Safety Rods and Bars.—Safety rods to be applied in an equivalent manner to that called for in Railway Mail Service interior specifications. Each side door not equipped with catcher arm should be provided with safety bar.

35. Interior Equipment.—The following equipment shall be furnished. Railway Mail Service drawings should be followed where these details are shown; otherwise details to be as per railway company's standard.

See Figs 2891-2922.

Broom	Mirror
Catcher arms	Paper-boxes
Chair or stout stool	Paper rakes
Cinder guards	Portable bins
Coffee heater when necessary	Register cages
Cots when necessary	Sack and pouch racks
Disinfectants	Shelf and letter drop
Distributing tables	Slip case
Deck-sash opener	Stepladder
Dustbrush	Torch for lighting gas
Dumping tray	Toilet-paper holder
Fire buckets	Wardrobe
Fire extinguishers	Water cooler
Folding washbasin	Water tank
Hopper	Wrecking tools
Letter cases	Wire screens for letter case
Lock rods	

36. Trucks.—(*a*) Trucks may have either built-up metal or cast-steel frames, and may be either four-wheel or six-wheel type, within the limits of the journal loads given below.

(*b*) For cars equipped with one cast-iron brake shoe per wheel the effective maximum emergency brake-shoe pressure must not exceed 18,000 pounds per shoe. In this case the maximum weight per journal of loaded car for Master Car Builders' standard axles shall not exceed

10,000 pounds for 4¼ by 8 inch journal, 14,000 pounds for 5 by 9 inch journal, 17,000 pounds for 5½ by 10 inch journal, or 20,000 pounds for 6 by 11 inch journal. Where two brake shoes per wheel are employed the standard Master Car Builders' journal loads may be used.

(*c*) Wheels shall be either all steel or steel tired. All other truck details, including body and truck center plates and side bearings, shall be in accordance with Master Car Builders' requirements and the practice of the railway for whose service the cars are built.

37. Painting.—The painting of car body and trucks shall be in accordance with railway company's specifications for steel cars. Light-color enamel paint shall be used for interior finish above side plate; below that line the car shall be painted a medium shade of darker color, preferably light buff or light brown, with dull finish. The lettering and numbering of postal cars shall conform to Railway Mail Service requirements and the railway company's standards. The inside length and width, the car number, and title of the company owning shall be painted at a convenient place inside the car. End doors and end-door posts must not be sanded.

SPECIFICATIONS FOR FIXTURES FOR POSTAL CARS, REVISED TO MARCH 17, 1915

1. Distributing Tables Under Letter Cases.—(*a*) Contour and location are shown on Railway Mail Service floor plans for mail cars. Letter case tables in 60, 50, and 40 foot full postal cars and 30, 25, 20 and 15 foot apartment cars should be 18 inches wide in clear between front of letter cases and inside of molding at widest part. For width of table in apartments less than 15 feet in length, see Railway Mail Service floor plans.

(*b*) Tables shall be of cherry, birch, or maple, preference in order named, and when finished shall be 1½ inches thick. Top of table shall be 28 inches from floor. Wooden drawers with hasp for locking shall be installed as indicated on Railway Mail Service floor plans.

(*c*) 10 inch by 10 inch canceling pads of high-grade elastic rubber, ½ inch thick, shall be installed in letter tables at points indicated on Railway Mail Service floor plans, top surface of pads to be flush with top of tables.

(*d*) A flat wooden strip, 2½ inches wide, 1 inch thick, quarter round at outer top edge, shall be placed at front edge of letter tables, to project 1 inch above surface of table. Sections shall be cut out at front, flush with surface of table, to provide for the removal of sweepings, ends of strip at opening to be rounded. See Railway Mail Service floor plans.

(*e*) For details, see Railway Mail Service drawings.

2. Letter Cases.—(*a*) Location of letter cases, with number and sizes of boxes to be provided, is shown on Railway Mail Service floor plans.

(*b*) Cases shall be constructed of aluminum or other metal, or wood when over-all dimensions permit. Vertical partitions shall be not less than 1/32 inch thick (if of aluminum, not less than 1/16 inch), devoid of shoulders, and present a rounded front not more than 3/16 nor less than 3/32 inch thick. The Tilley revolving label holder, a metal holder of equivalent design, or square label holder made of cherry or mahogany, shall be applied in front of horizontal partitions and above top row of boxes of all cases. No label holders are required at bottom of cases. If wood holders are used, corners should be beveled 1/16 inch, forming ⅜ inch flat surface, for application of paste labels. The label holders shall be installed so that each face may be turned to the front at will and be held in position by flat springs applied in such manner as to prevent formation of shoulders. Any number of label holders up to seven may be operated by one spring. Top of label holder shall be level with bottom of box at outer edge.

(*c*) Cases shall be made 12 rows high, the back of bottom row of boxes to rest on letter table. The seven lower rows and top row of boxes shall each be 4 inches high. The eighth, ninth, tenth and eleventh rows shall be 3¼ inches high. Short letter boxes shall be 6¼ inches and long letter boxes 9¼ inches deep, front to back (exclusive of label holders) sloping from the front 1½ inches. Short letter boxes shall be 4¼ inches and long letter boxes 5 inches wide. The bottoms shall be of perforated steel not less than 1/32 inch thick stamped to pattern shown on Railway Mail Service drawings, sheet 4, except lower row of boxes shall have bottoms with perforations at back only, with corresponding openings through letter tables to permit dust to fall through. Bottoms shall be turned at front to meet the ½ inch square label holders in such manner as to prevent formation of shoulders as indicated on drawings. There shall be a strip 1 inch wide underneath cases, immediately in front of holes through tables, fitted snugly between partitions to prevent accumulation of dust under case. Space between bottom of case and top of table shall be closed in by a vertical strip placed flush with face line of case.

(*d*) Figures in preceding paragraph covering height and width of boxes indicate dimensions in the clear at front.

(*e*) Portable screens of suitable wire, not to exceed 1-inch mesh, framed to insure rigidity, shall be applied to front of letter cases, as indicated on Railway Mail Service floor plans. Screens shall be suspended from hooks at top line and arranged to lock below bottom line of cases.

(*f*) Back of letter cases shall be covered with sheet metal or 1/16-inch wire. If the latter is used, mesh shall not exceed ¼ inch. Triangular space back of wing letter cases in full cars should be left open to accommodate wrecking tools, and fire extinguishers, if desirable.

(*g*) If metal other than aluminum is used, cases shall be given a heavy coating of dull aluminum paint.

(*h*) Supports and attachments for portable letter cases shall be proportionate to the weight of the section. Where necessary, additional strap hook to hang from safety bar should be provided on outer edge

(*i*) For details, see Railway Mail Service drawings.

3. Racks for Sacks and Pouches.—(*a*) Only such type of rack as has been approved by the department shall be installed in any car.

(*b*) Top frame of rack section to consist of four ¾-inch pipes, placed parallel with side of car. The rod nearest wall of car is designated as No. 1; the next, or middle top rod, as No. 2; the outside top rod, nearest center of car, as No. 3. Rods 1 and 2, and 2 and 3, shall be placed in line 13 inches center to center. Rod No. 4, same size; shall be 2¼ inches below and 1¼ inches forward of rod No. 3 (measuring center to center). This rod is used to support paper-distributing tables, dumping tray, and bridges. Racks shall be made in standard sections, 5 feet long, end to end, outside measurement, clearance at each end to be ¼ inch when installed, and shall furnish not less than 4 feet 10¼ inches clear hanging space between end members. Rack sections of same construction of less length than the above standard shall be installed when required, as shown on Railway Mail Service floor plans.

(*c*) Racks shall be of such construction as will permit of top frame being raised or lowered at will, that the space may be used for storage purposes.

(*d*) Two parallel rods of ¾-inch pipe, equidistant from center line of car, shall be installed to support paper-distributing tables and bridges. Rods shall be placed 4 inches apart, center to center, shall be 30½ inches from floor to center of rods, and be supported at ends and joints by single standards. Rods shall be made in sections to correspond in length with sections of racks and installed in such manner as to be removable in pairs. (See Railway Mail Service floor plan D and F for exceptions.)

(*e*) Sections of rack as hereinbefore described shall be installed on each side of parallel center rods, 22¾ inches from nearest rod to rod No. 4 of said sections (measuring center to center). The intervening space not occupied by distributing tables and dumping tray shall be filled with bridge sections. Such section shall be of ¾-inch pipe, and be 22½ inches long and 13 inches wide, with sides elevated 4 inches above ends. Measurements to be made center to center. Rod No. 1 shall be placed 38½ inches from floor to center. The rod will be 2 inches from side wall to center, in cars 9 feet in width, inside measurement, and in wider cars racks shall be similarly located from center line of car, the additional space between wall and rod No. 1 to be taken up by blocking-out brackets. Rod No. 2 shall be 37½ and rod No. 3, 36½ inches from floor to center.

(*f*) Five aluminum, malleable iron, or brass label holders uniformly spaced, shall be placed on rods No. 1 and No. 2, and one in center on each side of bridges. Label holder shall be 7 inches long, 1¼ inches wide, and have machine-milled slots 1/16 inch deep and 15/16 inch wide, enlarged at ends, into which folded paper labels can be inserted. Face opening of slot shall be 11/16 inch wide. Label holders shall have smooth finish, devoid of cutting edges and sharp points, and be attached to rods at an angle of 60 degrees from horizontal axis through lugs 1 inch from ends at such height as to give 5/16 inch clearance between rod and label holder, permitting free movement of hooks. Label holders should be riveted to rod or attached with machine screws, countersunk, heads to be soldered or covered with metal cement to present smooth surface and prevent loosening. (There shall be no label holders on rod No. 3.)

(*g*) Revolving-shank hooks shall be placed on the rods as follows: Rod No. 1 to have 20 hooks, all pointing toward rod No. 2. Rod No. 2 to have 40 hooks, pointing alternately toward rods No. 1 and No. 3. Rod No. 3 to have 20 hooks pointing toward rod No. 2. On rod No. 1 one hook should be placed at each end of each label holder, and two under middle parts, between lugs. On rod No. 2, two hooks pointing alternately toward rods No. 1 and No. 3, should be placed under each end of each label holder, and four hooks, similarly applied under middle part, between lugs.

(*h*) Rods and hooks, when painted, should permit free movement.

(*i*) Hinged wire screens to be provided at end of bag racks, adjoining door openings. Hooks should be provided for securing screen to wall when not in use, and springs or bolts under paper boxes to prevent rattling when in service position.

(*j*) For details, see Railway Mail Service drawings.

4. Paper Distributing Tables and Dumping Tray.—Wood required. For details, see Railway Mail Service floor plans and drawings.

5. Letter Package and Paper Boxes in All Mail Cars, Except 8, 10 and 12 Foot Apartments and 6, 8, 10, 12 and 15 Foot Alley Apartments.—(*a*) Letter package boxes may be of wood or metal construction sufficiently heavy to prevent deformation. Paper boxes shall be of wood with wood or steel roof and back.

(*b*) Paper boxes shall be 9 and 12 inches wide, respectively, center to center, as shown on Railway Mail Service floor plans. Shall be not less than 25 inches front to back in the clear, bottom sloping 6 inches toward front. Bottom line at front to be 5 feet 3 inches from floor. Boxes should conform at top to contour of deck. If necessary to reinforce bottom to prevent warping, transverse wood strips, about 1 inch thick by 2 inches wide, under every vertical partition should be used, strip, bottom and partition to be screwed together.

(*c*) In cars having round roof, paper boxes shall conform to details of measurement and shall have not less than the capacity indicated in paragraph (*b*).

(*d*) Paper boxes shall have wooden sliding fronts not less than 8 nor more than 10 inches high, or approximately one-third the height of front of box with 4½-inch combined label holder and lift at top. Fronts shall have wire or grill latticework centers.

(*e*) Brass or steel friction springs, to hold sliding fronts in a raised position, shall be placed in slide grooves in vertical partitions.

(*f*) Double or twin hooks shall be placed under each vertical partition, with points toward side of car, 1 inch back from face line of boxes.

(*g*) Paper boxes should be numbered consecutively, beginning with box nearest side door next to hopper. (See Railway Mail Service drawings, sheet 7.)

(*h*) Letter package boxes in apartment cars, and paper boxes in 8, 10 and 12 feet apartments and 6, 8, 10, 12 and 15 foot alley apartments, shall be installed as indicated on Railway Mail Service floor plans. These boxes shall follow same general construction as overhead paper boxes described in preceding paragraphs.

(*i*) For details, see Railway Mail Service drawings.

6. Small Cases for Slips.—Small wooden pigeonhole cases for slips and schemes and a small wood box for labels from pouches shall be installed as indicated on Railway Mail Service floor plans.

7. Portable Bins for Letter Packages.—Portable bins, of substantial light wood construction, approximately 15½ inches wide, 19½ inches front to back, 14¾ inches high at back, and 10¾ inches high in front, shall be furnished, as follows:

Four for 60-foot cars; two for 50- and 40-foot cars.

8. Cage for Registered Mail.—A strong wire netting cage shall be installed in all mail cars and apartments.

9. Hoppers.—Flushing or dry hopper, former preferred, shall be installed at location in car indicated on Railway Mail Service floor plans. When dry hopper is used, it shall have double lid, large opening top and bottom, with nearly straight sides, and chute leading through and extending below floor; bottom to be free from obstruction and provided with deflector.

10. Lavatory.—Lavatory located as indicated on Railway Mail Service floor plans shall be of the folding type, designed to occupy not to exceed 6½ inches front to back when folded; to have basin not less than 12 inches in diameter, 4½ inches deep, and not less than ½-inch splash rim at top. Top of basin, when lowered, to be 30 inches from floor. A steam jet shall be introduced into basin or water system to heat water.

11. Water Tanks and Drinking-Water Containers.—(*a*) Drinking-water container shall be constructed to keep

water and ice separate and free from foreign substances when filling, with provisions for draining each compartment at bottom, unless container is constructed in such manner as to permit of easy removal for cleaning. Suitable waste pipe for drippings with large outlet through floor to prevent freezing shall be provided. Only such type of container as has been approved by the department shall be installed in any car. For full cars water cooler having not less than 6 to 8 gallons' capacity should be used. Smaller tanks (not less than 4 gallons in capacity) will be acceptable for apartment cars.

(*b*) Tanks, insulated when service conditions require to prevent freezing, to contain water for lavatory and hopper, cylindrical or shaped to conform to deck of car, shall be located in deck above hopper, with provision for filling through roof or from sill or both, and shall be securely attached. Minimum capacity of overhead water tanks as follows:

40, 50- and 60-foot full cars, 40 gallons.

30-foot apartments, 25 gallons.

15, 20- and 25-foot apartments, 20 gallons.

8, 10- and 12-foot apartments, 15 gallons.

When dry hoppers are used the above capacity may be reduced 50 per cent.

12. Wardrobe—Mirror.—(*a*) Wardrobe of substantial construction shall be installed as indicated on Railway Mail Service floor plans. It shall extend from floor to deck of car, be provided with latch and hasp for locking, shelf 5½ feet from floor, and have a row of substantial wardrobe hooks 6 inches apart extending around sides and under shelf. In wardrobes 12 inches wide or less hooks should be placed on end and one side only. Ventilation should be provided through holes or grille plates at bottom and top of door.

(*b*) A mirror, approximately 12 by 15 inches, should be located at most available point above lavatory.

13. Wrecking Tools—Fire Extinguishers.—Shall be provided in accordance with existing laws and regulations. Extinguishers may be attached to ends of overhead paper boxes adjacent to side doorways. Wrecking tools may be attached vertically to side wall back of wing letter case in full cars or as shown in Railway Mail Service floor plans.

14. Gas Plate, Steam Cooker or Equivalent.—Shall be installed when required for use of postal clerks in making coffee and warming lunches, located preferably on bulkhead, as indicated on Railway Mail Service floor plans, approximately 5 feet from floor. Gas plate should be installed in gas-lighted cars.

15. Cots—Stepladders—Stool—Chair.—(*a*) Portable cots and stepladder should be furnished in cars where service conditions require their use. Hooks for hanging stepladder to be provided on side of clothes closet where practicable.

(*b*) A chair, or stout stool, 18 inches high, should be placed in all mail cars and apartments.

16. Deodorants and Disinfectants—Toilet Paper.—Toilet paper required in all cases; deodorants and disinfectants where conditions warrant.

17. Door Fixtures.—Suitable outside door fixtures shall be applied on side doors in such manner that door may be opened to full width between posts, and be locked shut with mail or other lock, as a means of safety.

A catch shall be provided to hold sliding doors in an open or closed position as desired.

End doors shall be provided with a locking bar.

Other fixtures, standard.

18. Rakes for Paper Boxes.—Two steel rakes, having crossheads 6½ inches long with 5 teeth 2½ inches long and handles 24 inches long, shall be furnished for each full railway postoffice car, and one such rake for each apartment car.

19. Catcher Arms—Safety Bars—Cinder Guards—"No Admission" Notices.—(*a*) Two catcher arms shall be furnished for each car, sockets applied to all side-door posts. Safety bars, to be secured in position by locking device, shall be installed at non-catcher doors in catcher-arm sockets.

(*b*) Four cinder guards shall be furnished for each full and two for each apartment car, holding brackets to be applied to all side-door posts and at ends of overhead paper boxes. Wire protection over glass or cinder guards should be curved in front of same and hinged or made removable to permit of cleaning glass.

(*c*) Two "No Admission" notices, properly framed, must be placed in full cars, and one such notice in apartment cars. These notices should be placed on end of paper boxes or on suitable wall location near side doors.

Printed "No Admission" notices, without frames, are furnished by the Post Office Department.

20. Safety Rods—Window-Protection Rods.—(*a*) Two rods of 1-inch iron pipe shall be suspended 7 feet 3 inches from floor to center of rod and 19 inches from center of car. Rods to extend full length of car, curved to clear lights and shall be suspended from deck ceiling by hangers not more than 8 feet apart, which shall be securely attached to reinforcement or filling blocks between ceiling and roof at each hanger. Safety rods shall be securely side braced to deck sills at each hanger. A ⅝-inch hand rod, securely attached to side plate, shall be installed above each side door, extending full width of same.

(*b*) Five-eighth-inch rods of hardwood, hickory preferred, spaced 3 inches apart in detachable frame, shall be provided as protection for windows on inside. Windows adjacent to side doorways shall be protected by ½-inch iron rods outside, if window is located less than 2 feet from door opening.

21. Letter Drops.—Letter drops shall be installed as indicated on Railway Mail Service floor plans, and shall conform in detail of construction to Railway Mail Service drawings.

22. Movable Stanchions.—Shall be made of 1½-inch gas pipe or steel tubing of the same outside diameter. Floor sockets to be located as shown on Railway Mail Service floor plans. Pole next to wall should be 12 and inside pole 29 inches from wall to centers. Where stoves are omitted, one additional set of stanchion sockets in lieu of bulkhead should be provided, except in 40-foot full and 30- and 25-foot apartment cars, where two additional sets of stanchion sockets should be provided, unless wardrobe is of sufficiently substantial construction to allow piling of mail against it. When stoves are omitted, an additional set of poles should be provided in 40-foot full cars, 25-foot, 15-foot, 12-foot, 10-foot and 8-foot apartments. Springs shall be placed in top brackets to prevent stanchions from rattling. Stanchions shall be provided with label holders when service conditions require.

Floor plans and drawings referred to herein bear date of November 30, 1914, redrawn or revised, on December 10, 1914. Modified in September, 1917.

Pouch Catcher. See Mail Catcher.

Pouch Hook (Postal Cars). A hook used for suspending mail bags while assorting the mails.

Pouch Rack (Postal Car). Figs. 2920, 2920-A. A rack built of standards and horizontal rods to which the pouch hooks are attached and which support the pouches or bags while mail is being distributed into them.

Poultry Car. Fig. 198. A form of stock car for carrying live poultry. See Car and Stock Car.

Pressure Bar (Buffing Apparatus). A stiff iron bar of a cross-shaped (+) cross section, which connects the drawbar to the buffer spring, so that the draft spring reinforces the buffing spring and the buffing spring takes up part of the pull on the drawbar, thus relieving the draft spring. The pressure bar also forces out the buffer stem and plate when the drawbar is pulled out, thus maintaining a continuous platform between the cars.

Pressure Gage (Pintsch Gas Lighting). A gage usually placed in a saloon. It registers atmospheres or pounds and atmospheres, for convenience in computing the volume of gas in the tank.

Pressure Head (Brake Cylinder). The head that covers the end of the brake cylinder into which air pressure is admitted when the brakes are applied.

Pressure Regulator. Figs. 2043 2044; Page 1184. A valve designed to regulate the delivery pressure of steam in a steam heating system. It depends entirely upon the elasticity of springs, the pressure of which can be gaged or regulated by screw studs that bear upon one end of the springs.

(Pintsch Gas Lighting Apparatus.) The valve by which the pressure of the compressed gas is reduced for consumption. The pressure regulator is one complete fixture, adjusted by the maker. Names of the principal interior parts are diaphragm, diaphragm connecting rod, diaphragm lever, regulating valve and dust arrester.

Pressure Retaining Valve. Figs. 1379-1381, 1399-1402, 1484, 1488; Page 1308. A device by means of which a certain part of the brake cylinder pressure may be retained to aid in retarding the acceleration of a train in descending long grades while the brake pipe pressure is increased after one application to recharge the auxiliary reservoirs. It is controlled by a small handle, the position of which causes it to operate or not, as desired. There are four different types, the ordinary, the vestibule, the double pressure, and the driver brake. The first two types may be made to retain 0 or 15 lbs.; the third to retain 0, 15 or 30 lbs. or 0, 25 and 50 lbs.; the fourth to retain 0, 15 lbs., or all cylinder pressure. In descending grades the handle is turned to the proper position to retain the desired pressure, while on the level the handle is turned to allow the air to escape to the atmosphere. Also called retaining valve.

Pressure and Vapor Heating System. Figs. 2062, etc. Page 1298. A combination of the pressure and vapor heating systems by which it is possible to operate with an open drip and the lowest temperature in the pipes, or by various pressures with the closed drip, up to that on the train line.

Priming (Painting). The first coat in car painting. See also Painting.

Private Car. A car for private use, usually containing eating and sleeping facilities. Private cars used by railway officials are ordinarily termed business cars. Freight cars owned by companies other than the railways are termed private line cars or sometimes simply private cars. See Car.

Produce Car. A modified form of refrigerator car, provided with ventilators and ice boxes, for the transportation of fruit, vegetables and perishable produce.

Profile Carline. A carline extending from one plate to the other, bent to conform to the shape of the clerestory.

Propelling Chain (Steam Shovel). A heavy chain passing over a sprocket on an axle of the truck and a sprocket geared to the winding drum. By revolving the winding drum sprocket the shovel is made to move forward or back on the track by its own power.

Propelling Gear (Steam Shovel). The gears which turn from the main winding drum when the propelling chain is to be operated.

Propelling Lever (Hand Car). The main lever, to which power is applied.

Protection Cap. A Lamp Jack.

Protection Strip. A strip used on a freight car side door to protect it from wear when being opened and closed. Such strips are also used to stiffen the door and to prevent the entrance of sparks. See Spark Strip.

Pull. A catch or lip upon a drawer, door or window, by which it is pulled open. See Door Pull.

Pull Hook or **Deck Sash Opener.** A rod with a small hook at one end for opening deck sashes. Also called a ventilator staff.

Pull Iron. A roping staple. A U-bolt passing through the side sill for the purpose of attaching ropes in switching. See also Push Pole Pocket.

Pull Ring. A metal ring with a screw attached, by which it is fastened to any object, as a sash, drawer, etc., to take hold of in opening it.

Pull Rod Carry Iron. A carry iron for an uncoupling rod.

Pulley. A wheel with a grooved, flat or slightly convex rim, adapted to receive a cord or band which runs over it. Its function is to transmit power or change the indication of motion. A sheave is a pulley wheel in a block, but sheave and pulley are used as almost synonymous terms. See Sheave and Berth Chain Pulley.

Pullman Car. A name strictly applicable only to cars operated by the Pullman Company, but in common usage frequently applied to sleeping, parlor, or drawing room cars built after the same designs as those adopted by the Pullman Company.

Pump (Wash Rooms). See Basin Pump.

Pump Governor. See Air Compressor Governor.

Purline or **Purlin.** 37, Figs. 34, 35. A longitudinal piece of timber over the carlines, extending from one end of the car roof to the other, to which the roof boards are fastened. Sometimes called a roof strip, but the latter more correctly applies to strips sometimes used above the purlins.

Purlin Bracket. Fig. 971. An iron casting or forging used to connect a purlin to the end plate.

Push Button. Fig. 1385. Used in connection with the whistle of the train signal apparatus.

Push Button Faucet. Figs. 1724, 1755. A faucet controlled by a push button.

Push Car or **Lorry Car.** Fig. 2818. A four-wheeled car used to carry materials and tools and moved or pushed by hand. See also FERRY PUSH CAR.

Push Pole. A pole or wrought iron tube which is used as a strut to span diagonally the distance between the corners of a locomotive and a car, standing on two parallel tracks to push the car without switching the locomotive onto the same track that the car occupies.

Push Pole Pocket. 52, Figs. 34, 35; 10, Fig. 80; 9, Fig. 147; Fig. 972. A plate placed on the corners of freight cars, with a cavity for inserting poles or bars in switching, to enable the car to be moved from the side by an engine on a parallel track. A Roping Staple serves the same purpose when it is desired to use a rope or cable.

A topical discussion on push pole pockets will be found in the 1909 M. C. B. Proceedings, page 100.

Push Rod (Brake Cylinder). Fig. 968. A bar which transmits the braking force from the piston of the brake cylinder to the brake levers. It has a cross-head formed on one end, by which it is attached to the cylinder lever. It is guided by a hollow piston rod. As it has not a rigid connection to the piston, but can slide freely in the hollow piston rod, when the brakes are applied by hand, it does not become necessary to overcome the friction of the piston in the cylinder.

Pushover Seat. See WALKOVER SEAT.

Putty. A mixture of linseed oil with whiting, which latter is chalk finely pulverized.

Q

Quadrant. A piece of metal curved in the form of the arc of a circle.

(Steam Shovel.) A casting for holding the operating levers.

Quadrant Levers (Steam Shovel). The handles mounted on the quadrant which controls the various movements of the shovel.

Quadruplet (of Elliptic Springs). Four springs side by side acting as one.

Quartette (Elliptic Spring). Also called QUADRUPLET.

Queen Post (of a Truss). 34, Fig. 260. One of a pair of vertical posts against which the truss rod bears. When one post only is used, it is called a King Post. Such posts are used for the truss rods under car bodies and occasionally trucks.

Queen Post Stay. A bar attached to a queen post to stay it laterally.

Quick Action Automatic Air Brake. Figs. 1366, etc. The triple valve is so modified that when a relatively quick reduction in brake pipe pressure is made, it also opens a direct communication from the brake pipe through the triple valve to the brake cylinder. This not only increases the brake cylinder pressure in proportion to the amount of air flowing into it from the brake pipe locally on each car, but by venting air from the brake pipe locally on each car, hastens and increases the effect of the reduction made at the brake valve. The net result is to shorten the time from the movement of the brake valve handle until a full brake application is obtained on the entire train, and to increase the total braking power obtainable by such an operation (emergency application) about 20 per cent over the maximum obtainable during ordinary operations (service application), or when using the plain automatic brake. See AIR BRAKE.

Quick Action Triple Valve (Air Brake). See TRIPLE VALVE.

Quick Service Valve. A valve used with the emergency straight air brake system to accelerate the application and release of brakes. It is located between the train line and the emergency valve.

Quill Drive (Motor Cars). Fig. 2594. A flexible connection between motors and driving wheels, providing a spring suspension for the motors and spring transmission of the motor torque.

Quintuplet (of Elliptic Springs). Five springs side by side acting as one.

R

Rabbet. A rectangular groove made longitudinally along the edge of one piece to receive the edge of another. It is common in paneling, and in door frames for the door to shut into.

Rack. A frame for receiving various articles. See BASKET RACK, etc.

In machinery, a rectilineal sliding piece, with teeth cut on its edge for working with a wheel. A RATCHET.

Rack Catch (for Head Board of a Sleeping Car Berth). A small cupboard catch to hold the headboard pocket closed.

Radial Draft Gear. Figs. 758, 770. A special form of draft gear and coupler yoke.

Radiator (Heating Apparatus). The pipes passing through a car, through which the hot water or steam circulates.

An individual paper by Professor A. J. Wood, in the 1916 M. C. B. Proceedings, page 503, gives a complete account of the tests of four types of passenger car radiators.

Radiator Stand. A support for a radiator.

Rafter. A timber to support a roof.

Rail. The horizontal part in any piece of framing or paneling.

Railing. See PLATFORM RAILING.

Raised Roof. An upper deck or clere story.

Rake (Postal Car). Fig. 2097. Used for handling the papers on postal cars.

Ranges and Cook Stoves. Fig. 1708-1717. A range is a fixed and more elaborate cook stove attached to the wall, and, in houses, usually built in with brick so as to need no stovepipe to connect with the chimney.

Ratchet. A serrated edge like that of a saw, sometimes straight and sometimes on a wheel, into which a pawl engages, for producing or (more commonly) restraining motion. See BRAKE RATCHET WHEEL, WINDING SHAFT RATCHET WHEEL. An undulating ratchet is one having no sharp edges, so that the ratchet catch will slide over them without removal on the application of force, as in deck sash pivots.

Ratchet Burner (Oil Lamp). One in which the wick is moved up and down by a pointed wheel engaging in it, like mineral oil burners.

Ratchet Jack. A jack operated on the ratchet principle. See JACK.

Ratchet Wheel. A wheel with teeth like a saw cut into the outer edge to engage with a pawl, which prevents the wheel from being turned in one direction while allowing it to turn in the opposite direction. See

BRAKE RATCHET WHEEL, WINDING SHAFT RATCHET WHEEL.

Receiver (Pintsch System). A cylindrical steel tank, with riveted and soldered seams, adapted to receive and retain gas at high pressures and hung under a car.

Receiver Filling Valve (Pintsch Gas Lighting). A valve of peculiar construction for the admission of the compressed gas to the receiver, so that it can be transmitted to the regulator for consumption.

Reclining Chair. Figs. 1676, 1687; Page 1255. A chair the back of which can be inclined, and which is provided with leg and foot rests.

Recording Table. The table on which is placed the recording apparatus of a dynamometer car. See DYNAMOMETER CAR.

Red Lead, Specifications for. (M. C. B. Recommended Practice.)

In 1916 the following Specifications were adopted for Red Lead:

1. *Scope.*—These specifications cover a high-grade commercial dry red lead, to be used in paint mixtures or as a priming coat. When used in priming coat it should be made up fresh for quick application to prevent setting. When less than three per cent of litharge is present, it may be mixed up in paste form and held indefinitely.

2. *Composition.*—The dry pigment, which is probably a mixture of lead monoxide and lead dioxide, should

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contain at least 85 per cent of true red lead, Pb_3O_4, equivalent to 30.60 per cent of lead dioxide, and the remainder to be practically pure lead monoxide.

3. *Color.*—The pigment must be of bright color, free from organic coloring matter.

I. METHODS OF ANALYSIS.

4. *Total Lead.*—(a) The total lead content will be obtained, after removal of insoluble matter, as sulphate.

(b) *Red Lead, Pb_3O_4.*—Weigh out 0.5 gram of pigment as received into a dry 125-cc. Erlenmeyer flask. Into a dry 150-cc. beaker place in the following order: 15 grams crystallized sodium acetate, 1.2 grams potassium iodide, 5 cc. distilled water, and 5 cc. 50 per cent acetic acid. Mix thoroughly until solution effected, pour into the Erlenmeyer flask containing the lead, and rub with a glass rod until all the lead is dissolved; add 15 cc. of cold, distilled water and titrate with tenth-normal sodium thio-sulphate, using starch as indicator. A small amount of the lead may escape solution at first, but when the titration is nearly complete this may be dissolved by stirring. The reagents used to be analyzed chemicals, and should be pulverized just before using. The titration should be started as soon as the greater part of the lead is in solution and should be carried to completion as soon as possible, as otherwise there is danger of loss of iodine. One cubic centimeter of tenth-normal sodium thiosulphate corresponds to 0.011945 gram of lead dioxide or 0.034235 gram of red lead.

(c) *Lead Monoxide, PbO.*—Calculate the red lead found under (b) to sulphate, deduct this weight from the total weight of sulphate under (a) and calculate the difference to lead monoxide.

(d) *Moisture.*—One gram of the pigment as received will be dried at a temperature of 220° F. for two hours, and the loss in weight calculated and expressed as per cent moisture.

(e) *Insoluble Impurities.*—Treat 1 gram of pigment with 20 cc. of concentrated hydrochloric acid, cover and heat on a steam bath for 15 minutes, add 100 cc. of hot water, boil, filter, wash with hot water, ignite, and weigh the insoluble residue. The weight found should be expressed as per cent insoluble matter.

5. *Fineness.*—(a) The pigment shall be so fine that after having been separated from the oil and freed from hygroscopic moisture and then thoroughly mixed again with pure raw linseed oil, which has also been freed from moisture in the proportion of one part oil to one part pigment by weight, it will stand the following:

(b) Place a small amount of the above mixture on the end of a strip of dry glass, set the strip vertical where the temperature is 70° F. and allow to remain for 30 minutes.

(c) As the mixture runs down the glass, the fineness will be acceptable if the oil and pigment do not separate in the first inch.

II. INSPECTION AND REJECTION

6. *Inspection.*—(a) The inspector representing the purchaser shall have free entry, at all times while work on the contract of the purchaser is being performed, to all parts of the manufacturer's works which concern the manufacture of the material ordered. The manufacturer shall afford the inspector, free of cost, all reasonable facilities to satisfy him that the material is being furnished in accordance with these specifications.

(b) The purchaser may make the tests and inspection to govern the acceptance or rejection of the material in his own laboratory or elsewhere. Such tests and inspection shall be made at the expense of the purchaser.

(c) All tests and inspection shall be so conducted as not to interfere unnecessarily with the operation of the works.

7. *Rejection.*—The material will have failed and will be rejected if the tests herein required show the following:

(1) Less than 85 per cent true red lead, Pb_3O_4.

(2) Moisture in excess of 0.25 per cent.

(3) The presence of organic coloring matter.

8. *Rehearing.*—Samples tested in accordance with this specification, which represent rejected material, shall be preserved for fourteen days from date of test report. In case of dissatisfaction with results of tests, the manufacturer may make claim for a rehearing within that time.

Reducer. See BUSHING and REDUCING PIPE COUPLING.

Reducing Pipe Coupling. A coupling for connecting two pipes of different diameters.

Reducing Tee (Pipe Fittings). A pipe fitting having three openings, one of which is smaller or larger than the other two. See TEE.

Reducing Valve (Train Air Signal Apparatus). Fig. 1448. A valve for reducing the pressure of air admitted to the train signal pipes below that maintained in the brake pipes and main reservoir. In the train air signal apparatus a pressure of from 40 to 45 lbs. is used.

(Air Brake.) See FEED VALVE.

(High-Speed Brake.) See Reducing Valve, Automatic.

(Car Heater.) Used for reducing the steam pressure for the steam heating apparatus.

Reducing Valve, Automatic (High-Speed Brake). Figs. 1394-1398. A valve attached to the brake cylinder to automatically bleed the pressure down to 60 lbs. after an emergency application, when the pressure in the cylinder rises to 85 lbs. or more. The triangular port gives a graduated reduction. It also prevents the brake cylinder pressure from exceeding 60 lbs. pressure in a service application. The triangular port then gives a wide opening.

Reflector. Fig. 2347, etc. A device placed behind or above a lamp to throw the light in any desired direction.

Refrigeration Details. Figs. 888-917.

Refrigerator (of a Refrigerator Car). The chamber, constituting the main body of the car, in which the paying load is placed.

(Fig. 1716.) A box or chest for keeping articles cold by means of ice. Used in dining, buffet and private cars.

Refrigerator Car. Figs. 207-244, 888-909, 2807, 2880-2885; Page 1196. See Car, Ventilated Car and Ice Car. A box carrying commodities that need icing in transit, equipped with two or more ice bunkers or baskets and suitable means for draining off melted ice or briny water. Has side doors and doors in the roof for admitting ice and salt. The temperature usually desired in refrigerator cars is about 40 degrees F., or 8 degrees above freezing. Refrigerator cars are often converted to heater cars during cold weather when it is desired to transport perishable products. See Heater Car.

An M. C. B. committee report on refrigerator cars with special reference to the uniform height of such cars from the rail to the floor; adoption of standard drip cups; and relatively small ice tanks, will be found in the 1911 M. C. B. Proceedings, page 272.

Refrigerator Car Doors. 19, Fig. 211; Figs. 839, 841, 846; Page 1225. Doors for this class of cars must fit tight and must be of a heavy insulated construction in keeping with the rest of the car.

Refrigerator Car Floors and Ice Tanks (M. C. B. Recommended Practice).

In 1911 a uniform height of refrigerator cars from rail to top of floor was adopted as follows:

Inasmuch as the heights of freight-house platforms of the largest roads and packing houses vary in height from 42 to 44 inches above the rail, and as the American Railway Engineering and Maintenance of Way Association had not adopted any standard height of freight-house platform, that this Association adopt a minimum of 48 in. as the Recommended Practice of height of refrigerator car floors, and that the Maintenance of Way Association be requested to adopt a maximum height of 44 inches, which will make ample allowance between the bottom of refrigerator car doors and top of platforms to avoid any trouble opening doors at freight houses.

ICE TANKS

In 1911 a Recommended Practice was adopted that:

For fresh-meat cars, ice tanks of 5,000 pounds ice capacity be the minimum. For fruit and dairy cars, ice tanks of 3,000 pounds minimum, or 6,000 pounds per car.

Refrigerator Car Plug. Fig. 215. A plug which closes the entrance to the ice bunkers of a refrigerator car.

Refrigerator Cars, Salt-Water Drippings. See Salt-Water Drippings, Collection of.

Refrigerator Express Car. Figs. 209-211, 222, 241-244. An express car fitted with insulation and refrigeration apparatus. See Car.

Register. Fig. 2197. An aperture for the passage of air, provided with suitable valves, doors and sliding or revolving plates, by which the aperture is opened or closed. See Ventilator Register.

Register Cage (Postal Car). Fig. 2915. A compartment or cage for registered mail.

Register Case (Postal Car). Fig. 2905. For the distribution of registered mail.

Regulating Valve. See Vapor Regulating Valve.

For acetylene gas lighting see Fig. 2239.

(Pintsch Gas Pressure Regulator.) See Pressure Regulator.

Regulator (Electric Car Lighting). The device for controlling the generator output and maintaining constant voltage on the lamp circuits. It is a form of automatic rheostat. See Lamp Regulator.

(Pintsch System of Gas Lighting.) See Pressure Regulator.

Regulator Straps (Pintsch System). An iron strap used to secure the regulator to the under side of the car.

Reinforcing Wooden Freight Cars. See Cars, Wooden Freight, Reinforcing of.

Relay. See Lamp Regulator Relay.

Release Cock. More properly Release Valve.

Release Spring (Passenger Equipment Trucks). A spring attached to a truck frame and acting on the brake beams so as to prevent the brake shoes dragging on the wheels when the train is running and the brakes are released.

(Air Brakes.) A spiral spring which acts to move the brake piston inward, and thus release the brakes from the wheels after the compressed air is allowed to escape from the cylinders.

Release Spring Clip. The clip which holds the release spring.

Release Valve (Air Brake). Fig. 1478; Page 1308. A cock attached to the auxiliary reservoir for permitting the air pressure to be reduced therein, when the locomotive is detached or when the apparatus is out of order, so as to release or "bleed" the brakes.

Release Valve Rod. Fig. 967. A rod extending from the release valve on the auxiliary reservoir to the side of the car to operate the release valve.

Release Valve Rod Guide. A small iron eye attached below the sills as a guide for the Release Valve Rod.

Relief Valve. See Gravity Release Valve.

Repair Card. Topical discussions on the abuse of the repair card will be found in the 1908 M. C. B. Proceedings, page 410; 1910 M. C. B. Proceedings, page 359; and 1913 Proceedings, page 549.

Repairs, Car. A topical discussion on modern requirements and facilities for car repair tracks as influenced by high capacity cars, will be found in the 1902 M. C. B. Proceedings, page 306.

A topical discussion on "What Is the Ideal Arrangement for Repair Shops for Freight Cars at Outlying Division Plants?" will be found in the 1903 M. C. B. Proceedings, page 68.

A topical discussion on piecework in freight car

repairs will be found in the 1906 M. C. B. Proceedings, page 133.

A discussion of the maintenance of steel cars will be found in the 1902 M. C. B. Proceedings, page 123.

A report of a committee on "What Is the Best Preventative of Rust in Steel Cars?" will be found in the 1904 Proceedings of the M. C. B. Association, page 144.

The committee report in the 1905 M. C. B. Proceedings, page 218, relates largely to the splicing of center sills.

Replacer. See CAR REPLACER.

Reservoir (Air Brake. Page 1308. Main Reservoirs of large capacity are placed under all motor cars having air compressors. Auxiliary reservoirs are placed under all cars equipped with automatic air brakes. In freight service a cast iron auxiliary reservoir is connected directly with the brake cylinder and triple valve. See AIR BRAKE.

See LAMP FOUNT.

(Pintsch Gas Lighting Apparatus.) See RECEIVER.

(Car Heating.) See VAPOR RESERVOIR.

Reservoir Drain Cock (Air Brake). Figs. 1366, 1367, 1414. A cock for emptying the reservoir of any water condensed from the compressed air.

Reservoir Pipe (Air Brake). Also called air pipe and discharge pipe. The pipe conveying the air from the air compressor to the main reservoir.

Reservoir Support (Air Brake). Fig. 968. A bracket by which a reservoir is attached to a car.

Resistance Coils. See ELECTRIC HEATERS.

Retaining Ring (for Wheel Tires). A ring securing the tire to the wheel. See TIRE FASTENING.

Retaining Valve, Brine. Figs. 916, 917. A valve installed in the tank of refrigerator cars for controlling the circulation of the brine. See PRESSURE RETAINING VALVE.

Retarding Spring (Triple Valve). 33, Fig. 1382-A.

Retirement of Lighter Capacity Cars. A topical discussion on the retirement from interchange service of cars of 40,000 and 50,000 pounds capacity will be found in the 1913 Proceedings, page 534. This was followed by a committee report, which will be found in the 1914 Proceedings, page 417.

Return Bend (Pipe Fittings). A short U-shaped tube for uniting the ends of two pipes.

Reversible Car Seat. A name used to designate the form of car seat in which the back turns over to reverse the seat. A turn over seat. See CAR SEAT.

Revolving Chair. See PARLOR CAR CHAIR.

Rheostat. Fig. 2623. A resistance used in connection with the controller for limiting the current taken by the motors, during acceleration. Usually consists of a number of iron grids or strips of iron ribbon properly connected and packed in a substantial frame, the whole being mounted on the under side of the car flooring.

Rib (of a Cast Iron Wheel). A bracket. See WHEEL RIB.

Ridge. See ROOF RIDGE.

Ridge Cap. A flanged metal strip to cover the ridge joint on a metal car roof.

Ridge Pole. 38, Figs. 34, 35. A longitudinal member in the center of a roof, supported by the carlines or rafters on which the roof boards rest. In some cases the rafters are framed into the ridge pole, and in some cases the ridge pole is grooved to receive the roof sheets.

Ridge Pole Bracket. Fig. 971. A forging or casting used to connect the ridge pole and the end plate.

Ridge Timber. A timber which caps the intersection of two inclined floors meeting in the center of the car as in side dump or ore cars. If the inclined floors were the two sides of a gable roof the ridge timber would then become a ridge pole.

Rigid Bolster Truck. Fig. 993. A car truck with a bolster which has no lateral or swing motion. See also BOLSTER and TRUCK BOLSTER.

Rim (of a Car Wheel). That portion of a car wheel outside of the plate.

Rim Latch. A latch which is attached to the inside of a door and is not let into it.

Rim Lock. A lock having an exterior metallic case which projects from the face of the door, differing thus from a mortise lock.

Riser. A piece of marble or metal set on edge around a wash bowl to prevent water from running against the walls. See also STEP RISER.

Rivet. A round piece of metal with a head on one end, used to hold two or more pieces of material together by passing it through them and turning over or upsetting the headless end.

Rivet Steel and Rivets for Passenger and Freight Equipment Cars, Specifications for (M. C. B. Standard).

In 1915 the following specifications were adopted as Recommended Practice. Modified in 1916. Advanced to Standard in 1917.

I. MANUFACTURE

1. *Process.*—The steel shall be made by the open-hearth process.

II. CHEMICAL PROPERTIES AND TESTS

2. *Chemical Composition.*—The steel shall conform to the following requirements as to chemical composition:

Carbon	Optional per cent.
Manganese	Optional " "
Phosphorus, not over	0.04 " "
Sulphur, not over	0.045 " "

3. *Ladle Analysis.*—An analysis shall be made by the manufacturer from a test ingot taken during the pouring of each melt, to determine the percentage of carbon, manganese, phosphorus and sulphur. Drillings for analysis shall be taken not less than ¼ in. beneath the surface of the test ingot. A copy of this analysis shall be given the purchaser or his representative. This analysis shall conform to the requirements specified in Section 2.

4. *Check Analysis.*—A check analysis shall be made from the finished bars representing each melt or finished rivets, if so desired by the purchaser or his representative, and shall meet the requirements specified in Section 2.

5. *Number of Samples.*—(a) Unless otherwise specified, one bar from every 200 bars or less of each different size of section shall be taken, and a piece 2 ft. long shall be cut off and given the purchaser or his representative, or 10 rivets from every 100 kegs.

(b) Where accurate account of the material has been kept, and it is presented as complete melts, only

one sample for each diameter, for chemical analysis, shall be taken from either the bars or the finished rivets for each melt.

III. PHYSICAL PROPERTIES AND TESTS

6. *Tension Tests.*—The bars shall conform to the following requirements as to tensile properties:

Tensile strength, lb. per sq. in..........45 000-60 000
Elongation in 8 in., per cent. 1 500 000/tensile strength

7. *Bend Tests.*—The test specimen shall bend cold through 180 deg. flat on itself without cracking on the outside of the bent portion.

8. *Test Specimen.*—Tension and bend-test specimens shall be of the full-size section of bars as rolled.

9. *Number of Tests.*—(a) Unless otherwise specified, all bars of one size shall be piled separately. One bar from each 200 or less shall be selected at random and tested as specified.

(b) Where accurate account of the material has been kept, and it is presented as a complete melt, only one of physical test specimens for each diameter shall be taken from the bars or finished rivets for each melt.

(c) If any test specimen from the bar originally selected to represent a lot of material contains surface defects not visible before testing, but visible after testing, or if a tension-test specimen breaks outside the middle third of the gage length, one retest from a bar will be allowed.

IV. PERMISSIBLE VARIATIONS IN GAGE

10. *Permissible Variations.*—Bars shall conform to the limits as given in Table No. 1.

TABLE No. 1.

Nominal Diameter of Rods, In.	Large Size End, In.	Small Size End, In.	Total Variation, In.
1/4	0.2550	0.2450	0.010
5/16	0.3180	0.3070	0.011
3/8	0.3810	0.3690	0.012
7/16	0.4440	0.4310	0.013
1/2	0.5070	0.4930	0.014
5/8	0.6330	0.6170	0.016
3/4	0.7585	0.7415	0.017
7/8	0.8840	0.8660	0.018
1	1.0095	0.9905	0.019
1 1/8	1.1350	1.1150	0.020
1 1/4	1.2605	1.2395	0.021

V. FINISH

11. *Finish.*—The finished bars shall be free from injurious defects and have a workmanlike finish.

VI. INSPECTION AND REJECTION

12. *Inspection.*—(a) The inspector representing the purchaser shall have free entry, at all times while work on the contract of the purchaser is being performed, to all parts of the manufacturer's works which concern the manufacture of the material ordered. The manufacturer shall afford the inspector free of cost, all reasonable facilities to satisfy him that the material is being furnished in accordance with these specifications.

(b) The purchaser may make the tests and inspection to govern the acceptance or rejection of the material in his own laboratory or elsewhere. Such tests and inspection shall be made at the expense of the purchaser.

(c) All tests and inspection shall be so conducted as not to interfere unnecessarily with the operation of the works.

13. *Rejection.*—Material which, subsequently to above tests at the mills or elsewhere and its acceptance, develops weak spots or imperfections, or fails to pass any one of the tests herein required, will be rejected, and shall be replaced by the manufacturer at his own expense.

14. *Rehearing.*—Samples tested in accordance with this specification, which represent rejected material, shall be preserved for 14 days from date of test report. In case of dissatisfaction with results of tests, the manufacturer may make claim for a rehearing within that time.

REQUIREMENTS FOR RIVETS.

15. *Chemical Composition.*—The finished rivets shall conform to the requirements specified in Section 2.

16. *Bend Tests.*—The rivet shank shall bend cold through 180 deg. flat on itself, as shown in Fig. 1, without cracking on the outside of the bent portion.

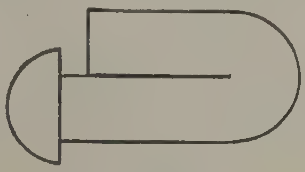


FIG. 1

17. *Flattening Test.*—Rivet heads shall be flattened down cold to a thickness of one-third, and when hot to a thickness of one-fourth, of the original diameter of the shank at the working heat when driving without splitting.

18. *Number of Tests.*—One of each of the above tests shall be made for each 100 kegs for each different size rivets.

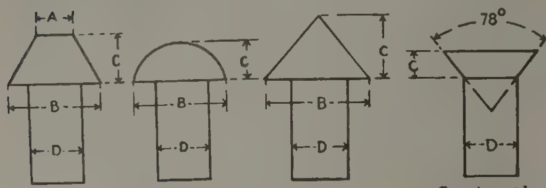
19. *Dimensions of Head.*—Rivet heads shall conform to the dimensions shown on the purchaser's standard drawings, when so specified, otherwise the heads shall

TABLE NO. 2.

DIMENSIONS FOR RIVETS.

Diameter of Rivet.	Cone Head.			Button Head.		Steeple Head.		Counter-sunk Head.
D	A	B	C	B	C	B	C	C
1/4	15/64	7/16	7/32	7/16	3/16	1/2	1/4	1/8
5/16	19/64	35/64	9/32	35/64	15/64	5/8	5/16	5/32
3/8	23/64	21/32	21/64	21/32	9/32	3/4	3/8	3/16
7/16	27/64	49/64	25/64	49/64	21/64	7/8	7/16	7/32
1/2	15/32	7/8	7/16	7/8	3/8	1	1/2	1/4
9/16	17/32	63/64	1/2	63/64	27/64	1 1/8	9/16	9/32
5/8	19/32	1 3/32	35/64	1 3/32	15/32	1 1/4	5/8	5/16
11/16	41/64	1 13/64	39/64	1 13/64	33/64	1 3/8	11/16	11/32
3/4	45/64	1 5/16	21/32	1 5/16	9/16	1 1/2	3/4	3/8
13/16	49/64	1 27/64	23/32	1 27/64	39/64	1 5/8	13/16	13/32
7/8	53/64	1 17/32	49/64	1 17/32	21/32	1 3/4	7/8	7/16
15/16	7/8	1 41/64	53/64	1 41/64	45/64	1 7/8	15/16	15/32
1	15/16	1 3/4	7/8	1 3/4	3/4	2	1	1/2
1 1/16	1	1 55/64	15/16	1 55/64	51/64	2 1/8	1 1/16	17/32
1 1/8	1 1/16	1 31/32	63/64	1 31/32	27/32	2 1/4	1 1/8	9/16
1 3/16	1 1/8	2 5/64	1 3/64	2 5/64	57/64	2 3/8	1 3/16	19/32
1 1/4	1 11/64	2 3/16	1 3/32	2 3/16	15/16	2 1/2	1 1/4	5/8
1 3/8	1 9/32	2 13/32	1 13/64	2 13/32	1 1/32	2 3/4	1 3/8	11/16
1 1/2	1 13/32	2 5/8	1 5/16	2 5/8	1 1/8	3	1 1/2	3/4
1 3/4	1 41/64	3 1/16	1 17/32	3 1/16	1 5/16	3 1/2	1 3/4	7/8
2	1 7/8	3 1/2	1 3/4	3 1/2	1 1/2	4	2	1

conform, within 5 per cent above or below, to the dimensions shown in Table No. 2.



Cone Head. $A = \frac{15}{16} \times D$, $B = 1\frac{3}{4} \times D$, $C = \frac{7}{8} \times D$

Button Head. $B = 1\frac{3}{4} \times D$, $C = \frac{3}{4} \times D$

Steeple Head. $B = 2 \times D$, $C = D$

Countersunk Head. $C = \frac{1}{2} \times D$, Taper = 78°

5. Are you in favor of the above changes in the specifications?

Rocker (Tip Car). A crescent-shaped casting bolted to the rocker timbers of the car body on which the body rests and rolls when the body is tipped.

Rocker Bar (Heaters). A horizontal bar which supports the grate, and on which the latter is attached by a pivot in the center so that it can be turned horizontally and thus shake down the ashes.

Rocker Bearing Timber Hangers (Tip Car). Vertical timbers or iron bars framed and bolted to the end piece, to which the rocker bearing timbers are fastened.

Rocker Car Seat. A seat having the bottom adjustable so as to give it an inclination toward the seat back in all cases, on whichever side the seat back may be placed. All modern car seats have mechanism by which this inclination is automatically given to the seat when the back is reversed or swung back.

Rocker Casting (Car Seats). A casting forming a part of the cushion carrier or stand, which is moved back and forth by the seat back arms, and moves the cushion forward, as well as giving it some inclination toward the back.

Rocker Side Bearing. Figs. 1096-1125; Pages 1204, 1316. A device somewhat similar to the roller side bearing. Instead of rollers, rockers are used, which tend to offer a gradually increasing resistance to the lateral motion of the bolster and tend to return it to its normal position at all times.

Rolled Axle. An axle made of rolled iron or steel. See Axle.

Rolled Steel Wheel. A Car Wheel made of rolled steel.

Roller Bearings. Figs. 1061, 1072, 1083, 1084.

Roller Center Plate. Figs. 1083, 1084; Page 1316. A center plate fitted with rollers to reduce the friction in turning.

Roller Side Bearing Truck. Figs. 987-992; Pages 1275-1277. A lateral motion truck the frame of which is very like a swing motion truck with a rigid spring plank. Lateral motion is given to the truck bolster by placing it upon cylindrical rollers resting upon the spring caps. The spring cap and bolster bearing plate are concaved, so that the motion of the rollers is restrained and the truck bolster given stability.

Roller Side Bearings. Figs. 1085-1137; Pages 1128, 1149, 1204, 1225, 1314, 1316. A side bearing fitted with rollers to reduce the friction in curving.

Roof. See Car Roof.

Roof Brace (of a Center Lamp or Chandelier). Diagonal stays passing from the lamp to the roof. Vertical supporting stays are known as lamp arms, with or without a large center stay.

Roof Corner Casting (Passenger Equipment Cars). A cast iron molding for the corners of platform roofs.

Roof Door. See Icing Door.

Roof Framing. See Body Framing and Frame.

Roof Grab Iron. See Roof Hand Hold.

Roof Hand Hold (Box and Stock Cars). An iron bar fastened to the roof to be grasped when ascending the ladder at the end of the car. Also called Roof Grab Iron. See Safety Appliances.

Roof Light. A deck sash.

Roof Panel (End). The panel over the door of a passenger car.

Roof Ridge (Freight Cars). The intersection of the two plane surfaces forming a pitching roof.

Roof Sheet Splice Tee. A commercial Tee, riveted to two roof sheets so as to form a splice between them and form a continuous surface.

Roof Sheets. Metallic sheets for covering car roofs. The joints are made in various ways, most of which are illustrated. See Car Roof.

Roof Support. A Carline, Purline, or Ridge Pole.

Roof Ventilator. A ventilator in the roof of a car.

Roofing. Fig. 968; Page 1288. See Siding, Flooring, Roofing and Lining.

Roping Staple. A U-bolt secured to the side sill near the end of a car into which the hook of a switching rope may be caught, so that a switching locomotive may pull cars on side tracks while it is on the main track, or vice versa.

Rose. A rosette or ornament.

Rotary Snow Plow. See Snow Plow.

Rotary Strainer. See Centrifugal Dirt Collector.

Rotary Valve (Motorman's Brake Valve). The main valve which rotates when the handle is turned.

Rotundity Gage for Solid Steel Wheels. See Wheels, Solid Steel, Rotundity Gage for.

Round (of a ladder). The horizontal bars on which the foot rests. They are called rounds, whether of wood or iron, and whether round or square.

Round Iron, Limit Gages for. See Limit Gages for Round Iron.

Rubber Tread (for Step). An india rubber covering fastened to a step, or threshold plate, of a car to prevent persons from slipping when ascending or descending the steps.

Rules for Examination of Car Inspectors. See Examination of Car Inspectors, Rules for.

Rules of Interchange. See Interchange of Traffic, Rules for.

Rules for Loading Materials (M. C. B. Standard). In 1893 a Recommended Practice was adopted for loading logs and poles on cars and for racking cars for loading bark, and in 1896 extended rules governing the loading of lumber and timber on open cars were adopted, replacing the former practice heretofore shown on Sheet M. C. B.—B, with the exception of racking cars for loading bark. At the same time rules governing the loading of long structural material, rails, plates, girders, etc., were adopted.

In 1897 some modification of these rules was adopted, with slight changes in the illustrations also. In 1898 still further slight changes were made in the text and in some of the drawings, and a new section was added containing rules for loading large logs,

pipe and stone on open cars. In 1900 a further modification was made in both text and illustrations.

Further revision, 1904; also, 1905; also, 1906.

In 1908 a further revision was made, and the rules advanced to Standard. Modified in 1910, 1911, 1912, 1913, 1914 and 1915.

A separate pamphlet is issued by the Association containing these rules. (See illustrations on pages 1099-1116.)

Running Board. 40, Figs. 34, 35; 16, Fig. 173; 25, Figs. 210, 211; 17, Fig. 260. A plane surface, made usually of boards, for trainmen to walk or run on. It is placed on the roof of box or stock cars and at the side of tank cars. Gondola and flat cars usually have none.

Running Board Bracket. 41, Figs. 34, 35. Support fastened to the roof of a box or stock car to carry the Running Board Extension, also a running board saddle.

Running Board Extension. The part of the running board which extends beyond the end of the car body so as to bring the ends of the running boards on adjoining cars nearer together to facilitate the passage of trainmen from one car to another. See RUNNING BOARD.

Running Board Extension Bracket. See RUNNING BOARD BRACKET.

Running Board Saddle. 41, Figs. 34, 35. A wooden block or an iron casting or forging, shaped on the lower side to fit the angle of a car roof and flat on the upper side, acting as a support for the running board.

Russia Iron. A form of sheet iron manufactured in Russia the exact process for making which has heretofore been kept secret, but which consists essentially in forming a chemical compound of iron upon its surface at the same time that it is highly polished, so that it is not likely to rust. Modern substitutes for this iron are also known as planished iron.

Rust. The report of a committee on "What is the Best Preventative of Rust on Steel Cars?" will be found in the 1904 M. C. B. Proceedings, page 144.

S

Saddle. A block or plate which acts as a bearing or support for a rod beam, etc.

Safety Appliances. Figs. 952, 953, 955, 956, 960, 961.

Safety Appliances (M. C. B. Standard). Figs. 2961-2979. (M. C. B. 19-A—19-S.)

See M. C. B. Proceedings 1918, Pages 552-583.

One of the features of the early M. C. B. conventions was the annual address of E. A. Moseley, then secretary of the Interstate Commerce Commission, on subjects relating to the development of safety appliances. The address in 1903 is reported on page 52 of the Proceedings for that year. In 1904 Mr. Moseley spoke particularly on the inspection services that had recently been inaugurated. Mr. Mosley's remarks at other conventions will be found in the 1905 Proceedings, page 50; 1906, page 61; 1907, page 56; and 1908, page 56.

A report of a special committee on standards for the protection of trainmen will be found in the 1908 M. C. B. Proceedings, page 374. See also 1910 Proceedings, page 386; 1911 Proceedings, page 222.

In 1911 the United States Safety Appliance Standards, as contained in the order of the Interstate Commerce Commission, dated March 13, 1911, were adopted as standard

Freight-Train Cars. Standard—Sheets M. C. B. 19 and 19A to 19P. In 1893 a Recommended Practice was adopted on safety appliances under the subheads as given. In 1896 some changes were made, especially in regard to handholds, and by the elimination of various details from drawing. In 1902 it was changed to Standard.

In 1905 Sheet M. C. B. 19 was revised to more clearly define the location of safety appliances on cars. Also, the lower round of the end ladder with wooden rails was made straight instead of having an offset.

In 1906 the position of the brake shaft and location of roof handholds were modified.—Proceedings 1906.

In 1907 Sheet 19 was devoted entirely to illustrating these standards.

In 1908 a thorough revision was made of both text and drawings in order to make their meaning and intent clear and adaptable to all existing types of car equipment, and to be capable of but one interpretation.

In 1909 reference to wooden tread 1½ by 2 inches was omitted from Sheet on account of them not being applicable to certain types of cars.

In 1911 the United States Safety Appliance Standards, as contained in the order of the Interstate Commerce Commission, dated March 13, 1911, were adopted as standard.

BOX AND OTHER HOUSE CARS

HAND BRAKES

Number. Each box or other house car shall be equipped with an efficient hand brake which shall operate in harmony with the power brake thereon.

The hand brake may be of any efficient design, but must provide the same degree of safety as the design shown on Plate A. (Fig. 2961.)

Dimensions. The brake shaft shall not be less than one and one-fourth (1¼) inches in diameter, of wrought iron or steel without weld.

The brake wheel may be flat or dished, not less than fifteen (15) preferably sixteen (16), inches in diameter, of malleable iron, wrought iron or steel.

Location. The hand brake shall be so located that it can be safely operated while car is in motion.

The brake shaft shall be located on end of car, to the left of and not less than seventeen (17) nor more than twenty-two (22) inches from center.

Manner of application. There shall be not less than four (4) inches clearance around rim of brake wheel.

Outside edge of brake wheel shall be not less than four (4) inches from a vertical plane parallel with end of car and passing through the inside face of knuckle when closed with coupler horn against the buffer block or end sill.

Top brake-shaft support shall be fastened with not less than one-half (½) inch bolt or rivets. (See Plate A.)

A brake-shaft step shall support the lower end of brake shaft. A brake-shaft step which will permit the brake chain to drop under the brake shaft shall not be used. U-shaped form of brake-shaft step is preferred. (See Plate A.)

Brake shaft shall be arranged with a square fit at its upper end to secure the hand-brake wheel; said square fit shall be not less than seven-eighths (⅞) of an inch square. Square-fit taper; nominally two (2) in twelve (12) inches. (See Plate A.)

Brake chain shall be of not less than three-eighths (⅜), preferably seven-sixteenths (7/16) inch, wrought iron or steel, with a link on the brake-rod end of not less than seven-sixteenths (7/16), preferably one-half (½) inch, wrought iron or steel, and shall be secured to brake-shaft drum by not less than one-half (½) inch hexagon or square-headed bolt. Nut on said bolt shall be secured by riveting end of bolt over nut.

Lower end of brake shaft shall be provided with a trunnion of not less than three-fourths (¾), preferably one (1), inch in diameter, extending through brake-shaft step and held in operating position by a suitable cotter or ring. (See Plate A.)

Brake-shaft drum shall be not less than one and one-half (1½) inches in diameter. (See Plate A.)

Brake ratchet wheel shall be secured to brake shaft by a key or square fit; said square fit shall be not less than one and five-sixteenths (1 5/16) inches square. When ratchet wheel with square fit is used, provision shall be made to prevent ratchet wheel from rising on shaft to disengage brake pawl. (See Plate A.)

Brake ratchet wheel shall be not less than five and one-fourth (5¼), preferably five and one-half (5½) inches in diameter and shall have not less than fourteen (14), preferably sixteen (16), teeth. (See Plate A.)

If brake ratchet wheel is more than thirty-six (36) inches from brake wheel, a brake-shaft support shall be provided to support this extended upper portion of brake shaft; said brake-shaft support shall be fastened with not less than one-half (½) inch bolts or rivets.

The brake pawl shall be pivoted upon a bolt or rivet not less than five-eighths (⅝) of an inch in diameter, or upon a trunnion secured by not less than one-half (½) inch bolt or rivet, and there shall be a rigid metal connection between brake shaft and pivot of pawl.

Brake wheel shall be held in position on brake shaft by a nut on a threaded extended end of brake-shaft; said threaded portion shall be not less than three-fourths (¾) of an inch in diameter; said nut shall be secured by riveting over or by the use of a lock-nut or suitable cotter.

Brake wheel shall be arranged with a square fit for brake shaft in hub of said wheel; taper of said fit, nominally two (2) in twelve (12) inches. (See Plate A.)

BRAKE STEP

If brake step is used, it shall be not less than twenty-eight (28) inches in length. Outside edge shall be not less than eight (8) inches from face of car and not less than four (4) inches from a vertical plane parallel with end of car and passing through the inside face of knuckle when closed with coupler horn against the buffer block or end sill.

Manner of application.

Brake step shall be supported by not less than two metal braces having a minimum cross-sectional area three-eighths (⅜) by one and one-half (1½) inches or equivalent, which shall be securely fastened to body of car with not less than one-half (½) inch bolts or rivets.

RUNNING BOARDS

Number.

One (1) longitudinal running board.

On outside-metal-roof cars two (2) latitudinal extensions.

Dimensions.

Longitudinal running board shall be not less than eighteen (18), preferably twenty (20), inches in width.

Latitudinal extensions shall be not less than twenty-four (24) inches in width.

Location.

Full length of car, center of roof.

On outside-metal-roof cars there shall be two (2) latitudinal extensions from longitudinal running board to ladder locations, except on refrigerator cars where such latitudinal extensions can not be applied on account of ice hatches.

Manner of application.

Running boards shall be continuous from end to end and not cut or hinged at any point: *Provided,* That the length and width of running boards may be made up of a number of pieces securely fastened to saddle blocks with screws or bolts.

The ends of longitudinal running board shall be not less than six (6) nor more than ten (10) inches from a vertical plane parallel with end of car and passing through the inside face of knuckle when closed with coupler horn against the buffer block or end sill; and if more than four (4) inches from edge of roof of car, shall be securely supported their full width by substantial metal braces.

Running boards shall be made of wood and securely fastened to car.

SILL STEPS.

Number.

Four (4).

Dimensions.

Minimum cross-sectional area one-half (½) by one and one-half (1½) inches, or equivalent, of wrought iron or steel.

Minimum length of tread, ten (10), preferably twelve (12), inches.

Minimum clear depth, eight (8) inches.

Location.

One (1) near each end on each side of car, so that there shall be not more than eighteen (18) inches from end of car to center of tread of sill step.

Outside edge of tread of step shall be not more than four (4) inches inside of face of side of car, preferably flush with side of car.

Tread shall be not more than twenty-four (24), preferably not more than twenty-two (22), inches above the top of rail.

Manner of application.

Sill steps exceeding twenty-one (21) inches in depth shall have an additional tread.

Sill steps shall be securely fastened with

not less than one-half (½) inch bolts with nuts outside (when possible) and riveted over, or with not less than one-half (½) inch rivets.

LADDERS.

Number. Four (4).

Dimensions. Minimum clear length of tread: Side ladders, sixteen (16) inches; end ladders, fourteen (14) inches.

Maximum spacing between ladder treads, nineteen (19) inches.

Top ladder tread shall be located not less than twelve (12) nor more than eighteen (18) inches from roof at eaves.

Spacing of side ladder treads shall be uniform, within a limit of two (2) inches from top ladder tread to bottom tread of ladder.

Maximum distance from bottom tread of side ladder to top tread of sill step, twenty-one (21) inches.

End ladder treads shall be spaced to coincide with treads of side ladders, a variation of two (2) inches being allowed. Where construction of car will not permit the application of a tread of end ladder to coincide with bottom tread of side ladder, the bottom tread of end ladder must coincide with second tread from bottom of side ladder.

Hardwood treads, minimum dimensions one and one-half (1½) by two (2) inches.

Iron or steel treads, minimum diameter five-eighths (⅝) of an inch.

Minimum clearance of treads, two (2), preferably two and one-half (2½), inches.

Location. One (1) on each side, not more than eight (8) inches from right end of car; one (1) on each end, not more than eight (8) inches from left side of car; measured from inside edge of ladder stile or clearance of ladder treads to corner of car.

Manner of application. Metal ladders without stiles near corners of cars shall have foot guards or upward projections not less than two (2) inches in height near inside end of bottom treads.

Stiles of wooden ladders will serve as foot guards.

Ladders shall be securely fastened with not less than one-half (½) inch bolts with nuts outside (when possible) and riveted over, or with not less than one-half (½) inch rivets. Three-eighths (⅜) inch bolts may be used for wooden treads which are gained into stiles.

END-LADDER CLEARANCE.

No part of car above end sills within thirty (30) inches from side of car, *except* buffer block, brake shaft, brake wheel, brake step, running board or uncoupling lever shall extend to within twelve (12) inches of a vertical plane parallel with end of car and passing through the inside face of knuckle when closed with coupler horn against the buffer block or end sill, and no other part of end of car or fixtures on same above end sills, other than exceptions herein noted, shall extend beyond the outer face of buffer block.

ROOF HANDHOLDS.

Number. One (1) over each ladder.

One (1) right-angle handhold may take the place of two (2) adjacent specified roof handholds, provided the dimensions and locations coincide, and that an extra leg is securely fastened to car at point of angle.

Minimum diameter, five-eighths (⅝) of an inch, wrought iron or steel.

Dimensions. Minimum clear length, sixteen (16) inches.

Minimum clearance, two (2), preferably two and one-half (2½) inches.

Location. On roof of car: One (1) in line with, and running parallel to, treads of each ladder, not less than eight (8), nor more than fifteen (15), inches from edge of roof, *except* on refrigerator cars where ice hatches prevent, when location may be nearer edge of roof.

Manner of application. Roof handholds shall be securely fastened with not less than one-half (½) inch bolts with nuts outside (when possible) and riveted over, or with not less than one-half (½) inch rivets.

SIDE HANDHOLDS

Number. Four (4).

[*Tread of side ladder is a side handhold.*]

Dimensions. Minimum diameter, five-eighths (⅝) of an inch, wrought iron or steel.

Minimum clear length, sixteen (16) inches.

Minimum clearance, two (2) preferably two and one-half (2½), inches.

Location. Horizontal: One (1) near each end on each side of car.

Side handholds shall be not less than twenty-four (24) nor more than thirty (30) inches above center line of coupler, *except* as provided above, where tread of ladder is a handhold. Clearance of outer end of handhold shall be not more than eight (8) inches from end of car.

Manner of application. Side handholds shall be securely fastened with not less than one-half (½) inch bolts with nuts outside (when possible) and riveted over, or with not less than one-half (½) inch rivets.

HORIZONTAL END HANDHOLDS

Number. Eight (8) or more. (Four (4) on each end of car.)

[*Tread of end ladder is an end handhold.*]

Dimensions. Minimum diameter, five-eighths (⅝) of an inch, wrought iron or steel.

Minimum clear length, sixteen (16) inches, preferably twenty-four (24) inches.

A handhold fourteen (14) inches in length may be used where it is impossible to use one sixteen (16) inches in length.

Minimum clearance, two (2) preferably two and one-half (2½), inches.

Location. One (1) near each side on each end of car, not less than twenty-four (24) nor more than thirty (30) inches above center line of coupler *except* as provided above, when tread of end ladder is an end handhold. Clearance of outer end of handhold shall be not more than eight (8) inches from side of car.

One (1) near each side of each end of car on face of end sill or sheathing over end sill,

projecting outward or downward. Clearance of outer end of handhold shall be not more than sixteen (16) inches from side of car.

On each end of cars with platform end sills six (6) or more inches in width, measured from end post or siding and extending entirely across end of car, there shall be one additional end handhold not less than twenty-four (24) inches in length, located near center of car, not less than thirty (30) nor more than sixty (60) inches above platform end sill.

Manner of application. Horizontal end handholds shall be securely fastened with not less than one-half (½) inch bolts with nuts outside (when possible) and riveted over, or with not less than one-half (½) inch rivets.

VERTICAL END HANDHOLDS

Number. Dimensions. Two (2) on full-width platform end-sill cars, as heretofore described.

Minimum diameter, five-eighths (⅝) of an inch, wrought iron or steel.

Minimum clear length, eighteen (18), preferably twenty-four (24), inches.

Minimum clearance, two (2), preferably two and one-half (2½), inches.

Location. One (1) on each end of car opposite ladder, not more than eight (8) inches from side of car; clearance of bottom end of handhold shall be not less than twenty-four (24) nor more than thirty (30) inches above center line of coupler.

Manner of application. Vertical end handholds shall be securely fastened with not less than one-half (½) inch bolts with nuts outside (when possible) and riveted over, or with not less than one-half (½) inch rivets.

UNCOUPLING LEVERS

Number. Two (2).

Dimensions. Uncoupling levers may be either single or double, and of any efficient design.

Handles of uncoupling levers, *except* those shown on Plate B (Fig. 2962) or of similar designs, shall be not more than six (6) inches from sides of car.

Uncoupling levers of design shown on Plate B and of similar designs shall conform to the following prescribed limits:

Handles shall be not more than twelve (12), preferably nine (9), inches from sides of cars. Center lift arms shall be not less than seven (7) inches long.

Center of eye at end of center lift arm shall be not more than three and one-half (3½) inches beyond center of eye of uncoupling pin of coupler when horn of coupler is against the buffer block or end sill.

Ends of handles shall extend not less than four (4) inches below bottom of end sill, or shall be so constructed as to give a minimum clearance of two (2) inches around handle. Minimum drop of handles shall be twelve (12) inches; maximum, fifteen (15) inches over all. (See Plate B.)

Handles of uncoupling levers of the "rocking" or "push-down" type shall be not less than eighteen (18) inches from top of rail when lock block has released knuckle, and a suitable stop shall be provided to prevent inside arm from flying up in case of breakage.

Location. One (1) on each end of car.

When single lever is used it shall be placed on left side of end of car.

HOPPER CARS AND HIGH-SIDE GONDOLAS WITH FIXED ENDS

[*Cars with sides more than thirty-six (36) inches above the floor are high-side cars.*]

HAND BRAKES

Number. Same as specified for "Box and other house cars."

Dimensions. Same as specified for "Box and other house cars."

Location. Each hand brake shall be so located that it can be safely operated while car is in motion.

The brake shaft shall be located on end of car to the left of, and not more than twenty-two (22) inches from, center.

Manner of application. Same as specified for "Box and other house cars."

BRAKE STEPS

Same as specified for "Box and other house cars."

SILL STEPS

Number. Same as specified for "Box and other house cars."

LADDERS

Dimensions. Same as specified for "Box and other house cars."

Location. Same as specified for "Box and other house cars," *except* that top ladder tread shall be located not more than four (4) inches from top of car.

Manner of application. Same as specified for "Box and other house cars."

Same as specified for "Box and other house cars."

SIDE HANDHOLDS

Same as specified for "Box and other house cars."

HORIZONTAL END HANDHOLDS

Same as specified for "Box and other house cars."

VERTICAL END HANDHOLDS

Same as specified for "Box and other house cars."

UNCOUPLING LEVERS

Same as specified for "Box and other house cars."

END-LADDER CLEARANCE

No part of car above end sills within thirty (30) inches from side of car, *except* buffer block, brake shaft, brake wheel, brake step or uncoupling lever shall extend to within twelve (12) inches of a vertical plane parallel with end of car and passing through the inside face of knuckle when closed with coupler horn against the buffer block or end sill, and not other part of end of car or fixtures on same above end sills, other than excep-

tions herein noted, shall extend beyond the outer face of buffer block.

DROP-END HIGH-SIDE GONDOLA CARS

HAND BRAKES

Number. Same as specified for "Box and other house cars."

Dimensions. Same as specified for "Box and other house cars."

Location. Each hand brake shall be so located that it can be safely operated while car is in motion.

The brake shaft shall be located on end of car to the left of center.

Manner of application. Same as specified for "Box and other house cars."

SILL STEPS

Same as specified for "Box and other house cars."

LADDERS

Number. Two (2).

Dimensions. Same as specified for "Box and other house cars," *except* that top ladder tread shall be located not more than four (4) inches from top of car.

Location. One (1) on each side, not more than eight (8) inches from right end of car, measured from inside edge of ladder stile or clearance of ladder treads to corner of car.

Manner of application. Same as specified for "Box and other house cars."

SIDE HANDHOLDS

Same as specified for "Box and other house cars."

HORIZONTAL END HANDHOLDS

Number. Four (4).

Dimensions. Same as specified for "Box and other house cars."

Location. One (1) near each side of each end of car on face of end sill. Clearance of outer end of handhold shall be not more than sixteen (16) inches from side of car.

Manner of application. Same as specified for "Box and other house cars."

UNCOUPLING LEVERS.

Same as specified for "Box and other house cars."

END-LADDER CLEARANCE

No part of car above end sills within thirty (30) inches from side of car, *except* buffer block, brake shaft, brake wheel or uncoupling lever, shall extend to within twelve (12) inches of a vertical plane parallel with end of car and passing through the inside face of knuckle when closed with coupler horn against the buffer block or end sill, and no other part of end of car or fixtures on same, other than exceptions herein noted, shall extend beyond the outer face of buffer block.

FIXED-END LOW-SIDE GONDOLA AND LOW-SIDE HOPPER CARS

Hopper Cars

[*Cars with sides thirty-six* (36) *inches or less above the floor are low-side cars.*]

HAND BRAKES

Number. Same as specified for "Box and other house cars."

Dimensions. Same as specified for "Box and other house cars."

Location. Each hand brake shall be so located that it can be safely operated while car is in motion.

The brake shaft shall be located on end of car, to the left of and not more than twenty-two (22) inches from center.

Manner of application. Same as specified for "Box and other house cars."

BRAKE STEP

Same as specified for "Box and other house cars."

SILL STEPS

Same as specified for "Box and other house cars."

SIDE HANDHOLDS

Number. Same as specified for "Box and other house cars."

Dimensions. Same as specified for "Box and other house cars."

Location. Horizontal: One (1) near each end on each side of car, not less than twenty-four (24) nor more than thirty (30) inches above center line of coupler, if car construction will permit, but handhold shall not project above top of side. Clearance of outer end of handhold shall be not more than eight (8) inches from end of car.

Manner of application. Same as specified for "Box and other house cars."

HORIZONTAL END HANDHOLDS

Number. Same as specified for "Box and other house cars."

Dimensions. Same as specified for "Box and other house cars."

Location. One (1) near each side on each end of car not less than twenty-four (24) no more than thirty (30) inches above center line of coupler, if car construction will permit. Clearance of outer end of handhold shall be not more than eight (8) inches from side of car.

One (1) near each side of each end of car on face of end sill, projecting outward or downward. Clearance of outer end of handhold shall be not more than sixteen (16) inches from side of car.

Manner of application. Same as specified for "Box and other house cars."

UNCOUPLING LEVERS

Same as specified for "Box and other house cars."

END-LADDER CLEARANCE

No part of car above end sills within thirty (30) inches from side of car, *except* buffer block, brake shaft, brake wheel or uncoupling

lever, shall extend to within twelve (12) inches of a vertical plane parallel with end of car and passing through the inside face of knuckle when closed with coupler horn against the buffer block or end sill, and no other part of end of car or fixtures on same above end sills, other than exceptions herein noted, shall extend beyond the outer face of buffer block.

DROP-END LOW-SIDE GONDOLA CARS

HAND BRAKES

Number. Same as specified for "Box and other house cars."

Dimensions. Same as specified for "Box and other house cars."

Location. Each hand brake shall be so located that it can be safely operated while car is in motion.

The brake shaft shall be located on end of car to the left of center.

Manner of application. Same as specified for "Box and other house cars"; provided that top brake shaft support may be omitted.

SILL STEPS

Same as specified for "Box and other house cars."

SIDE HANDHOLDS

Number. Same as specified for "Box and other house cars."

Dimensions. Same as specified for "Box and other house cars."

Location. Horizontal: One (1) near each end on each side of car, not less than twenty-four (24) nor more than thirty (30) inches above center line of coupler, if car construction will permit, but handhold shall not project above top of side. Clearance of outer end of handhold shall be not more than eight (8) inches from end of car.

Manner of application. Same as specified for "Box and other house cars."

END HANDHOLDS

Number. Four (4).

Dimensions. Same as specified for "Box and other house cars."

Location. Horizontal: One (1) near each end of car on face of end sill. Clearance of outer end of handhold shall not be more than sixteen (16) inches from side of car.

Manner of application. Same as specified for "Box and other house cars."

UNCOUPLING LEVERS

Same as specified for "Box and other house cars."

END-LADDER CLEARANCE

No part of car above end sills within thirty (30) inches from side of car, *except* buffer block, brake shaft, brake wheel or uncoupling lever, shall extend to within twelve (12) inches of a vertical plane parallel with end of car and passing through the inside face of knuckle when closed with coupler horn against the buffer block or end sill, and no other part of end of car or fixtures on same above end sills, other than exceptions herein noted, shall extend beyond the outer face of buffer block.

FLAT CARS

[*Cars with side twelve* (12) *inches or less above the floor may be equipped the same as flat cars.*]

HAND BRAKES

Number. Same as specified for "Box and other house cars."

Dimensions. Same as specified for "Box and other house cars."

Location. Each hand brake shall be so located that it can be safely operated while car is in motion.

The brake shaft shall be located on the end of car to the left of center, or on side of car not more than thirty-six (36) inches from right hand end thereof.

Manner of application. Same as specified for "Box and other house cars."

SILL STEPS

Same as specified for "Box and other house cars."

SIDE HANDHOLDS

Number. Same as specified for "Box and other house cars."

Dimensions. Same as specified for "Box and other house cars."

Location. Horizontal: One (1) on face of each side sill near each end. Clearance of outer end of handhold shall be not more than twelve (12) inches from end of car.

Manner of application. Same as specified for "Box and other house cars."

END HANDHOLDS

Number. Four (4).

Dimensions. Same as specified for "Box and other house cars."

Location. Horizontal: One (1) near each side of each end of car on face of end sill. Clearance of outer end of handhold shall be not more than sixteen (16) inches from side of car.

Manner of application. Same as specified for "Box and other house cars."

UNCOUPLING LEVERS

Same as specified for "Box and other house cars."

TANK CARS WITH SIDE PLATFORMS

HAND BRAKES

Number. Same as specified for "Box and other house cars."

Dimensions. Same as specified for "Box and other house cars."

Location. Each hand brake shall be so located that it can be safely operated while car is in motion.

The brake shaft shall be located on end of car to the left of center.

Manner of application. Same as specified for "Box and other house cars."

SILL STEPS

Same as specified for "Box and other house cars."

SIDE HANDHOLDS

Four (4) or more.

Dimensions. Same as specified for "Box and other house cars."

Location. Horizontal: One (1) on face of each side sill near each end. Clearance of outer end of handhold shall be not more than twelve (12) inches from end of car.

If side safety railings are attached to tank bands, four (4) additional vertical handholds shall be applied, one (1) over each sill step and securely fastened to tank or tank band.

Manner of application. Same as specified for "Box and other house cars."

END HANDHOLDS

Number. Four (4).

Dimensions. Same as specified for "Box and other house cars."

Location. Horizontal: One (1) near each side of each end of car on face of end sill. Clearance of outer end of handhold shall be not more than sixteen (16) inches from side of car.

Manner of application. Same as specified for "Box and other house cars."

TANK-HEAD HANDHOLDS

Number. Two (2). [*Not required if safety railing runs around ends of tank.*]

Dimensions. Minimum diameter, five-eighths (⅝) of an inch, wrought iron or steel. Minimum clearance, two (2), preferably two and one-half (2½), inches. Clear length of handholds shall extend to within six (6) inches of outer diameter of tank at point of application.

Location. Horizontal: One (1) across each head of tank, not less than thirty (30) nor more than sixty (60) inches above platform.

Manner of application. Tank-head handholds shall be securely fastened.

SAFETY RAILINGS

Number. One (1) continuous safety railing running around sides and ends of tank, securely fastened to tank or tank bands at ends and sides of tank; or two (2) running full length of tank at sides of car supported by posts.

Dimensions. Not less than three-fourths (¾) of an inch, iron.

Location. Running full length of tank, either at side supported by posts or securely fastened to tank or tank bands, not less than thirty (30) nor more than sixty (60) inches above platform.

Manner of application. Safety railings shall be securely fastened to tank body, tank bands or posts.

UNCOUPLING LEVERS

Same as specified for "Box and other house cars."

END-LADDER CLEARANCE

No part of car above end sills within thirty (30) inches from side of car, *except* buffer block, brake shaft, brake-shaft brackets, brake wheel or uncoupling lever, shall extend to within twelve (12) inches of a vertical plane parallel with end of car and passing through the inside face of knuckle when closed with coupler horn against the buffer block or end sill, and no other part of end of car or fixtures on same above end sills, other than exceptions herein noted, shall extend beyond the outer face of buffer block.

TANK CARS WITHOUT SIDE SILLS AND TANK CARS WITH SHORT SIDE SILLS AND END PLATFORMS

HAND BRAKES

Number. Same as specified for "Box and other house cars."

Dimensions. Same as specified for "Box and other house cars."

Location. Each hand brake shall be so located that it can be safely operated while car is in motion.

The brake shaft shall be located on end of car to the left of center.

Manner of application. Same as specified for "Box and other house cars."

RUNNING BOARDS

Number. One (1) continuous running board around sides and ends; or two (2) running full length of tank, one (1) on each side.

Dimensions. Minimum width on sides, ten (10) inches. Minimum width on ends, (6) inches.

Location. Continuous around sides and ends of cars. On tank cars having end platforms extending to bolsters, running boards shall extend from center to center of bolsters, one (1) on each side.

If side running boards are applied below center of tank, outside edge of running boards shall extend not less than seven (7) inches beyond bulge of tank.

The running boards at ends of car shall be not less than six (6) inches from a point vertically above the inside face of knuckle when closed with coupler horn against the buffer block, end sill or backstop.

Manner of application. Running boards shall be securely fastened to tank or tank bands.

SILL STEPS

Number. Same as specified for "Box and other house cars."

Dimensions. Same as specified for "Box and other house cars."

Location. One (1) near each end on each side under side handhold.

Outside edge of tread of step shall be not more than four (4) inches inside of face of side of car, preferably flush with side of

Tread shall be not more than twenty-four (24), preferably not more than twenty-two (22), inches above the top of rail.

Manner of application. Same as specified for "Box and other house cars."

LADDERS.

[*If running boards are so located as to make ladders necessary.*]

Number. Two (2) on cars with continuous running boards.

Four (4) on cars with side running boards.

Dimensions. Minimum clear length of tread, ten (10) inches.

Maximum spacing of treads, nineteen (19) inches.

Hardwood treads, minimum dimensions one and one-half (1½) by two (2) inches.

Wrought-iron or steel treads, minimum diameter five-eighths (⅝) of an inch.

Minimum clearance, two (2) preferably two and one-half (2½), inches.

Location. On cars with continuous running boards, one (1) at right end of each side.

On cars with side running boards, one (1) at each end of each running board.

Manner of application. Ladders shall be securely fastened with not less than one-half (½) inch bolts or rivets.

SIDE HANDHOLDS

Number. Four (4) or more.

Dimensions. Same as specified for "Box and other house cars."

Location. Horizontal: One (1) on face of each side sill near each end on tank cars with short side sills, or one (1) attached to top of running board projecting outward above sill steps or ladders on tank cars without side sills. Clearance of outer end of handhold shall be not more than twelve (12) inches from end of car.

If side safety railings are attached to tank or tank bands four (4) additional vertical handholds shall be applied, one (1) over each sill step and securely fastened to tank or tank bands.

Manner of application. Same as specified for "Box and other house cars."

END HANDHOLDS

Number. Four (4).

Dimensions. Same as specified for "Box and other house cars."

Location. Horizontal: One (1) near each side of each end of car on face of end sill. Clearance of outer end of handhold shall be not more than sixteen (16) inches from side of car.

Manner of application. Same as specified for "Box and other house cars."

TANK-HEAD HANDHOLDS

Number. Two (2). [*Not required if safety railing runs around ends of tank.*]

Dimensions. Minimum diameter, five-eighths (⅝) of an inch, wrought iron or steel.

Minimum clearance, two (2), preferably two and one-half (2½), inches.

Location. Horizontal: One (1) across each head of tank, not less than thirty (30) nor more than sixty (60) inches above platform on running board. Clear length of handholds shall extend to within six (6) inches of outer diameter of tank at point of application.

Manner of application. Tank-head handholds shall be securely fastened.

SAFETY RAILINGS

Number. One (1) running around sides and ends of tank, or two (2) running full length of tank.

Dimensions. Minimum diameter, seven-eighths (⅞) of an inch, wrought iron or steel.

Minimum clearance, two and one-half (2½) inches.

Location. Running full length of tank, not less than thirty (30) nor more than sixty (60) inches above platform or running board.

Manner of application. Safety railings shall be securely fastened to tank or tank bands and secured against end-shifting.

UNCOUPLING LEVERS

Same as specified for "Box and other house cars."

END-LADDER CLEARANCE.

No part of car above end sills within thirty (30) inches from side of car, *except* buffer block, brake shaft, brake-shaft brackets, brake wheel, running boards or uncoupling lever, shall extend to within twelve (12) inches of a vertical plane parallel with end of car and passing through the inside face of knuckle when closed with coupler horn against the buffer block or end sill, and no other part of end of car or fixtures on same, above end sills, other than exceptions herein noted, shall extend beyond the outer face of buffer block.

TANK CARS WITHOUT END SILLS

HAND BRAKES

Number. Same as specified for "Box and other house cars."

Dimensions. Same as specified for "Box and other house cars."

Location. Each hand brake shall be so located that it can be safely operated while car is in motion. The brake shaft shall be located on end of car to the left of center.

Manner of application. Same as specified for "Box and other house cars."

BRAKE STEP

Same as specified for "Box and other house cars."

RUNNING BOARDS

Number. One (1).

Dimensions. Minimum width on sides, ten (10) inches.

Minimum width on ends, six (6) inches.

Location. Continuous around sides and ends of tank.

Manner of application. If running boards are applied below center of tank, outside edge of running boards shall extend not less than seven (7) inches beyond bulge of tank.

Running boards at ends of car shall be not less than six (6) inches from a point

vertically above the inside face of knuckle when closed with coupler horn against the buffer block, end sill or backstop.

Running boards shall be securely fastened to tank or tank bands.

SILL STEPS

Number. Four (4). [*If tank has high running boards, making ladders necessary, sill steps must meet ladder requirements.*]

Dimensions. Same as specified for "Box and other house cars."

Location. One (1) near each end on each side, flush with outside edge of running board, as near end of car as practicable.

Tread not more than twenty-four (24), preferably not more than twenty-two (22), inches above the top of rail.

Steps exceeding eighteen (18) inches in depth shall have an additional tread and be laterally braced.

Manner of application. Sill steps shall be securely fastened with not less than one-half (½) inch bolts with nuts outside (when possible) and riveted over, or with one-half (½) inch rivets.

SIDE HANDHOLDS.

Number. Four (4) or more.

Dimensions. Same as specified for "Box and other house cars."

Location. Horizontal: One (1) near each end on each side of car over sill step, on running board, not more than two (2) inches back from outside edge of running board, projecting downward or outward.

Where such side handholds are more than eighteen (18) inches from end of car, an additional handhold must be placed near each end on each side not more than thirty (30) inches above center line of coupler.

Clearance of outer end of handhold shall be not more than twelve (12) inches from end of car.

If safety railings are on tank, four (4) additional vertical handholds shall be applied, one (1) over each sill step on tank.

Manner of application. Same as specified for "Box and other house cars."

END HANDHOLDS

Number. Four (4).

Dimensions. Same as specified for "Box and other house cars."

Location. Horizontal: One (1) near each side on each end of car on running board, not more than two (2) inches back from edge of running board, projecting downward or outward, or on end of tank not more than thirty (30) inches above center line of coupler.

Manner of application. Same as specified for "Box and other house cars."

SAFETY RAILINGS

Number. One (1).

Dimensions. Minimum diameter, seven-eighths (⅞) of an inch, wrought iron or steel.

Minimum clearance, two and one-half (2½) inches.

Location. Safety railings shall be continuous around sides and ends of car, not less than thirty (30) nor more than sixty (60) inches above running board.

Manner of application. Safety railings shall be securely fastened to tank or tank bands, and secured against end-shifting.

UNCOUPLING LEVERS

Number. Same as specified for "Box and other house cars."

Dimensions. Same as specified for "Box and other house cars," *except* that minimum length of uncoupling lever shall be forty-two (42) inches, measured from center line of end of car to handle of lever.

Location. Same as specified for "Box and other house cars," *except* that uncoupling lever shall be not more than thirty (30) inches above center line of coupler.

END-LADDER CLEARANCE

No part of car above buffer block within thirty (30) inches from side of car, *except* brake shaft, brake-shaft brackets, brake wheel or uncoupling lever, shall extend to within twelve (12) inches of a vertical plane parallel with end of car and passing through the inside face of knuckle when closed with coupler horn against the buffer block or back-stop, and no other part of end of car or fixtures on same, above buffer block, other than exceptions herein noted, shall extend beyond the face of buffer block.

CABOOSE CARS WITH PLATFORMS

HAND BRAKES

Number. Each caboose car shall be equipped with an efficient hand brake which shall operate in harmony with the power brake thereon.

The hand brake may be of an efficient design, but must provide the same degree of safety as the design shown on Plate A.

Dimensions. Same as specified for "Box and other house cars."

Location. Each hand brake shall be so located that it can be safely operated while car is in motion.

The brake shaft on caboose cars with platforms shall be located on platform to the left of center.

Manner of application. Same as specified for "Box and other house cars."

RUNNING BOARDS.

Number. One (1) longitudinal running board.

Dimensions. Same as specified for "Box and other house cars."

Location. Full length of car, center of roof. [*On caboose cars with cupolas, longitudinal running boards shall extend from cupola to ends of roof.*]

Outside-metal-roof cars shall have longitudinal extensions leading to ladder locations.

Manner of application. Same as specified for "Box and other house cars."

LADDERS

Number. Two (2).

Dimensions. None specified.

Location. One (1) on each end.

Manner of application. Same as specified for "Box and other house cars."

ROOF HANDHOLDS

Number. One (1) over each ladder.

Where stiles of ladders extend twelve (12) inches or more above roof, no other roof handholds are required.

Dimensions. Same as specified for "Box and other house cars."

Location. On roof of caboose, in line with and running parallel to treads of ladder, not less than eight (8) nor more than fifteen (15) inches from edge of roof.

Manner of application. Same as specified for "Box and other house cars."

CUPOLA HANDHOLDS

Number. One (1) or more.

Dimensions. Minimum diameter, five-eighths (⅝) of an inch, wrought iron or steel.

Minimum clearance, two (2), preferably two and one-half (2½), inches.

Location. One (1) continuous handhold extending around top of cupola, not more than three (3) inches from edge of cupola roof.

Four (4) right-angle handholds, one (1) at each corner, not less than sixteen (16) inches in clear length from point of angle, may take the place of the one (1) continuous handhold specified, if locations coincide.

Manner of application. Cupola handholds shall be securely fastened with not less than one-half (½) inch bolts with nuts outside and riveted over, or with not less than one-half (½) inch rivets.

SIDE HANDHOLDS

Number. Four (4).

Dimensions. Minimum diameter, five-eighths (⅝) of an inch, wrought iron or steel.

Minimum clear length, thirty-six (36) inches.

Minimum clearance, two (2), preferably two and one-half (2½), inches.

Location. One (1) near each end on each side of car, curving downward toward center of car from a point not less than thirty (30) inches above platform to a point not more than eight (8) inches from bottom of car. Top end of handhold shall be not more than eight (8) inches from outside face of end sheathing.

Manner of application. Same as specified for "Box and other house cars."

END HANDHOLDS

Number. Four (4).

Dimensions. Same as specified for "Box and other house cars."

Location. Horizontal: One (1) near each side on each end of car on face of platform end sill. Clearance of outer end of handhold shall be not more than sixteen (16) inches from end of platform end sill.

Manner of application. Same as specified for "Box and other house cars."

END PLATFORM HANDHOLDS

Number. Four (4).

Dimensions. Minimum diameter, five-eighths (⅝) of an inch, wrought iron or steel.

Minimum clearance, two (2), preferably two and one-half (2½), inches.

Location. One (1) right-angle handhold on each side of each end, extending horizontally from door post to corner of car at approximate height of platform rail, then downward to within twelve (12) inches of bottom of car.

Manner of application. Handholds shall be securely fastened with bolts, screws or rivets.

CABOOSE-PLATFORM STEPS

Safe and suitable box steps leading to caboose platforms shall be provided at each corner of caboose.

Lower tread of step shall be not more than twenty-four (24) inches above top of rail.

UNCOUPLING LEVERS

Same as specified for "Box and other house cars."

CABOOSE CARS WITHOUT PLATFORMS

HAND BRAKES

Number. Same as specified for "Box and other house cars."

Dimensions. Same as specified for "Box and other house cars."

Location. Each hand brake shall be so located that it can be safely operated while car is in motion.

The brake shaft on caboose cars without platforms shall be located on end of car to the left of center.

Manner of application. Same as specified for "Box and other house cars."

BRAKE STEP

Same as specified for "Box and other house cars."

RUNNING BOARDS

Number. Same as specified for "Box and other house cars."

Dimensions. Same as specified for "Box and other house cars."

Location. Full length of car, center of roof. [*On caboose cars with cupolas, longitudinal running boards shall extend from cupola to ends of roof.*]

Outside metal-roof cars shall have latitudinal extensions leading to ladder locations.

Manner of application. Same as specified for "Box and other house cars."

SILL STEPS

Same as specified for "Box and other house cars."

SIDE-DOOR STEPS

Number. Two (2) [*if caboose has side doors*].

Dimensions. Minimum length, five (5) feet.

Minimum width, six (6) inches.

Minimum thickness of tread, one and one-half (1½) inches.

Minimum height of backstop, three (3) inches.

Maximum height from top of rail to top of tread, twenty-four (24) inches.

Location. One (1) under each side door.

Manner of application. Side-door steps shall be supported by two (2) iron brackets having a minimum cross-sectional area seven-eighths (⅞) by three (3) inches or equivalent, each of which shall be securely fastened to car by not less than two (2) three-fourth (¾) inch bolts.

LADDERS

Number. Four (4).

Dimensions. Same as specified for "Box and other house cars."

Location. Same as specified for "Box and other house cars," *except* when caboose has side doors, then side ladders shall be located not more than eight (8) inches from doors.

Manner of application. Same as specified for "Box and other house cars."

END-LADDER CLEARANCE

No part of car above end sills within thirty (30) inches from side of car, *except* buffer block, brake shaft, brake wheel, brake step, running board or uncoupling lever, shall extend to within twelve (12) inches of a vertical plane parallel with end of car and passing through the inside face of knuckle when closed with coupler horn against the buffer block or end sill, and no other part of end of car or fixtures on same above end sills, other than exceptions herein noted, shall extend beyond the outer face of buffer block.

ROOF HANDHOLDS.

Number. Four (4).

Dimensions. Same as specified for "Box and other house cars."

Location. One (1) over each ladder, on roof in line with and running parallel to treads of ladder, not less than eight (8) nor more than fifteen (15) inches from edge of roof.

Where stiles of ladders extend twelve (12) inches or more above roof, no other roof handholds are required.

Manner of application. Roof handholds shall be securely fastened with not less than one-half (½) inch bolts with nuts outside (when possible) and riveted over, or with not less than one-half (½) inch rivets.

CUPOLA HANDHOLDS.

Number. One (1) or more.

Dimensions. Minimum diameter, five-eighths (⅝) of an inch, wrought iron or steel.

Minimum clearance, two (2), preferably two and one-half (2½), inches.

Location. One (1) continuous cupola handhold extending around top of cupola, not more than three (3) inches from edge of cupola roof.

Four (4) right-angle handholds, one (1) at each corner, not less than sixteen (16) inches in clear length from point of angle, may take the place of the one (1) continuous handhold specified, if locations coincide.

Manner of application. Cupola handhold shall be securely fastened with not less than one-half (½) inch bolts with nuts outside and riveted over, or with not less than one-half (½) inch rivets.

SIDE HANDHOLDS

Number. Four (4).

Dimensions. Same as specified for "Box and other house cars."

Location. Horizontal: One (1) near each end on each side of car, not less than twenty-four (24) nor more than thirty (30) inches above center line of coupler. Clearance of outer end of handhold shall be not more than eight (8) inches from end of car.

Manner of application. Same as specified for "Box and other house cars."

SIDE DOOR HANDHOLDS

Number. Four (4): Two (2) curved, two (2) straight.

Dimensions. Minimum diameter, five-eighths (⅝) of an inch, wrought iron or steel.

Minimum clearance, two (2), preferably two and one-half (2½), inches.

Location. One (1) curved handhold, from a point at side of each door opposite ladder, not less than thirty-six (36) inches above bottom of car, curving away from door downward to a point not more than six (6) inches above bottom of car.

One (1) vertical handhold at ladder side of each door, from a point not less than thirty-six (36) inches above bottom of car to a point not more than six (6) inches above level of bottom of door.

Manner of application. Side-door handholds shall be securely fastened with not less than one-half (½) inch bolts with nuts outside (when possible) and riveted over, or with not less than one-half (½) inch rivets.

HORIZONTAL END HANDHOLDS

Number. Same as specified for "Box and other house cars."

Dimensions. Same as specified for "Box and other house cars."

Location. Same as specified for "Box and other house cars," *except* that one (1) additional end handhold shall be on each end of car with platform end sills as heretofore described, unless car has door in center of end. Said handhold shall be not less than twenty-four (24) inches in length, located near center of car, not less than thirty (30) nor more than sixty (60) inches above platform end sill.

Manner of application. Same as specified for "Box and other house cars."

VERTICAL END HANDHOLDS

Same as specified for "Box and other house cars."

UNCOUPLING LEVERS

Same as specified for "Box and other house cars."

SAFETY APPLIANCES PASSENGER-TRAIN CARS

Passenger-Train Cars with Wide Vestibules

HAND BRAKES

Number. Each passenger-train car shall be equipped with an efficient hand brake, which shall operate in harmony with the power brake thereon.

Location. Each hand brake shall be so located that it can be safely operated while car is in motion.

SIDE HANDHOLDS

Number. Eight (8).

Dimensions. Minimum diameter, five-eighths (⅝) of an inch, metal.

Minimum clear length, sixteen (16) inches.

Minimum clearance, one and one-fourth (1¼), preferably one and one-half (1½) inches.

Location. Vertical: One (1) on each vestibule door post.

Manner of application. Side handholds shall be securely fastened with bolts, rivets or screws.

END HANDHOLDS

Number. Four (4).

Dimensions. Minimum diameter, five-eighths (⅝) of an inch, wrought iron or steel.

Minimum clear length, sixteen (16) inches.

Minimum clearance, two (2), preferably two and one-half (2½), inches.

Handholds shall be flush with or project not more than one (1) inch beyond vestibule face.

Location. Horizontal: One (1) near each side on each end, projecting downward from face of vestibule end sill. Clearance of outer end of handhold shall be not more than sixteen (16) inches from side of car.

Manner of application. End handholds shall be securely fastened with bolts or rivets.

When marker sockets or brackets are located so that they can not be conveniently reached from platforms, suitable steps and handholds shall be provided for men to reach such sockets or brackets.

UNCOUPLING LEVERS

Uncoupling attachments shall be applied so they can be operated by a person standing on the ground.

Minimum length of ground uncoupling attachment, forty-two (42) inches, measured from center line of end of car to handle of attachment.

On passenger-train cars used in freight or mixed train service, the uncoupling attachments shall be so applied that the coupler can be operated from left side of car.

Passenger-Train Cars With Open End Platforms

Number. Each passenger-train car shall be equipped with an efficient hand brake, which shall operate in harmony with the power brake thereon.

Location. Each hand brake shall be so located that it can be safely operated while car is in motion.

END HANDHOLDS

Number. Four (4).

Dimensions. Minimum diameter, five-eighths (⅝) of an inch, wrought iron or steel.

Minimum clear length, sixteen (16) inches.

Minimum clearance, two (2), preferably two and one-half (2½), inches.

Handholds shall be flush with or project not more than one (1) inch beyond face of end sill.

Location. Horizontal: One (1) rear each side of each end on face of platform end sill, projecting downward. Clearance of outer end of handhold shall be not more than sixteen (16) inches from end of end sill.

Manner of application. End handholds shall be securely fastened with bolts or rivets.

END PLATFORM HANDHOLDS

Number. Four (4). [*Cars equipped with safety gates do not require end platform handholds.*]

Dimensions. Minimum clearance, two (2), preferably two and one-half (2½), inches, metal.

Location. Horizontal from or near door post to a point not more than twelve (12) inches from corner of car, then approximately vertical to a point not more than six (6) inches from top of platform. Horizontal portion shall be not less than twenty-four (24) inches in length nor more than forty (40) inches above platform.

Manner of application. End-platform handholds shall be securely fastened with bolts, rivets or screws.

UNCOUPLING LEVERS

Uncoupling attachments shall be applied so they can be operated by a person standing on the ground.

Minimum length of ground uncoupling attachment, forty-two (42) inches, measured from center of end of car to handle of attachment.

On passenger-train cars used in freight or mixed train service, the uncoupling attachments shall be so applied that the coupler can be operated from left side of car.

PASSENGER-TRAIN CARS WITHOUT END PLATFORMS

HAND BRAKES

Number. Each passenger-train car shall be equipped with an efficient hand brake, which shall operate in harmony with the power brake thereon.

Location. Each hand brake shall be so located that

it can be safely operated while car is in motion.

SILL STEPS

Number. Four (4).

Dimensions. Minimum length of tread, ten (10), preferably twelve (12), inches.

Minimum cross-sectional area, one-half (½) by one and one-half (1½) inches or equivalent, wrought iron or steel.

Minimum clear depth, eight (8) inches.

Location. One (1) near each end on each side, not more than twenty-four (24) inches from corner of car to center of tread of sill step.

Outside edge of tread of step shall be not more than two (2) inches inside of face of side of car.

Tread shall be not more than twenty-four (24), preferably not more than twenty-two (22), inches above the top of rail.

Steps exceeding eighteen (18) inches in depth shall have an additional tread and be laterally braced.

Manner of application. Sill steps shall be securely fastened with not less than one-half (½) inch bolts with nuts outside (when possible) and riveted over, or with not less than one-half (½) inch rivets.

SIDE HANDHOLDS

Number. Four (4).

Dimensions. Minimum diameter, five-eights (⅝) of an inch, wrought iron or steel.

Minimum clear length, sixteen (16), preferably twenty-four (24), inches.

Minimum clearance, two (2), preferably two and one-half (2½), inches.

Location. Horizontal or vertical: One (1) near each end on each side of car over sill step.

If horizontal, not less than twenty-four (24) nor more than thirty (30) inches above center line of coupler.

If vertical, lower end not less than eighteen (18) nor more than twenty-four (24) inches above center line of coupler.

Manner of application. Side handholds shall be securely fastened with bolts, rivets or screws.

END HANDHOLDS

Number. Four (4).

Dimensions. Minimum diameter, five-eighths (⅝) of an inch, wrought iron or steel.

Minimum clear length, sixteen (16) inches.

Minimum clearance, two (2), preferably two and one-half (2½) inches.

Location. Horizontal: One (1) near each side on each end, projecting downward from face of end sill or sheathing. Clearance of outer end of handhold shall be not more than sixteen (16) inches from side of car.

Manner of application. Handholds shall be flush with or project not more than one (1) inch beyond face of end sill.

End handholds shall be securely fastened with bolts or rivets.

When marker sockets or brackets are located so that they cannot be conveniently reached from platforms, suitable steps and handholds shall be provided for men to reach such sockets or brackets.

END HANDRAILS

Number. Four (4). [*On cars with projecting end-sills.*]

Dimensions. Minimum diameter, five-eighths (⅝) of an inch, wrought iron or steel.

Minimum clearance, two (2), preferably two and one-half (2½), inches.

Location. One (1) on each side of each end, extending horizontally from door post or vestibule frame to a point not more than six (6) inches from corner of car, then approximately vertical to a point not more than six (6) inches from top of platform end sill; horizontal portion shall be not less than thirty (30) nor more than sixty (60) inches above platform end sill.

Manner of application. End handrails shall be securely fastened with bolts, rivets or screws.

SIDE-DOOR STEPS

Number. One (1) under each door.

Dimensions. Minimum length of tread, ten (10), preferably twelve (12), inches.

Minimum cross-sectional area, one-half (½) by one and one-half (1½) inches or equivalent, wrought iron or steel.

Minimum clear depth, eight (8) inches.

Location. Outside edge of tread of step not more than two (2) inches inside of face of side of car.

Tread not more than twenty-four (24), preferably not more than twenty-two (22), inches above the top of rail.

Steps exceeding eighteen (18) inches in depth shall have an additional tread and be laterally braced.

Manner of application. Side-door steps shall be securely fastened with not less than one-half (½) inch bolts with nuts outside (when possible) and riveted over, or with not less than one-half (½) inch rivets.

A vertical handhold not less than twenty-four (24) inches in clear length shall be applied above each side-door step on door post.

UNCOUPLING LEVERS

Uncoupling attachments shall be applied so they can be operated by a person standing on the ground.

Minimum length of ground uncoupling attachment, forty-two (42) inches, measured from center line of end of car to handle of attachment.

On passenger-train cars used in freight or mixed train service, the uncoupling attachment shall be so applied that the coupler can be operated from the left side of car.

Cars of construction not covered specifically in the foregoing sections, relative to handholds, sill steps, ladders, hand brakes and running boards, may be considered as of special construction, but shall have, as nearly as possible, the same complement of handholds, sill steps, ladders, hand brakes and

running boards as are required for cars of the nearest approximate type.

"Right" or "left" refers to side of person when facing end or side of car from ground.

To provide for the usual inaccuracies of manufacturing and for wear, where sizes of metal are specified, a total variation of five (5) per cent below size given is permitted.

CONFERENCE RULINGS OF THE INTERSTATE COMMERCE COMMISSION

Issued December 9, 1911

328. November 6, 1911. Safety Appliances—Cars of Special Construction.—Locomotives while equipped with snow plows or flanges are to be regarded as cars of special construction within the meaning of the order of March 13, 1911.

329. Safety Appliances—Order of March 13, 1911, Construed.—The order entitled "United States Safety Appliance Standard," adopted on March 13, 1911, is interpreted with respect to the details mentioned as follows:

1. That gondola and ballast cars with swinging side doors at ladder locations may be considered as cars of special construction.

Ladders and handholds need not be applied to swinging side doors.

A side vertical handhold shall be placed on corner post of such cars as nearly as possible over sill step.

2. That high-side gondola and ballast cars with end platforms 18 inches or more in length may be considered as cars of special construction.

Ladders shall be placed on such cars as prescribed for high-side gondola and hopper cars, with sill step under ladder, or as near under ladder as car construction will permit. Ends and side of cars to be equipped with handholds in the same manner as flat cars.

3. Ladders—Spacing of Ladder Treads.—That the spacing of top ladder treads shall be taken from eave of roof at side of car, whether latitudinal running board is used or not. (Shown on plates illustrating United States Safety Appliance Standards, issued by the Commission, July 1, 1911.)

4. Box and Other House Cars, Automobile Cars with Swinging End Doors—End Ladders:

That these cars may come under the head of cars of special construction, as per clause on page 37 of the order, and the end ladders placed as nearly as possible to designated location.

CONFERENCE RULING OF THE INTERSTATE COMMERCE COMMISSION

Issued January 13, 1913

Safety Appliances—Cars of Special Construction.—Order of March 13, 1911, construed:

The order entitled "United States Safety Appliance Standards," adopted on March 13, 1911, is interpreted with respect to the details mentioned, as follows:

1. High-side, drop-bottom ore cars of narrow construction are to be regarded as cars of special construction. On such cars offset sill steps may be applied where, owing to the construction of car, the standard sill step would foul the oil box and prevent the proper opening of the lid.

2. Air hose are not to be regarded as fixtures, as that word is used in that part of the order relating to "End-ladder Clearance."

Safety Appliances for Tank Cars Built After January 1, 1917. Standard. In 1916 the following specifications were adopted:

SAFETY APPLIANCES FOR TANK CARS AFTER JANUARY 1, 1917

All tank cars built after January 1, 1917, or old tanks placed on new steel underframes after that date, must be equipped with safety appliances in accordance with the following specifications and Fig. 7. This arrangement conforms to the United States Safety Appliances, Standard.

END OF CAR

Shall be constructed with a platform similar to flat cars. Maximum height of platform from top of rail shall be fifty (50) in.

HAND-BRAKES

Number.—Same as specified for "Box and Other House Cars."

Dimensions.—Same as specified for "Box and Other House Cars."

Location.—Each hand-brake shall be so located that it can be safety operated while car is in motion. The brake-shaft shall be located on end of car to the left of center.

Manner of Application.—Same as specified for "Box and Other House Cars."

RUNNING-BOARDS

Number.—One continuous running-board around sides and ends. End platform shall form continuation of side running-board.

Dimensions.—Minimum thickness one and three-quarters (1¾) in. Minimum width on sides, ten (10) in.

Location.—Continuous around sides and ends of cars. End platform shall form continuation of side running-board.

Manner of Application.—Outside edge of side running-board shall extend not less than seven (7) inches beyond bulge of tank, safety hand-railing and dome ladder. In case of large tanks, where road limits will not permit the clearances specified, the outer edge of running-boards shall extend not less than seven (7) inches beyond bulge of tank and the foot of ladder shall have a clearance of at least seven (7) inches from outer edge of running-board.

Outside edge of end-platform shall extend not less than seven (7) inches beyond bulge of tank-head and safety hand-railing.

Running-boards shall be supported to prevent sagging. Where running-boards are spliced, joints must be flush and both ends supported.

Running-boards shall be securely fastened to platform and running-board supports.

SILL STEPS

Number.—Same as specified for "Box and Other House Cars."

Dimensions.—Same as specified for "Box and Other House Cars."

Location.—When located on side sill: Same as specified for "Box and Other House Cars." When located on running-board: One (1) near each end on each side, flush with outside edge of running-board, so that there shall be not more than eighteen (18) in. from end of car to center of tread of sill

step. Tread shall be not more than twenty-four (24), preferably not more than twenty-two (22) in. above the top of rail.

Manner of Application.—When located on side sill: Same as specified for "Box and Other House Cars." When located on running-board: Steps exceeding eighteen (18) in. in depth shall have an additional tread and be laterally braced. Sill steps shall be securely fastened with not less than one-half (½) in. bolts with nuts outside (when possible) and riveted over, or with one-half (½) in. rivets.

SIDE HANDHOLDS

Number.—Eight (8).

Dimensions.—Same as specified for "Box and Other House Cars."

Location.—Four (4) horizontal: One (1) on face of each side sill near each end on tank cars with side sills; or one (1) near each end on each side of car over sill step, on running-board, projecting downward or outward. Clearance of outer end of handhold shall be not more than twelve (12) in. from end of car.

Four (4) vertical: One (1) as near as possible over each sill step, securely fastened to tank or tank band.

Manner of Application.—Same as specified for "Box and Other House Cars."

END HANDHOLDS

Number.—Four (4).

Dimensions.—Same as specified for "Box and Other House Cars."

Location.—Horizontal: One (1) near each side of each end of car on face of end sill; or one (1) near each side on each end of car on platform, projecting downward or outward. Clearance of outer end of handhold shall be not more than sixteen (16) in. from side of car.

Manner of Application.—Same as specified for "Box and Other House Cars."

SAFETY RAILINGS

Number.—One (1) continuous running around sides and ends of tank.

Dimensions.—Minimum diameter, seven-eighths (⅞) of an in., wrought iron or steel rod or one and one-quarter (1¼) in. pipe. Minimum clearance, two and one-half (2½) in.

Location.—Running around sides and end of tank, not less than thirty-six (36) nor more than fifty-four (54) in. above platform or running-board.

Manner of Application.—Safety-railings shall be securely fastened to tank or tank bands with a minimum of four brackets for each side of tank and one bracket on head at each end of tank, and secured against end shifting.

Uncoupling Levers.—Same as specified for "Box and Other House Cars."

End Ladder Clearance.—No part of car above end sills within thirty (30) inches from side of car, except buffer block, brake-shaft brackets, brake wheel, running-boards or uncoupling lever shall extend to within twelve (12) in. of a vertical plane parallel with end of car and passing through the inside face of knuckle when closed with coupler horn against the buffer block or end sill, and no other part of end of car or fixtures on same, above end sills, other than exceptions herein noted, shall extend beyond the outer face of buffer block.

LADDER, DOME PLATFORM, DOME PLATFORM HANDHOLD AND DOME HANDHOLD

Number.—One (1) ladder, one (1) dome platform, one (1) dome platform handhold and one (1) dome handhold.

Dimensions.—Ladder: Ladder stiles three-eighths by two (⅜ by 2) in. or equivalent, wrought iron or steel.

Ladder treads, minimum diameter, five-eighths (⅝) of an in., wrought iron or steel.

Minimum clear length of tread, fourteen (14) in.

Minimum spacing of treads, nineteen (19) in. Safety railing will be considered a ladder tread.

Minimum clearance of treads and ladder stiles, two (2), preferably two and one-half (2½) in.

Dome Platform.—Minimum width, seven (7) in.; minimum thickness one and three-quarters (1¾) in.

Dome Platform Brackets.—Three-eighths by one and one-half (⅜ by 1½) in., or equivalent, wrought iron or steel.

Dome Platform and Dome Handholds.—Minimum diameter, five-eighths (⅝) of an in., wrought iron or steel.

Minimum clear length, fourteen (14) in., preferably sixteen (16) in.

Minimum clearance, two (2), preferably two and one-half (2½) in.

Location.—On brake mast side of car leading to dome. When car is equipped with more than one dome, the step board shall be lengthened so that all dome covers will be accessible from same; or, ladder, dome platform and handholds provided leading to each dome.

Dome platform handhold to be applied in line with ladder, not more than two (2) in. back from outside edge of platform, projecting downward and outward with horizontal portion of handhold flush with or extending one (1) in. beyond edge of platform. Top ladder rung will be considered dome platform handhold if located within not less than two (2) or more than three (3) in. from bottom of dome platform. Dome handhold to be applied to dome over dome platform, in line with ladder.

Manner of Application.—Ladders shall be securely fastened at bottom to running-board with not less than one-half (½) in. bolts with nuts underneath and riveted over, or with not less than one-half (½) in. rivets. Ladders shall be secured at top to safety railing or to under side of dome platform. If fastened to dome platform, the stiles shall be secured with not less than one-half (½) in. bolts riveted over nuts, or with one-half (½) in. rivets.

The dome platform shall be supported by wrought iron or steel brackets, which shall be securely fastened to tank or tank bands.

Dome platform handholds same as specified for "Box and Other House Cars."

Dome handholds shall be securely fastened.

NOTE.—In lieu of dome platform specified, any efficient design of platform encircling dome will be acceptable.

TANKS COVERED WITH JACKETS

On tanks covered with jackets, metal pads should be attached to the shell proper with studs or rivets, to which brackets should be fastened for securing the safety appliances attached to the tanks; or, the safety appliances (with the exception of the running-board brackets and dome-platform brackets) may be se-

cured to the jackets reinforced with metal pads at point of attachment, which pads must extend at least two in. from center line of rivet holes. The running-board brackets must be attached preferably to the underframe or to metal pads attached to shell proper. The dome-platform brackets must be attached to tank bands or to metal pads attached to shell proper. When the safety appliances are attached to the jacket covering of the tank, the jacket must be tightened so that there will be no danger of its slipping around.

Safety Beam (Six-Wheel Trucks). See Axle Guard.

Safety Berth Latch. A device by which it is made impossible for an upper berth to shut automatically in case of accidental overturning of the cars. These devices enable the Berth Safety Rope to be dispensed with.

Safety Attachment. Figs. 2676, 2677, Page 1317. A device attached to the car truck which automatically causes an application of the air brakes when the trucks may be derailed or broken, and also makes light application of the brakes when excessive speed on rough tracks causes abnormal or dangerous swaying of the trucks.

Safety Car Control Equipment. Figs. 1461, etc. An equipment used principally on "Safety Cars" where a single operator is entirely responsible for the control of the car and the sole dependence in case of danger. With this equipment, the air brake and car door operating devices are interlocked, the air brake equipment is of the semi-automatic type, a dead man's feature is provided, and convenient means are provided for sanding the rails.

Safety Chain Eye. An iron eye with a broad base bolted to the under side of the side sills of a passenger equipment car to receive the hook on the end of a truck safety or check chain.

Safety Chains, Platform (M. C. B. Recommended Practice).

In 1893 a Recommended Practice was adopted for location and details of platform safety chains for passenger equipment cars. See Proceedings 1890 and 1893. In 1896 this was modified as follows: Platform Safety Chains for passenger equipment cars to be located 14½ in. each side of center; to be suitably attached to under side of platform timbers, and to be of such length that when extended horizontally the chain with hook shall measure 12¾ in. from face of end timber to bearing point of hook, and the chain with eye shall measure 2¾ in. from face of end timber to bearing point of eye. The hook shall not be more than 1¼ in. thick transversely, and the eye shall not be less than 1½ in. wide, or less than 4 in. long in its opening. When facing end of car the chain fitted with hook shall be on the left-hand side, and the chain fitted with eye on the right-hand side. See Proceedings 1896.

Safety Chains for Steel and Wooden Freight Cars (M. C. B. Recommended Practice). Fig. 3039.

In 1894 a Recommended Practice was adopted for Safety Chains for Freight Cars, when such chains are used. The use of safety chains on freight cars was not recommended, but when they are used on cars for special service a location is recommended as shown.

A topical discussion on safety chains for use on freight cars carrying double loads will be found in the Master Car Builders' Proceedings, 1900, page 196.

In 1904 a Recommended Practice for safety chains for Steel Freight Cars was adopted. See letter ballot, Proceedings 1904; also Sheet M. C. B.—E.

The committee report in the 1904 Proceedings, page 108, relates to permanently attached coupling or safety chains and loose chains for fastening cars under special conditions. A minority report was also made. No action was taken and the committee was continued.

In 1905, as a result of letter ballot, the two designs of temporary safety chains for chaining together cars carrying double loads, shown on Sheet M. C. B.—E, were adopted as a Recommended Practice.

Safety or Check Chain Eyebolt. An eyebolt for securing a safety or check chain to a truck or to the car body.

Safety or Check Chain Hook. A hook on the end of a Check Chain with which to attach it to an eyebolt on the car body.

Safety Guard (for Spring Plank). Figs. 1361-1363; Page 1129. An iron strap attached to the truck transoms and passing under the spring plank to hold up the latter in case of accidental breaking of the link hangers. More properly Spring Plank Safety Hanger.

Safety Hanger. A metal loop or eye surrounding a rod or bar to prevent its falling in case of breakage.

Safety Plate (Baker Heater). An iron plate which covers the hole in the partition between the fire pot and the base of the smoke flue. Its office is to prevent the ignited coals from falling out if the heater be overturned.

Safety Rod (Postal Cars). Fig. 2907. A rod suspended from overhead, over the pouch racks, within easy reach, to serve as a handhold or grabiron in case of derailment, etc.

Safety Rope (Sleeping Car Berths). More properly Berth Safety Rope. See also Safety Berth Latch.

Safety Strap. See Safety Hanger.

Safety Tread. Figs. 604-614. Rubber or metal coverings for step treads which prevent the foot from slipping.

Safety Valve (Car Heating). Figs 2093, 2096, 2154. Used to provide against an accumulation of excess pressure.

(High Speed Brake.) An improved type of relief valve applied to the brake cylinders of such cars in a train as are not equipped with a high speed reducing valve, to relieve the brakes from excessive pressure.

(Passenger Triple Valve.) Figs. 1441, 1471; Page 1164.

(Tank Cars.) 12, Fig. 173. To prevent excess pressure. See Tank Cars, Specifications for.

Saloon. A retiring room, furnished with a dry closet or a water closet. The saloon is commonly also provided with washing facilities. Other terms are lavatory, closet, toilet. See Lavatory.

One of the smaller subdivisions or staterooms of a sleeping or parlor car.

Salt-Water Drippings, Collection of (M. C. B. Recommended Practice).

In 1898 the subject of rust on trucks and track from salt-water drippings from refrigerator cars was discussed, and a Recommended Practice for the collection of such drippings was adopted.

In 1910 this practice was modified as follows:

1. All salt-water drippings should be retained in the ice tanks and drained off only at icing stations.

2. The total capacity of drain openings should not exceed the capacity of traps, and the capacity of both drains and traps should be sufficient to release all drippings within the time limit of icing the train.

3. The mechanism adopted for handling drain valves should be simple and positive, and so designed as to insure closing the valves before hatch plugs can be returned to their places.

4. Salt drippings should be conducted from ice tanks through the drain valves above described and thence to the outside of cars through the regular traps and drain pipes.

A topical discussion on the danger from salt water drippings will be found in the 1905 M. C. B. Proceedings, page 107.

The report of a committee in the 1910 M. C. B. proceedings, page 466, contains the results of a series of tests, with recommendations on the part of the committee.

Sand Blast. A process of cutting glass by blowing sand upon it with a strong blast of air.

The same principle is used in larger machines for cleaning the rust and old paint from steel cars.

Sand Plank. A common name for spring plank.

Sanitation of Passenger Cars. See Cleaning Passenger Cars.

Sandwich Plates. See Flitch Plates.

Sash. Figs. 1858, etc. The frame of a window or blind, in which the glass or slats are set, but commonly used, especially in compound words, as a substitute for window, which means the window and sash complete. The various members used in framing a sash are the same as Door Frame. See Deck Sash, etc.

Sash Balance. Figs. 1862, 1890, 1892, 1893, etc.; Pages 1171, 1288. A spring or weight, with or without a cord, so connected to a sash as to counterbalance its weight and make it easy to raise or lower.

Sash Bars. See Sash Latch.

Sash Fastener. A sash lock.

Sash Holder. See Sash Lock.

Sash Latch. Similar to a sliding door latch. See Latch.

Sash Lift. Figs. 1877, 1920, etc. A metal finger hold attached to the bottom rail of a window sash for raising and lowering it. They are sometimes let in flush, but are usually attached on the outside. Sometimes, but rarely, the sash lift is a mere knob, and so called. A Window Blind Lift is a somewhat similar device. See Bar Sash Lift.

Sash Lock. Figs. 1861-1960, etc.; Pages 1162, 1165, 1171. A spring bolt attached to a window sash, or (rarely) a window blind, provided with thumb lever (sash lock trigger), to withdraw the bolt with by one hand, while the sash is lifted by the other. Both hands must thus be used. To accomplish this end less awkwardly Sash Balances have been adopted.

Sash Lock Plate. A sash lock stop.

Sash Lock Rack. A rack or stop bar used as a Sash Lock Step.

Sash Lock Spring. See Sash Lock.

Sash Lock Stop. Figs. 1868, etc.; Page 1171. There are two kinds of stops, upper stops for holding the window open, and lower stops to hold it shut. Sash lock bushings, plates, or racks, are substitutes and equivalents for sash lock stops. Sash lock racks are often called stop bars.

Sash Parting Strip. See Parting Strip.

Sash Opener. Pages 1171, 1288. A contrivance, as a lever or rod, for opening a window, used chiefly for the deck sash which are out of reach.

Sash Pivot. A metal pin or pivot attached to a sash on which the latter turns. See Deck Sash Pivot.

Sash Pull. See Deck Sash Pull.

Sash Rail. A horizontal bar in the frame of a window or blind.

Sash Spring. A metal spring attached to the edge of the stile of a window sash to prevent it from rattling.

Schedule of Prices and Credits. See Interchange of Traffic.

Scheme Rod (Postal Cars). A rod supported upon the scheme rod bracket, and carrying the scheme or schedule of the proper distribution of mail matter for the various post offices; used in distributing mail.

Scoop Car. Fig. 463. A car of special construction and equipment for removing rock or earth slides from railway tracks.

Screen (Window) Fig. 1891. Page 1288. A wire netting stretched on a frame to admit air but exclude cinders.

Screw. A cylinder surrounded by a spiral ridge or groove, every part of which forms an equal angle with the axis of the cylinder, so that if developed on a plane surface it would be an inclined plane. It is considered as one of the mechanical powers. When used alone the term commonly means a wood screw, having a slotted head and gimlet point, for driving in with a screw driver. Machine screws are similar, except that they have no gimlet point and have a metal screw thread. They are used for uniting metallic parts. All ordinary forms of bolts have screw threads cut on them, but are not commonly called screws. A special form of wood screw is a lag screw, which is a large sized screw with a head like a bolt, so that it may be inserted with a wrench instead of a screw driver. See Screw Thread.

Screw Coupling (British). The means by which passenger train vehicles are coupled together. On the Continent of Europe it is used for both passenger and freight cars. It comprises a right and left-handed screw provided with a hinged weighted handle, which always hangs downward, so that it has no tendency to unscrew and slacken the coupling, and two nuts with gudgeons taking in the eyes of U-shaped coupling links or shackles. The screw coupling may be either loose, or one shackle may be attached to the drawbar.

Screw Gages. Instruments for measuring the diameter or size of screws. They are of two kinds: external, for measuring male screws, and internal, for measuring female screws. See also Screw Pitch Gage, Screw Thread Gage.

Screw Jack. A jack, the power of which depends upon a screw, turned by a lever. See Jack.

Screw Pitch Gage. A gage for determining the number of threads to the inch on screws and taps. It consists of a number of toothed plates turning on a common pivot, so that the serrated edge of each may be applied to the screw until one is found which corresponds therewith. The figures stamped on the plate indicate the number of threads to the inch. In the ordinary single thread screw the pitch is indicated by the number of threads to an inch.

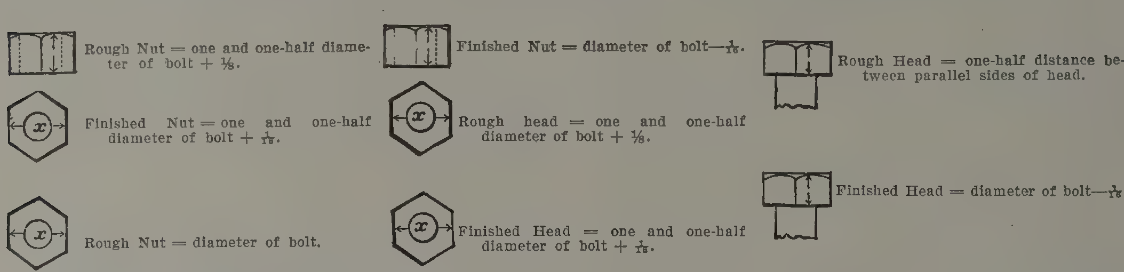
Screw Thread Gage. A steel plate with notches in the edge of the precise form of screw threads, used for giving the proper form to the edges of screw cutting tools. See SCREW THREAD.

Screw Threads, Bolt Heads and Nuts (M. C. B. Standard).

The Sellers or Franklin Institute system of screw threads, bolt heads and nuts is the standard of the Association, and repeated action of the Association has deprecated the use of any other system and encouraged the careful maintenance of these standards. See Proceedings 1872, pages 18 and 21; Proceedings 1879, pages 82 and 83; Proceedings 1882, page 229.

TABLE II.

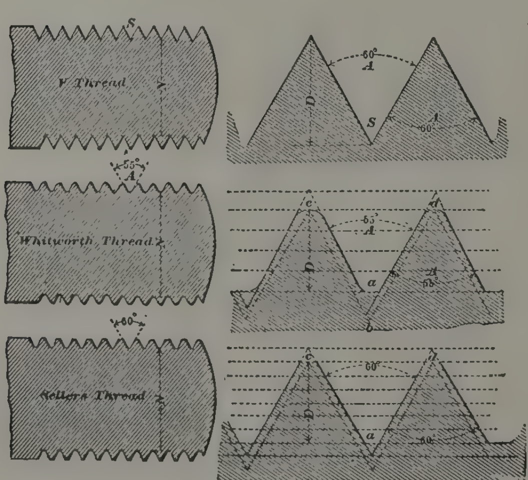
PROPORTIONS FOR SELLERS' STANDARD NUTS AND BOLTS.



NOTE.—In 1899 the following dimensions for square bolt heads were adopted as Recommended Practice: The side of the head shall be one and one-half times the diameter of the bolt, and the thickness of the head shall be one-half the side of the head. See Recommended Practice. In 1900 these dimensions were adopted as Standard.

A set of gages for standard screw threads and a standard inch scale 2 ft. long, are held in the office of the secretary for reference.

Mr. Sellers, who proposed this system of screw threads, described it in an essay read before the Franklin Institute of Philadelphia, April 21, 1864, as follows:



"The proportions for the proposed thread and its comparative relation to the sharp and rounded threads, will be readily understood from the accompanying diagram in which Figs. 11 and 12—the latter on an exaggerated scale—represent a sharp thread, Figs. 13 and 14 a rounded top and bottom to the English proportion, and Figs. 15 and 16 the flat top and bottom, all of the same pitch. The angle of the proposed thread is fixed at 60°, the same as the sharp thread, it being more readily obtained than 55°; and more in accordance with the general practice in this country. Divide the pitch, or, which is the same thing, the side of the thread, into eight equal parts, take off one part from the top and fill in one part in the bottom of the thread, then the flat top and bottom will equal one-eighth of the pitch; the wearing surface will be three-quarters of the pitch, and the diameter of screw at bottom of the thread will be expressed by the formula:

$$\textit{Diameter} - \frac{1{,}299}{\textit{number of threads per inch}}$$

SPECIFICATIONS FOR BOLTS AND NUTS

In 1916, Specifications for Bolts and Nuts were drafted, these specifications to include the table given on page 843, M. C. B. 1915 Proceedings, which was enlarged.

1. *Scope.*—These specifications to apply to all bolts and nuts.

I. MANUFACTURE

2. *Process.*—The bolts and nuts may be made from wrought iron or steel, made in accordance with M. C. B. Specifications for Refined Wrought Iron Bars or Mild Steel Bars.

II. CHEMICAL PROPERTIES AND TESTS

3. *Chemical Composition.*—The steel for the bolts shall conform to the requirements of the M. C. B. Specifications for Mild Steel.

III. PHYSICAL PROPERTIES AND TESTS

4. *Tension Tests.*—The wrought iron or steel shall conform to the physical properties as specified in the M. C. B. Specifications for Refined Wrought Iron Bars and Mild Steel Bars.

IV. PERMISSIBLE VARIATIONS

5. *Gage of Bolts.*—Rods shall conform to the limits as specified in M. C. B. Specifications for Refined Wrought Iron Bars or Mild Steel Bars.

6. *Threads.*—Nuts shall be so tapped that a U. S. standard plug gage of normal size will pass through

the nut, and in that position be snug and not show an appreciable shake. Bolts to be threaded so as to fit the nut in such a manner that it may be turned to within one thread of the end of the threaded portion of the bolt. When in this position there shall be no appreciable shake.

10. *Dimensions of Bars.*—The dimensions of square and round given in Table No. 1.

7. *Finished Bolt and Nut.*—The finished bolt and nut shall conform in its finished dimensions to Tables No. 1 and No. 2. The permissible variation from this of short diameter to be as follows: For nuts under ½ in., 1/16 in. under and 1/64 in. over. For nuts ½ in. and larger, 1/16 in. under and 3/64 in. over. All other dimensions of nuts and heads of bolts, 1/16 in. variation either way will be permitted, except for bolts and nuts under ½ in. 1/32 variation either way will be permitted.

8. *Tapping of Nuts.*—The nuts shall be tapped so that, when applied, the angle between the bearing surfaces shall not exceed two degrees.

9. *Length.*—The finished length of the bolt shall not vary more than ⅛ in. from the ordered dimension and, unless otherwise specified, the threads shall be cut 2½ times the diameter of the bolt.

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V. WORKMANSHIP AND FINISH

10. *Workmanship.*—The heads of all bolts shall be neatly formed, firmly joined to the body of the bolt, free from large projecting fins and no nicking or reduction of the size of the body of the bolt by dies.

11. *Threads.*—Bolts and nuts shall be cut with a U. S. and M. C. B. standard thread, the threads being cut full and clean. Unless otherwise specified, each bolt shall be furnished with a nut screwed on.

12. *Finish.*—Where the keyways are cut in the ends of bolts, they shall be full and clean and the metal around them shall show that it has not been injured by cutting the keyways more than is necessary.

VI. INSPECTION AND REJECTION.

13. *Inspection.*—(a) The inspector representing the purchaser shall have free entry, at all times while work on the contract of the purchaser is being performed, to all parts of the manufacturer's works which concern the manufacture of the material ordered. The manufacturer shall afford the inspector, free of cost, all reasonable facilities to satisfy him that the material is being furnished in accordance with these specifications.

(b) The purchaser may make the tests and inspection to govern the acceptance or rejection of the material in his own laboratory or elsewhere. Such tests and inspection shall be made at the expense of the purchaser.

(c) All tests and inspection shall be so conducted as not to interfere unnecessarily with the operation of the works.

14. *Rejection.*—Material which, subsequently to above tests at the mills or elsewhere and its acceptance, develops weak spots or imperfections, or fails to pass any one of the tests herein required, or properly thread or weld, when so specified, will be rejected and shall be replaced by the manufacturer at his own expense.

15. *Rehearing.*—Samples tested in accordance with this specification, which represent rejected material, shall be preserved for fourteen days from date of test report. In case of dissatisfaction with results of tests, the manufacturer may make claim for a rehearing within that time.

PROPORTIONS FOR SELLERS' STANDARD SCREW THREADS, NUTS AND BOLTS.

Screw Threads.				Hexagon Nuts.				Hexagon Bolt Heads.			
Diameter of screw.	Threads per inch.	Diameter at root of thread.	Width of flat.	Short diameter rough.	Short diameter finish.	Thickness rough.	Thickness finish.	Short diameter rough.	Short diameter finish.	Thickness rough.	Thickness finish.
1/4	20	185	0062	1/2	7/16	1/4	3/16	3/8	5/16	3/16	1/8
5/16	18	.240	0074	19/32	17/32	5/16	1/4	15/32	13/32	15/64	11/64
3/8	16	.294	.0078	11/16	5/8	3/8	5/16	9/16	1/2	9/32	7/32
7/16	14	344	0089	25/32	23/32	7/16	3/8	21/32	19/32	21/64	17/64
1/2	13	400	0096	7/8	13/16	1/2	7/16	3/4	11/16	3/8	5/16
9/16	12	454	.0104	31/32	29/32	9/16	1/2	27/32	25/32	27/64	23/64
5/8	11	507	0113	1 1/16	1	5/8	9/16	15/16	7/8	15/32	13/32
3/4	10	620	0125	1 1/4	1 3/16	3/4	11/16	1 1/8	1 1/16	9/16	1/2
7/8	9	731	0138	1 7/16	1 3/8	7/8	13/16	1 5/16	1 1/4	21/32	19/32
1	8	.837	0156	1 5/8	1 9/16	1	15/16	1 1/2	1 7/16	3/4	11/16
1 1/8	7	940	0178	1 13/16	1 3/4	1 1/8	1 1/16	1 11/16	1 5/8	27/32	25/32
1 1/4	7	1 065	.0178	2	1 15/16	1 1/4	1 3/16	1 7/8	1 13/16	15/16	7/8
1 3/8	6	1.160	.0208	2 3/16	2 1/8	1 3/8	1 5/16	2 1/16	2	1 1/32	31/32
1 1/2	6	1.284	.0208	2 3/8	2 5/16	1 1/2	1 7/16	2 1/4	2 3/16	1 1/8	1 1/16
1 5/8	5 1/2	1.389	.0227	2 9/16	2 1/2	1 5/8	1 9/16	2 7/16	2 3/8	1 7/32	1 5/32
1 3/4	5	1.491	.0250	2 3/4	2 11/16	1 3/4	1 11/16	2 5/8	2 9/16	1 5/16	1 1/4
1 7/8	5	1.616	.0250	2 15/16	2 7/8	1 7/8	1 13/16	2 13/16	2 3/4	1 13/32	1 11/32
2	4 1/2	1.712	.0277	3 1/8	3 1/16	2	1 15/16	3	2 15/16	1 1/2	1 7/16

Scrubber. (Acetylene Gas Lighting). A device for cleaning the gas.

Sealed Jet (Car Heating). A piece of apparatus in which live steam is brought directly into contact with the circulating water and heats it, at the same time forcing the circulation.

Seat. That flat portion of a chair or sofa to support the person. See CAR SEAT.

In Mechanics: The part on which another thing rests, as a valve seat.

Seat Arm Cap. A piece of metal shaped to the form of the seat arm and screwed to the top to take the wear and as an ornament.

Seat Arm Pivot. Fig. 1657, 1658, 1663. A metal pivot by which a seat arm of a reversible seat is attached to a seat end or the side of a car. In some cases the pivot is made in one piece with the seat arm plate, which is attached to the seat end. The two combined then become a seat arm pivot plate. A seat arm pivot is sometimes called a seat arm rivet.

Seat Arm Plate. A plate fastened to a seat end with a hole in the corner, which receives and holds a seat arm pivot. In some cases the pivot is made in one piece with the plate. The part formed by combining the two is then called a seat arm pivot plate. Sometimes a seat arm pivot plate or washer and a bolt is used.

Seat Arm or Seat Arm Rest. Fig. 1661. An arm by which the back of a seat is attached to the seat end or to the side of the car. Such arms are usually attached by a pivot, so that the seat back can be reversed. Sometimes called striker arm, seat back arm, and also seat back reversing arms.

This term is also used to designate the portion of a seat end which supports the arm of a person sitting in the seat, and sometimes, incorrectly, to designate a SEAT ARM CAP.

Seat Arm Rest Bracket. A bracket to be screwed to the wall to carry a wood arm rest.

Seat Arm Rivets. Fig. 1673.

Seat Arm Stop. Figs. 1653-1656, 1664. A metal lug or bracket attached to a seat end, and sometimes to the side of the car, on which the seat arm rests. Seat stops are either attached to a long plate (curved or straight seat stop), or as in round seat stops, and have a flange entirely surrounding them, by which they are attached to the seat arm or side of the car. They are also called seat stops.

Seat Arm Thimble. Fig. 1670.

Seat Arm Washer. A small washer for the head of a screw, by which a seat arm is fastened to a seat end. Now little used.

Seat Back. That part of a car seat which forms a support for the back. It has an arm, called the seat back arm, attached to it, by which it is attached to the seat ends with a seat arm pivot, so that it can be swung over so as to face the other way. In some styles the seat back arm is pivoted below the seat cushion and the seat back swings over the cushion so that both sides are used alternately. In sleeping cars the back does not swing, but a part of it pulls out to form the lower berth. See SEAT. On some suburban cars, and commonly on street cars, longitudinal seats are used, with the backs against the side of the car.

Seat Back Arm Lock. See SEAT LOCK.

Seat Back Arm Pivot. Fig. 1657. The swinging joint or seat back pivot in the seat arm. See SEAT ARM PIVOT.

Seat Back Band. A seat back molding.

Seat Back Corner. Fig. 1660. A metallic cornice piece to screw to the backs of seats and protect the upholstery from wear.

Seat Back Curved Stop. A seat back stop of a curved form.

Seat Back Molding. A wood, or more usually, metal band or molding fastened around the edge of a seat back to give it a finish and protect it from wear.

Seat Back Paneling. The panels forming the partition between the seat backs in a sleeping car.

Seat Back Pivot Plate. The plate bearing a seat arm pivot fastened to the seat back.

Seat Back Reversing Arms. A seat back arm of a car seat.

Seat Back Round Stop. A round seat stop.

Seat Back Slats. Narrow strips of wood used to form a seat back; used chiefly for seats which are not upholstered.

Seat Back Spring. A weak spring placed in the upholstering in the back of a seat. Usually called simply back spring.

Seat Bracket (Hand Car). A wrought iron knee which supports the seat.

Seat Cover Guard Rail. A strip of wood tacked to the flap of the seat cover to keep it straight.

Seat Cushion. The upholstered part of a car seat. There is ordinarily a separate cushion for the seat and for the back. In sleeping cars the two cushions are used to form the lower berth. Two kinds of cushions are used on cars; a squab cushion, which is a loose pad and is now little used, and box cushion, which is a cushion built upon a cushion frame, with springs, etc.

Seat Division (Longitudinal Seats). A bar of wood or metal to separate the space occupied by a passenger from that adjoining it

Seat End. A frame of wood or metal at the end of a car seat which supports the arm of the occupant and to which the seat back arm is attached. Seat ends are designated as long or short, according to whether they extend entirely to the floor or are supported upon a seat stand. They are also designated as aisle seat ends, or wall seat ends, and, for corner seats, as left-hand or right-hand seat ends.

Seat End Arm. The portion of a seat end which supports the arm of a person sitting in the seat. An arm rest.

Seat End Cross Rail. The end rail between posts of a wood seat end.

Seat Front Rail. A rail fastened to the ends of the seat bearing cross bar and running along at the top of the seat front and under the front seat rail.

Seat Head End. The upper part of the seat end projecting out beyond the head rest.

Seat Hinge (Sleeping Cars). Fig. 1659. A strap hinge used to connect a seat with the seat back. See also SOFA HINGE.

Seat Joint Bolt. A bolt for fastening a seat rail to aisle seat ends. It is also used at the wall ends.

Seat Leg (Longitudinal Seats). A wooden post which supports a front seat rail.

Seat Leg Plate. A metal plate with which the front of a seat end or leg is covered to protect it from injury.

Seat Lever (Water Closet). A lever projecting backward from the seat lid, to which the connecting rod is attached.

Seat Lid (Water Closet). A cover for the seat.

Seat Lock. Figs. 1662, 1668. A lock for holding the back of a seat so that its position cannot be reversed. Such locks are attached either to the seat end, seat back arm or seat back stop. A form for iron seat ends with a small escutcheon, not provided with screw holes is sometimes distinctively called a barrel lock, although the term is almost equally applicable to any form of seat lock. Seat locks operate by pushing the key inward, turning it a little and then pulling on the key.

Seat Lock Bolt. Fig. 1668. The beveled bolt by which locking is effected.

Seat Pull (Sleeping Cars). Fig. 1672. A flush handle for pulling out the seat in making up the berth so as to drop the back and seat to the same level.

Seat Rail. One of a pair of rails, front and back, resting on and attached to the seat ends, and which support a cushion frame or seat bottom.

Seat Rail Bracket or Socket. Fig. 1665. A support for a wooden seat rail.

Seat Slat. A narrow strip of wood which forms part of a seat bottom, or seat back.

Seat Spring. Fig. 1669. A spiral or other metal spring used to give a seat elasticity. Spiral springs are the most common, the elliptic and spiral-elliptic having become nearly obsolete in new seats. A special form of seat springs called back springs, of little resistance, is used for seat backs. British seat springs are called sofa springs, and the back springs back squab sofa springs.

Seat Stand. A support on which an aisle seat end rests.

Seat Stop. See Seat Arm Stop.

Seat Webbing. Fig. 1669. A form of coarse canvas used in upholstering car seats.

Second Catch (of Car Door Fastener). A double hook or eye placed in the hasp of a car door lock in such manner that the door can, if desired, be locked, leaving a small opening for ventilation.

Second-Class Car. A plainly finished passenger car for carrying passengers who pay a lower rate of fare than first-class passengers. See First-Class Car.

Section (of a Sleeping Car). Two double berths, an upper and a lower, making up into two seats facing each other by day.

Sectional Seat Cushion. One with spiral springs separately attached to narrow slats so that the seat can be made up or repaired in sections.

Self-Clearing or Self-Cleaning Car. A car having a floor forming one or more hoppers, with doors at the bottom which, when opened, permit the load to discharge by gravity. Most hopper cars are self-clearing. See also Car.

Self-Closing Faucet or Cock. A faucet having a horizontal bar handle provided with a spring by which it is closed when released.

Self-Propelled Car. A car propelled by a motor which is carried entirely by the car itself and does not require power from any outside source. See Motor Car.

Sellers System of Screw Threads. A system of screw threads designed by William Sellers of Philadelphia. Often called Franklin Institute or United States Standard Thread. See Screw Thread.

Series. A method of connecting two or more pieces of electrical apparatus to a common circuit. The connections are made so that the negative side of one piece of apparatus is connected to the positive of the next and the full current passes successively through each piece of apparatus in the circuit.

Series-Parallel Control. The common method of controlling the speed of direct-current railway motors by connecting them first in series in pairs with external resistance in the circuit. To increase the speed the resistance is cut out by steps, and when entirely cut out the motors are then connected in parallel between the trolley and ground in circuit. The maximum speed is attained when the resistance is entirely cut out and all the motors are receiving full trolley voltage.

Series Parallel Controller. See Series Parallel Control.

Service Application. See Air Brakes.

Set (of Elliptic Springs). The amount of compression of which the spring is capable. The distance between the spring bands when unloaded. The arch is half the set, plus the thickness of the spring band.

Sextuple (Elliptic Springs). Six elliptic springs coupled together, side by side, to act as one.

Shackle Bar. A coupling link.

Shade. See Lamp Shade, Window Shade.

Shade Cap (Oil Lamp). A vertical tube extending the shade upward and constituting in effect an extension of the chimney. A similar part for a lamp globe is called a globe chimney.

Shade Roller (Window Shades). Figs. 1879, etc.; Page 1165. A device serving the purpose which its name implies; the only forms now in general use are the automatic and hold the shade in any position desired.

Shaft. That part of a machine to which motion is communicated by torsion. See Brake Shaft, Winding Shaft, etc.

Shank (of a Coupler). That part of a coupler or drawbar between the draw head and tail. The body of the coupler.

Shear Beams (Snow Plow Framing). The timbers forming the inclined plane and parting ridge of a plow. They are placed in positions so that they resemble the knives of a pair of shears, hence the name.

Shears (of a Pile Driver). The tongs which grasp the Hammer.

Sheathing. 28, Figs. 34, 35; 6, Figs. 210, 211; 26, Fig. 260; 34, Fig. 348; Figs. 1611, 1613. The side and end covering of a car. Tongued and grooved lumber is used on wooden cars and steel plates on all-steel cars. Lining is in addition to the ordinary outside sheathing. See Siding, Flooring, Roofing and Lining and Lumber Specifications.

Sheathing Furring. Wooden strips or blocks to which to nail sheathing.

Sheave. A wheel, roller or pulley, over which a cord or rope runs, or on which any object, as a door or window rolls. Sheave is often used to designate a block or pulley, but more properly it designates simply the grooved wheel in the block. See Pulley.

Sheave Hook (Derrick Cars). The hook carried at the lower end of a hoisting block, to which the load is attached.

Sheave Pin or Pintle. The axle of a sheave.

Sheet. The plates used in inclosing all types of steel cars are termed sheets, as end sheet, side sheet, roof sheet, floor sheet, etc.

Sheet Iron. Iron rolled into thin sheets.

Shelled Out (Car Wheels). A term applied to wheels which become rough from circular pieces shelling out of the tread. See Interchange of Traffic.

Shim. A thin piece of wood or metal used as a lining or filling piece.

Shipper Shaft (Steam Shovel). The shaft connected to the boom engine and geared to the ratchet beam.

Shoe. A plate, block or piece of any material on or against which an object moves, usually to prevent the latter from being worn. See also BRAKE SHOE.

Short Sill or Floor Timber. An auxiliary longitudinal timber sometimes used in a car floor, but not extending its whole length.

Shot (Chilled Car Wheels). See COLD SHOT.

Shovel. See STEAM SHOVEL.

Side Bearings. Figs. 1085-1137, etc.; Pages 1128, 1149, 1204, 1275-1277, 1286, 1314, 1316. Bearings attached to the bolsters of body, or truck, on each side of the center plate to steady the car, to prevent excessive rocking, and upsetting, while passing curves. The upper, or body side bearing, and the lower, or truck side bearing, both are usually made of box shape castings, forming large flat bearing surfaces to mate with each other.

To overcome friction between these surfaces, balls, rollers, and rockers have been used in many different ways. Such frictionless or anti-friction side bearings are ordinarily furnished complete as one device to fill the space between the two bolsters, the whole device being called either a truck or a body side bearing. If the portion containing the anti-friction member is fastened to the truck bolster, it is known as a truck side bearing; if fastened to the body bolster, it is considered a body side bearing.

See ANTIFRICTION, BALL, ROLLER AND ROCKER SIDE BEARINGS.

Side Bearing Arch or Bridge (Six-Wheel Truck). An iron bar, truss or wooden beam attached to the bolsters to support the truck side bearing.

Side-Bearing Clearance, Truck (M. C. B. Recommended Practice).

M. C. B. STANDARD

In 1914, by letter ballot, side-bearing clearance for new cars was adopted as Recommended Practice, as follows:

Advanced to Standard in 1917.

	Minimum.	Maximum.
Per side bearing	1/8 inch	5/16 inch
Total (one truck)	1/4 inch	5/8 inch

Side Bearings, Spread of (M. C. B. Recommended Practice).

In 1915 the following was adopted:

"That the side bearing spacing, center to center of side bearings, be within the limits of 48 in. to 58 in., both inclusive, on the M. C. B. design of bolster."

The report of the committee on side bearings in the Master Car Builders' Proceedings, 1900, page 165, includes a consideration of the standard spread, side bearing clearance, and tests with the weight carried on the center plate with a clearance between side bearings, and the weight distributed between the side bearings and center plates.

A committee report in the 1902 Proceedings, page 237, discusses the use of anti-friction side bearings, including reports as to their use from a number of roads.

A topical discussion on the comparative merits of the different types of bearings in service will be found in the 1904 Proceedings, page 247.

The committee report in the 1908 Proceedings, page 283, gives a synopsis of the reports submitted since the year 1900; it also includes the results of a circular of inquiry and contains detailed recommendations of the committee.

Side Bearing Truck. Figs. 976, 985. A truck in which the weight of the car is transmitted at the side instead of the center. The term balanced side bearing truck is also used to indicate that the car body is so balanced on the truck that the weight is equally distributed to all the wheels at all times.

Side Brace. 16, Figs. 34, 35; 12 and 13; Fig. 260. Commonly designated as simply BODY BRACE or BRACE, except when the end braces are to be distinguished from them.

Side Brace Rod. See BRACE ROD.

Side Casting. A CHEEK OR DRAFT CASTING.

Side Chute Plank. The planking of an inclined floor which discharges its load transversely to the car, either toward or from the middle of the car.

Side Deck Lamp. A bracket lamp fastened above the windows and to the deck sill, or to the lower deck ceiling and the deck post.

Side Door. 33, Figs. 34, 35, 871-887. Designated thus to distinguish from end doors on both freight and passenger equipment. See DOOR, and BOX CAR DOOR.

Side Door Bottom Guide. 35, Figs. 34, 35; Fig. 972. An iron bracket attached to the side of freight cars with sliding doors to guide the door while it is being opened and shut and also to prevent its swinging away from the car at the bottom.

Side Door Fixtures. See DOOR FIXTURES, BOX CAR.

Side Door Hanger. See DOOR HANGER.

Side Door Protection Strip. Fig. 967. See PROTECTION STRIP.

Side Door Stiffener. Fig. 967. See STIFFENER

Side Door Top Track. See DOOR TRACK.

Side Dump Car. Figs. 109, 111-133; Pages 1172-1173. A car so constructed that its contents may be discharged to either side or both sides of the track through doors in the car sides, or drop doors in the floor, by means of an inclined floor and side doors, or by tipping the car body sidewise. See also DUMP CAR and HOPPER CAR.

Side Eave. A term sometimes used to designate a steel plate running along the eaves or edge of the roof of a steel passenger equipment car.

Side Fascia. See FASCIA.

Side Frame. The frame which forms the side of a car body or truck. It includes the posts, braces, plate, belt rail, etc., for the car body and the side member of a truck frame. See TRUCK SIDES, CAST STEEL, SPECIFICATIONS FOR; TRUCK SIDE FRAME.

Side Furring. See FURRING.

Side Lamp. A lamp attached to the side of a passenger car in distinction from a center lamp, which hangs from the roof. They are usually made with brackets, by which they can be conveniently fastened.

Side Lamp Braces. Diagonal bars attached to a side lamp and to the side of a car to steady the lamp.

Side Lamp Holder. A metal ring or bowl-shaped receptacle usually attached to a bracket to hold a lamp.

Side Nailing Strip. 53, Figs. 34, 35. A piece of wood bolted outside the side sills of steel underframe cars to which the ends of the floor planks and the bottom ends of the sheathing are nailed. See NAILING STRIP.

Side Piece (Platform Hood). A thin block cut to the curve of the hood.

Side Plank Tie Rod. A vertical rod passing through the side sill and side planking of a wooden gondola car and tying them together.

Side Plate. 25, Figs. 34, 35; 15, Fig. 260; 41, Fig. 348. More properly, simply plate. The longitudinal member connecting the tops of the side posts of the car body. So called as distinguished from the end plate.

Side Plate Stiffening Angle (Steel Cars). An angle iron riveted to the side plate, and serving the same purpose as the stakes. Often called stake.

Side Plate Tie Rod. A rod extending across the top of the car and tying the side plates together.

Side Post. 20, Fig. 35. Vertical member used in the side framing of freight and passenger cars.

Side Post Strap Bolt. A strap bolt joining the post to the side sill.

Side Rail. A longitudinal timber extending along the top of the side frame of a coal or ore car. It rests upon posts and braces and connects with end rails, which go across the end of the car. It corresponds to the plate of a box car, but does not carry any rafters or carlines, as does a plate.

Side Seat. A longitudinal car seat, the back of which is against the side of a car.

Side Sheet. 20, Fig. 80; 4, Fig. 111. A plate used in closing in the sides of a steel car.

Side Sill. 1, Figs. 34, 35; 2, Figs. 111, 147, 210; 4, Fig. 260; 5, Fig. 348. The outside longitudinal members of the underframe. In some designs of steel cars the side sills are done away with entirely and the entire side of the car is designed as a deep plate girder to carry most of the load to the bolster.

Side Sill Flitch Plank. One of the planks which enclose the flitch plate and make up a composite or built-up side sill.

Side Sill Step. See SILL STEP and SAFETY APPLIANCES.

Side Slope. That part of the floor which slopes from the side of a hopper to the hopper door. See HOPPER SLOPE SHEET.

Side Stake. See STAKE.

Side Stake Pocket. See STAKE POCKET.

Side Stem. A bar attached to the side of a three-stem coupler to transmit part of the force to springs separate from the regular draft springs. See THREE-STEM EQUIPMENT.

Side Straps (Gondola Cars). The straps to which the end planks and sometimes also the side planks, are bolted. They are also called side plank tie straps.

Side Strut for Hopper Floor (Hopper Cars). An inclined strut or support for the hopper floor between the bolster and the end of the car, fastened to the corner of the end sill.

Siding. A side track. See below and also SHEATHING and LUMBER SPECIFICATIONS.

Siding, Flooring, Roofing and Lining (M. C. B. Standard). Figs. 2996, 2997.

In 1901 the following specifications were adopted as standard:

FLOORING

Flooring shall be of three kinds: square-edged, dressed all over; ship-lapped, dressed all over; or tongued and grooved, dressed all over, in accordance with section shown on Sheet M. C. B. 26.

In 1908 the dimensions of dressed flooring were increased ¼ in.

In 1908 a drawing was added showing details of flooring 2⅜ in. thick for use on cars for rough freight.

In 1909 drawing was revised to show flooring of 2⅜-in. finished section.

In 1912 the drawing was revised to show the under shoulder on the tongue edge set back 1/32 in.

SIDING, ROOFING AND LINING

Siding, roofing and lining shall be of the section shown on Sheet M. C. B. 26.

In 1908 drawing was revised to show separate sections for roofing and lining.

In 1912 the drawing was revised to show the under shoulder on the tongue edge set back 1/32 inch.

Signal. See BACK-UP AIR SIGNAL, and TRAIN AIR SIGNAL APPARATUS.

Signal Branch Pipe. A pipe leading from the train air signal pipe to the car discharge valve.

Signal Cord. Fig. 1982. Where the train air signal system is used a separate signal cord is used in each car and is attached to the car discharge valve; a pull on the cord releases the air in the signal pipe and blows the signal in the cab.

Signal Cord Bushing. Fig. 1976. A thimble lining a hole through a partition for a signal cord to pass through, in distinction from a signal cord guide, which it attached to the side or roof of the car or to the signal cord hanger and serves solely the purpose which its name implies. For passing the signal cord through inclined surfaces beveled bushings are used, which are frequently provided with one or more pulleys to avoid friction.

Signal Cord Coupling. Fig. 1981. The hook attached to the end of a signal cord to enable it to be connected or disconnected at pleasure with another signal cord.

Signal Cord End Hook. A common metal hook with a screw shank by which it is attached to the end of the car. The hook is used to fasten the end of a bell cord to the last car and thus hold it in its place and prevent it from being drawn out of its guides.

Signal Cord Guide. Figs. 1977-1980. A metal eye or ring attached to the roof or ceiling of a car, or to the end of a Signal Cord Hanger, and by which a signal cord is carried or conducted.

Signal Cord Hanger. Fig. 1975. A guide for the signal cord, hanging usually from the center of the clere story or upper deck.

Signal Cord Pulley or Sheave. Figs. 1977, 1980. A wheel in a signal cord guide over which a signal cord runs.

Signal Cord Sheave. A SIGNAL CORD PULLEY.

Signal Cord Splice. A metal coupling with right and left hand screws for permanently splicing the ends of a broken cord.

Signal Cord Strap. See SIGNAL CORD HANGER.

Signal Cord Thimble. See SIGNAL CORD BUSHING.

Signal Hose. An air hose similar to, but of smaller diameter than, an air brake hose, and used between cars to connect the train air signal lines.

Signal Lamp. See TAIL LAMP.

Signal Lamp Bracket. Figs. 2229-2233. A bracket attached to the car body to hold the signal lamp or marker.

Signal Lamp Socket (M. C. B. Standard). Sheet 27, Fig. 2998.

In 1903 a form of combination lamp holder and flag bracket was adopted as Recommended Practice. In 1911 the dimensions showing the slot and taper of the

socket were advanced to Standard and the bracket omitted.

Signal Light Box. Fig. 870. An electric light box which indicates to the motorman the closing of all doors.

Signal Pipe (Train Air Signal Apparatus). A continuous pipe running from car to car through the train, substantially a duplicate of the brake pipe, but working with a lower pressure of air. The signal pipe couplings are also similar to brake pipe hose couplings, but are arranged so that they will not couple with the latter.

Signal Pipe Cut-out Cock (Train Air Signal Apparatus). A cock placed at each end of every car for closing the signal pipe when desired.

Signal Pipe Strainer. Fig. 1476. Strainer used in signal pipe.

Signal Reducing Valve (Train Air Signal). Fig. 1448.

Signal Reservoir (Train Air Signal Apparatus). See WHISTLE RESERVOIR.

Signal Valve (Train Air Signal Apparatus). Figs. 1446, 1479. A valve attached to a branch from the signal pipe, which, on the opening of the car discharge valve in any car, and the consequent reduction of pressure in the signal pipe, permits the air to escape to blow the signal whistle. On motor cars this valve and whistle are placed in the cab at each end of the car.

Signal Whistle (Train Air Signal Apparatus). See WHISTLE.

Sill (Car Building). The main longitudinal timbers which are connected transversely by the end sills, body bolsters, and cross ties. Sills are divided into side sills, intermediate sills and center sills. For the splice for broken sills required by the regulations for the interchange of cars see INTERCHANGE OF TRAFFIC. See also END SILL, PLATFORM END SILL, SIDE SILL, etc.

The lower horizontal member of the frame surrounding a window or door. See DOOR SILL, WINDOW SILL.

A topical discussion on the advisability of using metal center sills in wooden car construction, will be found in the 1902 M. C. B. Proceedings, page 62. See LUMBER SPECIFICATIONS.

Sill Knee Iron. An L-shaped or right-angle iron casting or forging bolted into the inside corner of a car frame to strengthen it.

Sill and Plate Rod Washer. A large rectangular washer for the ends of the sill and plate tie rod.

Sill and Plate Tie Rod. 19, Figs. 34, 35; 14, Fig. 260. A vertical iron rod which passes through the sill and plate of a car body frame and ties the two together. A BRACE STRAINING ROD is a similar part for low passenger car trusses below the windows.

Sill Splice. See INTERCHANGE OF TRAFFIC.

Sill Splicing (M. C. B. Standard). Sheet 28. Fig. 3001.

STEEL CENTER SILLS

At the convention of 1905 the following methods for splicing of center sills on steel cars and cars constructed with steel underframes were adopted as Recommended Practice. Drawings illustrative of these methods of splicing are shown on Sheet M. C. B. 28. In 1911 these splices were advanced to Standard.

The splice for center sills, except as otherwise herein stated, to be located not less than 7 in. from either side of the body bolster, consisting of butt joints. The butt joints to be reinforced by plates on both sides to be not less than twice the length of the protruding end, but not exceeding 24 in., and not less than same thickness of web plate, with the one on the flange side of channel to include flanges, while the outside plate should only cover the web. The rivets to be spaced as shown on Figs. "A" and "B," Sheet M. C. B. 28.

Fig. "A" shows the method of splicing center sills in front of body bolster and Fig. "B" shows method of splicing center sills back of body bolster.

Fig. "C" shows method of splicing in cases where cars are damaged to such extent that the center sills have to be cut off less than 8 in. from the front side of the body bolster; this method is not recommended for sills with protruding end less than 3 in. The outside plate in this splice may be made of pressed steel or a casting. The rivets to be spaced as shown on sketch.

Fig. "D" shows the method of splicing side sills; this splice may be located on either side of the body bolster. The rivets to be spaced as shown on sketch.

In 1909 the illustrations shown on Sheet D were revised by the addition of end sills to drawing. Advanced to Standard in 1911.

In 1912 the text of standards was changed to show the limit of length of projection for splicing as 7 in.

A report of the committee on splicing passenger car sills in the 1902 M. C. B. Proceedings, page 137, is based on replies to a circular of inquiry.

The report of the committee in the 1910 M. C. B. Proceedings, page 391, is based on a circular of inquiry.

WOODEN SILLS

In 1909 the form of splice shown on Sheet M. C. B. 28 for the splicing of center sills of freight cars was adopted. Five-eighths inch diameter for bolts and 11/16 inch for bolt holes were adopted as Recommended Practice for assembling sill splices for freight cars.

The butt or step splice, without side plank, was adopted for the splicing of all freight-car sills other than center sills.

In 1911 all reference to draft sills was omitted on account of being construed in some quarters to mean draft timbers, and the illustrations advanced to Standard.

A topical discussion on the splicing of wooden sills for long passenger car equipment, will be found in the M. C. B. Proceedings, 1901, page 348.

A topical discussion on the advisability of splicing center sills on cars of 50,000 pounds or less capacity will be found in the M. C. B. Proceedings, 1906, page 348.

Sill Step (Freight Cars). 15, Figs. 34, 35; 24, Fig. 80; 6, Fig. 260. A U-shaped iron attached to the sill of a car as a step for trainmen. See SAFETY APPLIANCES.

Sill Strap Bolt. A strap bolt used to fasten the side and end sills together. When set into the sill it is called a joint bolt.

Sill Tie Rod. A transverse iron tie rod in the floor of a car for holding the sills together.

Sill Timber Key. A metal block let into a gained seat on the sills to relieve the sill bolts from shearing stresses.

Sills, Uniformity for Section of (M. C. B. Standard). In 1899 the following finished sizes for sections of longitudinal car sills were adopted as standard of the Association:

For cars such as box, stock, flat, long gondolas, refrigerators, etc., 32 ft. and over in length, but under 40 ft.:

4 "x8"	4 "x9"	4 "x10"	4½"x12"	5"x14"
4½"x8"	4½"x9"	4½"x10"	5 "x12"	
5 "x8"	5 "x9"	5 "x10"		

For cars 40 ft. long and over, such as furniture and special long gondolas:

4½"x8"	4½"x9"	5"x10"	6"x12"	6"x14"
5 "x8"	5 "x9"	6"x10"		
	6 "x9"			

It is believed that the above recommendations afford a sufficient range of sizes to cover all requirements of design; they are good merchantable sizes, and if used as suggested car repairs will be greatly expedited, as there will be less delay in getting special sizes of lumber, and requisitions for regular sizes can be filled more promptly, as lumbermen can saw in advance of orders with a reasonable certainty of selling their stock.

Single Plate Wheel. A wheel, in which the hub and rim are united by only a single plate, which is strengthened usually by ribs, called brackets, or sometimes by corrugations. See WHEEL.

Single Track Snow Plow. Fig. 444. A snow plow for use on single track railroads and so constructed that it throws the snow to both sides of the track.

Sink (Dining Car). A shallow metallic box to receive and carry off dirty water. See Fig. 1728 for sink plug.

Six-Wheel Truck. Figs. 998-1002, 1019-1032. See TRUCK.

Skid Shoe. Fig. 2708. An iron shoe used to slide broken car wheels to a side track in order to avoid blocking the road.

Slack Adjuster. Figs. 1366, 1367, etc.; 1525-1531; Pages 1120, 1121, 1182. A device for automatically taking up the slack in the foundation brake gear when normal piston travel is exceeded.

Slat. A narrow strip of board or metal.

Slat Seat. A seat composed of narrow strips of wood.

Sleeping Car. Figs. 336-351, 363, 365, 2734, 2735. A car provided with fixed seats, arranged to face each other, which can be used for day travel and at night can be made up into berths. A pair of seats, which makes a lower berth, and its corresponding upper berth, together make up a section. The mattress and bedding are carried in a pocket under the deck, the bottom of the pocket being hinged to lower and form the upper berth, while the seat cushions and backs are arranged on the seat frame to form the lower berth. See Figs. 1458, 1459.

Most of the sleeping cars in the United States are owned and operated by the Pullman Company and hence are often referred to simply as Pullman cars. The Pullman sleeping cars are commonly referred to either as standard or tourist cars.

EMIGRANT SLEEPING CARS, COLONIST CARS and TOURIST SLEEPING CARS resemble standard sleeping cars, but are without such expensive upholstery. Compartment sleeping cars are divided into compartments, generally with one upper and one lower berth in each. A corridor runs along the side of the car. See also CAR.

Sleeping Car Seat. Figs. 1626, 1627.

Sleeping Car Section. Figs. 1626, 1627. The space in a sleeping car occupied by two double seats in daytime and by two berths (a lower berth and its corresponding upper berth) at night.

Slewing Gear (Pile Driver). The means for causing the swinging platform to revolve.

Slewing Rings (of a Derrick). Rings attached to the upper end of the boom for attaching a rope by which to move or steady it when loaded.

Slide Valve (Triple Valve). 3, Fig. 1382-A. A plain slide-valve, controlled in its motion by the piston, by means of which the air is admitted to, and exhausted from, the brake cylinder, applying and releasing the brake.

Slide Valve Feed Valve. See FEED VALVE.

Slide Valve Spring (Triple Valve). 6, Fig. 1382-A.

Slideover Seat. See WALKOVER SEAT.

Sliding Chair. Figs. 1298, 1336. A casting attached to a brake beam which slides on an inclined member in such a way as to secure a proper adjustment of the brake shoe as it wears.

Sliding Door. Figs. 821-845, 871-887. A door which opens by sliding sideways instead of swinging on hinges. Such doors are almost universally used on freight cars; also on baggage, express and postal cars, subway trains and tunnel cars. They are hung by hooks called the door hangers, which slide on a top door track. See also CAR DOOR HANGER.

Sliding Door Bracket. A DOOR BRACKET.

Sliding Door Curtain. Fig. 587. A curtain which automatically rolls up when a sliding door is opened. Used to darken the motorman's cab on electric cars.

Sliding Door Friction Roller. A small wheel attached to the top or bottom of a sliding door to make it run easily. It may or may not carry the weight of the door.

Slip Case (Postal Car). Fig. 1907. A small pigeon hole case for use on a postal car.

Sloped Floor Sheet. See HOPPER SLOPE SHEET.

Smoke Bell. A cover or screen of glass, porcelain or metal, shaped somewhat like a bell, and placed over a lamp to protect the ceiling of a car or room. Large smoke bells are often called canopies.

Smoke Bell Bracket. A separate carrier for a smoke bell.

Smoke Bell Stem. A tube attached to the upper part of a smoke bell and serving to carry away the gases so as to bring the smoke bell lower and nearer to the lamp.

Smoke Flue. A smoke pipe.

Smoke Jack. 20, Fig. 260. A term commonly applied to the outside portion of a smoke flue when used on caboose and work cars.

Smoke Pipe (Heaters). The pipe by which the smoke is conducted to the outside of the car, usually called stove pipe, but the stove pipe of heaters is called a smoke pipe or smoke flue, to distinguish it from the air pipes.

Smoke Pipe Cap. A covering on top of the smoke pipe to exclude rain and wind. Also called jack.

Smoke Pipe Casing (Heaters). An outside pipe which incloses a smoke pipe, leaving a space between the two through which air is admitted from the top and is thus warmed.

Smoke Screen (Baker Heaters). A conical-shaped box, the front of which is the feed door and the bottom of which is the hole through which the coal enters the fire pot, and which is covered by the safety plate.

Smoke Top (Baker Heaters). The upper part of the heater, made of Russia iron, in a conical form.

Smoking Car. A passenger car reserved for smokers. Combination cars frequently have a smoking compartment. See CAR.

Smoking Room (Sleeping Cars). A compartment now almost universal in modern sleeping cars and parlor cars.

Snatch Block. Properly a single block which has an opening (notch) in one cheek to receive the rope. The snatch block is usually provided with a swivel hook. The term is also popularly applied to any form of single block provided with a hook, although more properly it applies to only one with an opening at the side for readily inserting or removing the rope.

Snow Flanger. See FLANGER.

Snow Plow. Figs. 444-449. A car so constructed that it will remove snow from railroad tracks. Snow plows are generally of either the wedge or rotary types. What is frequently called a wedge plow has a wedge-shaped front end, and is pushed through the snow by a locomotive. A wing-elevator snow plow has large wings which may be swung out by means of compressed air. Such a plow clears a wider space than one without the wing-elevator, and the sloped surfaces on the wings throw the snow well clear of the track. Snow plows are usually equipped with FLANGERS. See DOUBLE TRACK SNOW PLOW, SINGLE TRACK SNOW PLOW.

A rotary snow plow (Fig. 449) has at the front end a wheel, set at right angles to the track, and furnished with blades. This wheel is driven through a horizontal shaft by a steam engine located on the car and when the whole machine is pushed forward by a locomotive the blades cut the snow from before the plow and discharge it through a chute to one side of the track.

Snow Scraper. A Flanger.

Snow Sweeper. Figs. 461, 462. A car equipped with brushes, near the rails, and the necessary machinery to revolve them. Used for sweeping snow from railroad tracks. See Sweeping Car.

Soap. See LIQUID SOAP FIXTURE.

Soap Dish. Figs. 1731, 1732.

Soap Holder. A soap dish attached to a partition like a bracket. See LIQUID SOAP FIXTURE.

Socket, Signal Lamp. See SIGNAL LAMP SOCKET.

Socket Washer. A large washer with a cavity to receive the head or nut of a bolt or rod so that it will not project beyond the surface of the wood to which it is attached. Also called cup washer.

Sofa (Sleeping Cars). A longitudinal seat which makes up as a berth by pulling out sidewise so as to drop the back. Now used only in staterooms.

Sofa Arm Rest Bolt. Figs. 1644, 1645.

Sofa Arm Rest Fixtures. Fig. 1644-1652.

Sofa Back Leg Socket. Fig. 1649.

Sofa Back Pivot Hinge and Bushing. Fig. 1648.

Sofa Bolt (Sleeping Cars). Fig. 1644. A sliding bolt used for holding a sofa in its place. It is operated from the front by a sofa pull working through a sofa crank. Sofas standing against the side of the cars are now little used.

Sofa Caster. Fig. 1652. See CASTOR.

Sofa Hinge. A hinge by which the seat and back of a sofa are fastened together so that they can be changed from a sofa to a bed.

Sofa Rail End and Socket. Fig. 1650.

Solenoid. A coil of insulated copper wire wound on a spool which, when the electric current flows through it, may draw or attract an iron rod, core or plunger into its interior. A modified form of electro magnet. Used as a means for operating regulators, switches and other electrical apparatus.

Solid Bottom Gondola Car. A gondola car without openings in the floor or bottom for discharging the load. See also CAR.

Spanner. A wrench for uncoupling hose, etc., formed like the arc of a circle, with notches or lugs for engaging in dogs or grooves on a spanner nut. An ordinary wrench is termed a spanner in Great Britain.

Spark Strip. A filling strip placed between a box car side door and the car to prevent the entrance of sparks or cinders.

Specifications. A committee of the M. C. B. Association was asked to standardize the forms for specifications and tests of materials. Its reports will be found in the M. C. B. Proceedings, 1913, page 582; 1914 Proceedings, page 357; 1915 Proceedings, page 371; and 1916 Proceedings, page 466.

Specification for Cast Steel Truck Sides. See TRUCK SIDES, CAST STEEL, SPECIFICATIONS FOR.

Specifications for Tank Cars. See TANK CARS, SPECIFICATIONS FOR

Specifications for Wheels. See WHEELS, SPECIFICATIONS FOR.

Speed Recorder. Figs. 2017-2020. A device, usually driven from an axle, which records the speed of a train. Its use is confined practically to official cars, dynamometer cars and locomotives.

Spiral Elliptic Sea Spring. A spring made of a thin band of steel wound in a spiral coil, the transverse section of which is elliptic.

Spiral Seat Spring. The common form of Seat Spring.

Spiral Spring. See HELICAL SPRING.

Spiral Spring Cap. A casting or plate which forms a bearing for the top of a spiral spring, and which also holds it in its place. A similar seat is used at the other end.

Spittoon. See CUSPIDOR.

Splice Plate. Fig. 970. A plate used to fasten the ends of two members of a frame together, so that they make a continuous member.

Splice Shoe. Page 1193.

Splicing Sills. See SILL SPLICING.

Split Key. Page 1151. A form of pin which is self-fastening, consisting essentially of two parallel strips or bars of metal, which, when united, constitute one pin, but the ends of which may be forced apart to prevent the pin being withdrawn. See COTTER PIN.

Spoke. One of the radial arms which connect the hub with the rim of a wheel.

Spoke Wheel. A wheel, the rim or tire of which is connected with the hub by spokes instead of one or more plates. See WHEEL.

Spool (of Hoisting Gear). The drums on which the hoisting rope or chain is wound.

Spraying Car. Fig. 428. A car equipped with a tank and spraying apparatus to spray the roadbed with various chemicals to kill weeds, prevent dust, and by using a mixture having a strong odor, keeping cattle away from the tracks.

Spreader. See BALLAST PLOW.

Spring. Figs. 1178-1198; Pages 1127, 1175, 1239, 1248, 1282, 1283, 1292. Elliptic springs. Figs. 1178-1188. An

elastic body to resist concussion. Springs are also used to produce motion in a reverse direction to that caused by some other applied force, as a brake spring and the spring of a door latch. The leading forms of springs are ELLIPTIC SPRINGS and SPIRAL or HELICAL SPRINGS. Spiral springs are designated according to the number combined one within the other, as double coil, triple coil, etc., or if the springs are placed side by side, as two group, four group, six group, etc.; elliptic springs, according to the number united to work together as one spring, are designated as double or duplicate, triple or triplicate, quadruple, quintuple and sextuple. The main springs about a car are nearly all spiral springs, except that elliptic springs are almost exclusively used for the bolster springs of passenger cars.

The principal springs of a car supporting its weight are the bolster springs, also called bearing springs or body springs. Equalizing bar or equalizer springs are used in addition on passenger cars, as also sometimes journal springs. Side journal springs are used on street cars, and are sometimes key-shaped or spool-shaped. See DRAFT SPRINGS, SPRING DAMPENER.

A topical discussion on truck springs on journal boxes rather than under the bolsters will be found in the 1907 M C. B. Proceedings, page 341.

Spring Band (Elliptic Springs). A wrought iron strap which embraces the plates at the center.

Spring Block. See EQUALIZER SPRING BLOCK.

Spring Buffer. See BUFFER.

Spring Cap. X, Fig. 980; 72 and 75, Fig. 1003. A cup-shaped piece of cast or wrought iron for holding the top of a spring and against which the latter bears. They are further distinguished by the name of the spring, as bolster spring cap, etc. The spring seat comes below the spring, but both these parts are very commonly called spring plates, especially in large group springs.

Spring Caps for Freight Car Trucks. See SPRINGS and SPRING CAPS FOR FREIGHT CAR TRUCKS.

Spring Controller. A telescopic band which guides or keeps coil springs in proper position.

Spring Dampener. Figs. 1191, 1196, 1198. A device to increase the capacity of a spring by bringing into play a certain amount of friction which helps to absorb the load or shock, the friction increasing at a greater rate than the load as the latter increases. Some spring dampeners are intended to retard the sharp vibration of a coil spring and make its motion more like that of an elliptic spring. See also FRICTION DRAFT SPRING.

Spring Door Latch. A latch, the bolt of which is thrown into contact with a catch by a spring, and is disengaged by a knob or handle. Such latches are not arranged so as to be fastened with a key. See LATCH.

Spring Door Lock. A lock usually called a night latch.

Spring Edge (Car Upholstery). A term applied to a method of upholstery which protects the frame work entirely by springs, so that it is not felt by the occupant of the seat.

Spring Hanger. See SWING HANGER.

Spring Hinge. Fig. 1983. A hinge fitted with a spring to make the door self-closing. A double acting spring hinge is one which will permit the door to open either way and also to make it self-closing.

Spring Plank. G, Fig. 980; 43, Fig. 1003; Figs. 265, 1143; Page 1262. A transverse member underneath a truck bolster and on which the bolster springs rest. Also called sand plank. A Spring Plank Safety Hanger passes under the spring plank. A swing spring plank is used in passenger and other Swing Motion Trucks. In rigid bolster trucks the spring plank is bolted to the lower arch bar of the truck frame.

Spring Plank Bearing. 44, Fig. 1003. A casting on which a spring plank rests.

Spring Plank Bolt. A horizontal bolt connecting the spring plank and truck columns. Rivets are also used.

Spring Plank Safety Hanger (Passenger Equipment Trucks). 45, Fig. 1003. A U-shaped strap of iron attached to the transoms, and passing under the spring plank, so as to hold it up in case the swing hangers or their attachments should break.

Spring Plate. A spring seat or cap.

Spring Pocket or **Strap Drawbar.** A drawbar with a rectangular strap or "pocket" at the back end, in which the draft spring is placed.

A topical discussion on spring pockets for freight cars will be found in the M. C. B. Proceedings, 1904, page 251.

Spring Seat. 73 and 74, Fig. 1003; Pages 1174, 1177. A cup-shaped piece of cast or wrought iron, on which the bottom of a spring rests. See SPRING PLATE. They are further distinguished by the name of the spring for which they serve, as bolster spring seat, equalizer spring seat, etc.

Springs, Elliptical, Specifications for. (M. C. B. Recommended Practice.)

In 1917 the following specifications for elliptical springs were adopted as Recommended Practice:

1. *Scope.*—These specifications cover all elliptical springs.

I. MANUFACTURE

2. *Process.*—The steel may be made by the open-hearth, crucible or electric process.

3. *Bands.*—The bands of the springs shall be made of wrought iron conforming to the requirements of the M. C. B. Specifications for Refined Wrought-iron Bars, or if agreed upon, they may be made of "dead-soft" open-hearth steel, the carbon content of which shall not exceed 0.15 per cent. Bands of special design, subject to agreement between the manufacturer and the purchaser, may be made of cast steel conforming to the requirements of the M. C. B. Specifications for Steel Castings.

II. CHEMICAL PROPERTIES AND TESTS

4. *Chemical Composition.*—The steel shall conform to the requirements of the M. C. B. Specifications for Carbon Steel Bars for Railway Springs.

5. *Chemical Analysis.*—Ladle and check analysis shall be made in accordance with the requirements of the M. C. B. Specifications for Carbon Steel Bars for Railway Springs.

6. *Number of Analyses.*—One analysis shall be made from each lot of 500 springs or less.

7. *Drillings for Analysis.*—Drillings for analysis shall be taken from pieces sheared from the bars during the process of manufacture, and not from the finished product, unless otherwise agreed upon.

III. PHYSICAL PROPERTIES AND TESTS

8. *Physical Tests: Compression Method.*—(a) When the "compression" method is to be used, the properties specified in paragraphs (b), (c) and (d), modified if necessary to conform to the requirements of the appendix, shall be determined in the order

specified. The spring shall not be rapped or otherwise disturbed during the test. The ends of the half-elliptic springs shall be supported on roller or swing bearings.

(b) *Free Height.*—The free height is the height of the spring after a test load of one and one-half times the specified working load has been applied and fully released.

(c) *Loaded Height and Loaded Length.*—The loaded height and the loaded length are respectively the height and length when the specified working load is applied. The load shall be applied gradually and in such a way that the specified working load shall not be exceeded. If it is exceeded, the load shall be released to not more than one-half the specified working load and then increased to the specified working load. The loaded height shall not be less, but may be ⅜ in. more than that specified. The loaded length shall not vary more than ¼ in. from that specified.

(d) *Permanent Set.*—The permanent set is the difference, if any, between the free height and the height after the test load of one and one-half times the specified working load has again been applied and fully released. The following two requirements shall be met:

(1) The permanent set shall not exceed 1/32 in.

(2) If there is any permanent set not exceeding 1/32 in., the difference between the free height and the height after the test load of one and one-half times the specified working load has been applied and fully released two additional times, shall not be greater than the permanent set first measured.

9. *Physical Tests: Release Method.*—(a) When the "release" method is specified the properties specified in paragraphs (b), (c) and (d), modified if necessary to conform to the requirements of the appendix, shall be determined in the order specified. The spring shall not be rapped or otherwise disturbed during the test. The ends of the half-elliptic springs shall be supported on roller or swing bearings.

(b) *Free Height.*—The free height is the height of the spring after a test load of one and one-half times the specified working load has been applied and fully released.

(c) *Loaded Height and Loaded Length.*—The loaded height and loaded length are respectively the height and length when a test load of one and one-half times the specified working load has been applied and is slowly released to the specified working load. If released to less than the specified working load, the load shall again be raised to one and one-half times the specified working load and then released to the specified working load. The loaded height shall not be more, but may be ⅜ in. less than that specified. The loaded length shall not vary more than ¼ in. from that specified.

(d) *Permanent Set.*—The permanent set is the difference, if any, between the free height and the height after the test load of one and one-half times the specified working load has again been applied and fully released. The following two requirements shall be met:

(1) The permanent set shall not exceed 1/32 in.

(2) If there is any permanent set not exceeding 1/32 in., the difference between the free height and the height after the test load of one and one-half times the specified working load has been applied and fully released two additional times, shall not be greater than the permanent set first measured.

10. *Number of Tests.*—(a) From each lot of springs which has met the requirements of Sections 11 and 13 the purchaser or his representative may select for physical tests at least 25 per cent to be tested in accordance with the "compression" method of Section 8, or, if specified, in accordance with the "release" method of Section 9 and the appendix.

(b) If any of the springs representing a lot fail to meet the requirements as to physical properties specified in Sections 8 or 9, as required, but at least one-half of the springs representing a lot do meet these requirements, each spring of the lot shall be tested, and those which meet the requirements shall be accepted. If more than one-half of the springs representing a lot fail to meet the requirements specified in Sections 8 or 9, as required, the lot represented will be rejected.

IV. PERMISSIBLE VARIATIONS

11. *Permissible Variations.*—The bars shall conform to the limits for spring steel bars as shown in the M. C. B. Specifications for Spring Steel Bars for Railway Springs.

V. WORKMANSHIP

12. *Springs.*—The purchaser or his representative may examine all springs in each lot for workmanship and general dimensions.

13. *Bands.*—The bands of the springs shall not vary from the specified dimensions more than 1/16 in. in width and 1/32 in. in thickness of straps, nor more than ⅛ in. in width across the spring.

VI. MARKING

14. *Marking.*—(a) The name or brand of the manufacturer, the year and month of manufacture, and, if specified, the purchaser's class number, shall be legibly stamped on each spring at a place not detrimental to the life or service of the spring.

(b) Any stamping by the inspector shall be so placed as not to be detrimental to the life or service of the spring.

VII. INSPECTION AND REJECTION

15. *Inspection.*—(a) The inspector representing the purchaser shall have free entry, at all times while work on the contracts of the purchaser is being performed, to all parts of the manufacturer's works which concern the manufacture of the springs ordered. The manufacturer shall afford the inspector, free of cost, all reasonable facilities and necessary assistance to satisfy him that the springs are being furnished in accordance with these specifications.

(b) The purchaser may make the tests to govern the acceptance or rejection of the material in his own laboratory or elsewhere. Such tests, however, shall be made at the expense of the purchaser.

(c) All tests and inspection shall be so conducted as not to interfere unnecessarily with the operation of the works.

16. *Rejection.*—(a) Material represented by samples which fail to conform to the requirements of these specifications will be rejected.

(b) Individual springs which, subsequent to the above tests at the mills or elsewhere and their acceptance, show defects or imperfections will be rejected and shall be replaced by the manufacturer.

17. *Rehearing.*—Samples tested in accordance with Section 4, which represent rejected material, shall be held for two weeks from the date of test report. In case of dissatisfaction with the results of tests, the manufacturer may make claim for a rehearing within that time.

18. *Reworking.*—Any springs which fail to meet the requirements of the physical tests or conform to the specified dimensions may be again submitted after being reworked.

APPENDIX

**Important Note.*—The stress at 127,500 lb. per sq. in., referred to in Section 19-(a), is given solely as a limiting stress not to be exceeded in testing by the methods covered by the specifications. It is not intended as a guide in the design of springs, as the proper working fiber stress will depend on the class and design of the spring and on the service for which it is intended.

TEST FIBER STRESS

19. (a) The properties and methods of testing specified in Sections 8 and 9 have been established for carbon-steel springs on the assumption that the maximum fiber stress under test shall not exceed 127,500 lb. per sq. in.*

(b) For alloy-steel springs, practice has not been sufficiently well established to enable definite fiber stresses to be given. Unless otherwise agreed upon by the manufacturer and the purchaser, alloy-steel springs shall be tested under the conditions as to fiber stress specified for carbon-steel springs.

RELATION BETWEEN FIBER STRESS AND LOAD

20. To find the maximum loads under which the conditions of Section 19-(a) are fulfilled, the following formula shall be used:

$$P = \frac{2\,S\,n\,b\,h^2}{3\,L} \quad \ldots\ldots\ldots\ldots\ldots (*)$$

Where P = the load in lb.; S = the stress of the most strained fiber in lb. per sq. in.; n = the number of plates in half-elliptic springs, or half the number of plates in full elliptic springs; b = the width of each plate in inches; h = the thickness of each plate in inches; and L = the distance between supports, in inches, when the spring is loaded.

TEST OF SPRINGS NOT IN ACCORDANCE WITH PRECEDING RULES

21. If it is desired to purchase under these specifications springs in which the maximum fiber stress exceeds that specified in Section 19-(a), the tests shall be made as specified in Sections 8 or 9, except that the test load to be applied shall not be one and one-half times the specified working load, but shall be the load which corresponds to the fiber stress of 127,500 lb. per sq. in., as determined by equation (*).

TEST OF SPRINGS FOR WHICH NO WORKING LOAD IS SPECIFIED

22. If springs are ordered to free height and length only, and no working load and no loaded dimensions are specified, the tests specified in Sections 8 or 9 shall be made, using instead of the "specified working load" the load which corresponds to a fiber stress of 75,000 lb. per sq. in., as determined by equation (*).

TABLE TO FACILITATE CALCULATIONS

23. Table 1 appended is arranged to facilitate the calculations necessary to determine whether a spring can be tested in accordance with the specifications without exceeding the stress given in Section 19-(a). The table shows, for various lengths and for various thicknesses of plate, the loads per inch of effective width of spring corresponding to a fiber stress of 127,500 lb. per sq. in. These are the maximum allowable test loads and shall not be exceeded in any tests.

The loads are given per inch of effective width of spring. The effective width of spring is understood to mean the width of the individual plate multiplied by the number of plates as defined in Section 20. Consequently the total load in pounds for any spring is found by multiplying the value from Table 1 by the product of the width of plate into the number of plates.

TABLE No. 1.

TEST LOADS FOR ELLIPTIC SPRINGS IN POUNDS PER INCH OF EFFECTIVE WIDTH, WHICH WILL CORRESPOND TO A MAXIMUM FIBER STRESS OF 127,500 LB. PER SQ. IN.

Length of Spring, In.	Thickness of Plate, In.						
	3/16	1/4	5/16	3/8	7/16	1/2	9/16
20	150	265	...	...	...	...	...
22	136	241	377	...	...	...	...
24	125	221	345	497	...	...	...
26	115	204	319	460	625	...	...
28	107	190	296	427	581	760	...
30	100	177	277	398	543	707	896
32	...	166	259	374	509	665	840
34	...	156	244	351	479	625	791
36	...	148	230	332	452	590	748
38	...	140	218	314	429	560	708
40	...	133	208	298	407	531	673
42	...	126	198	284	388	506	640
44	...	...	189	272	370	483	612
46	...	...	180	260	354	462	585
48	...	...	...	249	339	443	561
50	...	...	...	239	325	425	538
52	...	...	...	...	313	409	518
54	...	...	...	...	302	394	499
56	...	...	...	...	...	380	481
58	...	...	...	...	...	366	465
60	...	...	...	...	...	354	450

Springs, Helical, Specifications for (M. C. B. Recommended Practice).

In 1914 by letter ballot specifications for helical springs for passenger and freight equipment cars were adopted. Advanced to Standard in 1916. Revised in 1917.

1. *Scope.*—These specifications cover all helical springs.

I. MANUFACTURE

2. *Process.*—The steel may be made by the open-hearth, crucible or electric process.

II. CHEMICAL PROPERTIES AND TESTS

3. *Chemical Composition.*—The steel shall conform to the requirements of the M. C. B. Specifications for Carbon Steel Bars for Railway Springs.

4. *Chemical Analyses.*—Ladle and check analyses shall be made in accordance with the requirements of the M. C. B. Specifications for Carbon Steel Bars for Railway Springs.

5. *Number of Analyses.*—One check analysis may be made by the purchaser from each 20,000 lb. or fraction thereof of each diameter of wire.

6. *Sample for Analysis.*—(a) If the section is large, a specimen weighing about ½ lb. shall be cut from any part of the spring, or if the spring is small, the entire spring may be taken. If the sample is cut off hot, it shall be cooled in such a way as not to harden it. The inspector shall stamp the sample with his private mark as soon as it is cut off.

(b) The drillings for check analysis shall be made

from the sample so selected; the drill to be approximately one-half the diameter of the wire. The drillings shall be mixed from the total drillings obtained by passing entirely through the section of the wire.

III. PHYSICAL PROPERTIES AND TESTS

7. *Physical Tests.*—(a) The properties specified in paragraphs (b), (c), (d) and (e), modified, if necessary, to conform to the requirements of the appendix, shall be determined in the order specified. The spring shall not be rapped or otherwise disturbed during the test.

(b) *Solid Height.*—The solid height is the perpendicular distance between the plates of the testing machine when the spring is compressed solid with a test load of at least one and one-quarter times that necessary to bring all coils in contact. The solid height shall not vary more than ⅛ in. from that specified.

(c) *Free Height.*—The free height is the height of the spring when the load specified in paragraph (b) has been released, and is determined by placing a straight-edge across the top of the spring and measuring the perpendicular distance from the plate on which the spring stands to the straight-edge at the approximate center of the spring. The free height shall not vary more than ⅛ in. from that specified.

(d) *Loaded Height.*—The loaded height is the difference between the plates of the testing machine when the specified working load is applied. The loaded height shall not vary more than ⅛ in. over nor more than 1/16 in. under that specified.

(e) *Permanent Set.*—The permanent set is the difference, if any, between the free height and the height after the spring has been compressed solid three times in rapid succession, with the test load specified in paragraph (b), measured at the same point and in the same manner. The permanent set shall not exceed 1/32 in.

8. *Number of Tests.*—(a) A lot for physical test shall consist of not more than 500 individual coils, regardless of the grouping.

(b) From each lot of springs which has met the requirements of Sections 10 and 11, the purchaser or his representative may select for physical test at least 10 per cent, to be tested in accordance with the requirements of Section 7 and the appendix.

9. *Retests.*—If any of the springs representing a lot fail to meet the requirements as to physical properties specified in Section 7, but at least one-half of the springs representing a lot do meet these requirements, each spring of the lot shall be tested, and those which meet the requirements shall be accepted. If more than one-half of the springs representing a lot fail to meet the requirements specified in Section 7, the lot will be rejected.

IV. PERMISSIBLE VARIATIONS

10. *Bars.*—The gage of the bars shall be within the limits as specified in the M. C. B. Specifications for Carbon Steel Bars for Railway Springs.

11. *Springs.*—(a) The outside dimensions of the springs, excepting the height, shall not vary more than 1/16 in. from that specified.

(b) When under the specified working load, at the loaded height, the spring shall be of uniform pitch within 15 per cent of the diameter of the wire throughout the length of the bar, excluding the tapered section.

V. WORKMANSHIP

12. *Workmanship.*—The springs shall be of a uniform pitch, with the ends tapered to give a reasonably square, firm bearing. The points of the bars shall not protrude beyond the outside diameter of the springs.

VI. MARKING

13 *Marking.*—(a) The name or brand of the manufacturer, the year and month of manufacture and, if specified, the purchaser's class number, shall be legibly stamped on each spring at a place not detrimental to the life of the spring.

(b) Any stamping by the inspector shall be so placed as not to be detrimental to the life or service of the spring.

VII. INSPECTION AND REJECTION

14. *Inspection.*—(a) The inspector representing the purchaser shall have free entry, at all times while work on the contract of the purchaser is being performed, to all parts of the manufacturer's works which concern the manufacture of the springs ordered. The manufacturer shall afford the inspector, free of cost, all reasonable facilities and necessary assistance to satisfy him that the springs are being furnished in accordance with these specifications.

(b) The purchaser may make the tests to govern the acceptance or rejection of the material in his own laboratory or elsewhere. Such tests, however, shall be made at the expense of the purchaser.

(c) All tests and inspection shall be so conducted as not to interfere unnecessarily with the operation of the works.

15. *Rejection.*—(a) Material represented by samples which fail to conform to the requirements of these specifications will be rejected.

(b) Individual springs which, subsequent to the above tests at the mills or elsewhere and their acceptance, show defects or imperfections will be rejected and shall be replaced by the manufacturer.

16. *Rehearing.*—Samples tested in accordance with Section 3, which represent rejected material, shall be held for two weeks from the date of test report. In case of dissatisfaction with the results of tests, the manufacturer may make claim for a rehearing within that time.

17. *Reworking.*—Any springs which fail to meet the requirements of the physical tests or conform to the specified dimensions may be again submitted after being reworked.

APPENDIX

**Important Note.*—The stress of 90,000 lb. per sq. in., referred to in Section 18 (a), is given solely as a limiting stress not to be exceeded in testing by the methods covered by the specifications. It is not intended as a guide in the design of springs, as the proper working fiber stress will depend on the class and design of the spring and on the service for which it is intended.

TEST FIBER STRESS

18. (a) The properties and methods of testing specified in Section 7 have been established for carbon-steel springs on the assumption that the maximum fiber stress under test shall not exceed 90,000 lb. per sq. in.*

(b) For alloy-steel springs, practice has not been sufficiently well established to enable definite fiber stresses to be given. Unless otherwise agreed upon by the manufacturer and the purchaser, alloy-steel

springs shall be tested under the conditions, as to fiber stress, specified for carbon-steel springs.

RELATION BETWEEN FIBER STRESS AND LOAD

19. To find the maximum load under which the conditions of Section 18 (a) are fulfilled, the following formula shall be used:

$$P = \frac{3.1416\ S\ d^3}{8\ M} \ldots\ldots\ldots\ldots\ldots (*)$$

Where P = the load in pounds, S = the stress of the most strained fiber in pounds per sq. in., d = the diameter of the bar in inches, and M = the mean diameter of the helix in inches; this is found by subtracting the diameter or thickness of the bar from the outside diameter of the spring.

TEST OF SPRINGS NOT IN ACCORDANCE WITH PRECEDING RULES

20. If it is desired to purchase under these specifications springs in which the maximum fiber stress exceeds that specified in Section 18 (a), the tests shall be made as specified in Section 7, except that the maximum test load to be applied in determin the properties specified in Section 7 (b) and (e) shall not be sufficient to compress the spring solid, but shall be the load which corresponds to a fiber stress of 90,000 lb. per sq. in., as determined by equation (*).

TABLE TO FACILITATE CALCULATIONS

21. Table 1 appended is arranged to facilitate the calculations necessary to determine whether a spring can be tested in accordance with the specification without exceeding the stress given in Section 18 (a). The table shows the loads at which springs of various sizes are stressed to 90,000 lb. per sq. in. These are the test loads to be used for springs tested in accordance with Section 20. In testing in accordance with Section 7 (b), the load given in Table 1 for the given size of spring shall not be exceeded, unless with this load the spring is compressed solid.

TABLE No. 1.

TEST LOADS FOR HELICAL SPRINGS, IN LB., WHICH WILL CORRESPOND TO A MAXIMUM FIBER STRESS OF 90,000 LB. PER SQ. IN.

Outside Diameter of Spring, In.	DIAMETER OF BAR, INCHES.																					Outside Diameter of Spring, In.
	5/16	3/8	7/16	1/2	9/16	5/8	11/16	3/4	13/16	7/8	15/16	1	1 1/16	1 1/8	1 3/16	1 1/4	1 5/16	1 3/8	1 7/16	1 1/2	1 9/16	
2	640	1,145	1,895	2,950																		2
2¼	555	995	1,630	2,530	3,730																	2¼
2½	495	880	1,310	2,215	3,250	4,620																2½
2¾	445	785	1,180	1,970	2,880	4,080	5,580															2¾
3	400	710	1,070	1,770	2,580	3,650	4,980	6,630														3
3¼		650	985	1,610	2,340	3,300	4,500	5,970	7,800													3¼
3½			910	1,475	2,140	3,010	4,100	5,420	7,080	9,020												3½
3¾				1,360	1,970	2,770	3,750	4,970	6,450	8,250	10,390											3¾
4				1,265	1,830	2,560	3,470	4,600	5,950	7,590	9,550	11,800										4
4¼					1,710	2,390	3,230	4,260	5,540	7,030	8,830	10,880	13,270									4¼
4½					1,600	2,230	3,020	3,980	5,150	6,550	8,200	10,100	12,350	14,900								4½
4¾						2,100	2,830	3,730	4,830	6,120	7,680	9,450	11,500	13,850	16,700							4¾
5						1,980	2,670	3,510	4,540	5,750	7,200	8,850	10,750	12,950	15,600	18,500						5
5¼							2,520	3,310	4,290	5,410	6,780	8,330	10,120	12,150	14,650	17,300	20,200					5¼
5½							2,390	3,140	4,050	5,130	6,400	7,880	9,580	11,500	13,800	16,300	19,100	22,700				5½
5¾								2,980	3,850	4,870	6,070	7,450	9,050	10,850	13,050	15,400	18,000	21,400	24,000			5¾
6								2,840	3,660	4,630	5,770	7,080	8,600	10,300	12,350	14,600	17,000	20,300	23,200	26,600	30,400	6
6¼									3,500	4,410	5,500	6,740	8,220	9,800	11,750	13,850	16,450	19,300	21,500	25,200	28,800	6¼
6½									3,340	4,220	5,250	6,440	7,850	9,350	11,200	13,200	15,400	18,300	20,500	24,000	27,400	6½
6¾										4,040	5,030	6,150	7,500	8,950	10,700	12,600	14,700	17,500	19,300	22,800	26,100	6¾
7										3,870	4,820	5,900	7,180	8,550	10,200	12,050	14,000	18,700	18,000	21,800	24,800	7
7½											4,450	5,450	6,620	7,880	9,450	11,100	12,850	15,300	17,100	19,800	22,800	7½
8													6,150	7,300	8,730	10,250	11,900	14,150	15,800	18,400	21,000	8
8½													5,730	6,800	8,150	9,550	11,100	13,100	14,700	17,100	19,500	8½
9														6,380	7,620	8,950	10,350	12,250	13,700	15,900	18,200	9
9½															7,150	8,400	9,730	11,550	12,800	14,900	17,000	9½
10																7,920	9,180	10,850	12,000	14,100	16,000	10
10½																	8,700	10,300	11,400	13,300	15,100	10½
11																		9,750	10,850	12,600	14,300	11
11½																			10,300	12,000	13,600	11½
12																				11,400	12,900	12

Springs and Spring Caps for Freight-Car Trucks (M. C. B. Standard). (Sheet M. C. B.—31.) Figs. 3021-3023.

In 1898 detail designs of spring coils and caps suitable therefor were adopted as Recommended Practice, and were then shown on Sheet M. C. B.—J.

In 1901 a committee presented revised drawings with full details and specifications. They were submitted to letter ballot and adopted as Recommended Practice, and are now shown on Sheet M. C. B.—31.

In 1901 designs with full details and specifications for springs for 100,000 lb. capacity cars were presented, and as a result of letter ballot were adopted as Recommended Practice. See Sheet M. C. B.—31.

In 1912 the form of spring caps was changed. Revised 1913.

In 1914 by letter ballot design of springs for cars of 140,000 lb. capacity were adopted as shown on Sheet M. C. B.—H-1.

In 1915 these items were advanced to Standard.

Springs, Specifications for Carbon Steel Bars for Railway Springs (M. C. B. Standard).

In 1916 the following Specifications were adopted as Recommended Practice for Carbon Steel Bars for Railway Springs. Advanced to Standard in 1917.

1. *Scope.*—(a) These specifications cover two classes of bars, determined by their carbon ranges as specified in Section 3.

(b) The purposes for which these classes are frequently used, depending upon the design and upon the stresses and services to be imposed, are as follows:

Class A, for elliptical and helical springs.

Class B, for helical springs.

I. MANUFACTURE

2. *Process.*—The steel shall be made by the open-hearth, crucible or electric process.

II. CHEMICAL PROPERTIES AND TESTS.

3. *Chemical Composition.*—The steel shall conform to the following requirements as to chemical composition:

Elements Considered.	Class A.	Class B.
Carbon, per cent	0.90—1.10	0.95—1.15
Manganese, max. per cent.	0.50	0.50
Phosphorus, max. per cent	0.05	0.05
Sulphur, max. per cent...	0.05	0.05

4. *Ladle Analysis.*—An analysis shall be made by the manufacturer from a test ingot taken during the pouring of each melt, a copy of which shall be given to the purchaser or his representative. This analysis shall conform to the requirements specified in Section 3.

5. *Check Analyses.*—Analyses may be made by the purchaser from finished bars representing each melt, which shall conform to the requirements specified in Section 3.

III. PERMISSIBLE VARIATIONS IN GAGE.

6. *Permissible Variations.*—The dimensions of the bars shall not vary from those ordered more than the amount shown in the following table:

FLATS.

Size.	Width, In.		Thickness, In. Up to 3/8 In., Inclusive.		Thickness, In. Over 3/8 to 3/4 In., Inclusive.	
	Over.	Under.	Over.	Under.	Over.	Under.
1 to 2 in., incl......	0.015	0.015	0.015	0.005	0.015	0.010
Over 2 to 4 in., incl.	0.047	0.015	0.015	0.005	0.015	0.010
Over 4 to 5 in., incl.	0.047	0.032	0.015	0.005	0.015	0.010
Over 5 to 6 in., incl.	0.062	0.032	0.015	0.005	0.015	0.010

ROUNDS AND SQUARES.

Size.	Diameter or Thickness, In. Over.	Diameter or Thickness, In. Under.
Up to 5/16 in., incl..................	0.005	0.005
Over 5/16 to 7/16 in., incl.............	0.007	0.005
Over 7/16 to 5/8 in., incl.............	0.009	0.005
Over 5/8 to 7/8 in., incl.............	0.010	0.006
Over 7/8 to 1 in., incl..............	0.011	0.007
Over 1 to 1 1/8 in., incl............	0.012	0.008
Over 1 1/8 to 1 1/4 in., incl...........	0.013	0.009
Over 1 1/4 to 1 3/8 in., incl...........	0.014	0.010
Over 1 3/8 to 1 1/2 in., incl...........	0.016	0.011
Over 1 1/2 to 2 in., incl.............	0.019	0.012

IV. FINISH

7. *Finish.*—The finished bars shall be free from injurious defects and shall have a workmanlike finish.

V. MARKING

8. *Marking.*—The bars shall, when loaded for shipment, be properly separated and marked with the name or brand of the manufacturer and the melt number for identification.

VI. INSPECTION AND REJECTION

9. *Inspection.*—The inspector representing the purchaser shall have free entry, at all times while work on the contract of the purchaser is being performed, to all parts of the manufacturer's works which concern the manufacture of the bars ordered. The manufacturer shall afford the inspector, free of cost, all reasonable facilities to satisfy him that the bars are being furnished in accordance with these specifications. All tests (except check analyses) and inspection shall be made at the place of manufacture prior to shipment, unless otherwise specified, and shall be so conducted as not to interfere unnecessarily with the operation of the works.

10. *Rejection.*—(a) Unless otherwise specified, any rejection based on tests made in accordance with Section 5 shall be reported within five working days from receipt of samples.

(b) Bars which show injurious defects subsequent to their acceptance at the manufacturer's works will be rejected, and the manufacturer shall be notified.

11. *Rehearing.*—Samples tested in accordance with Section 5, which represent rejected bars, shall be held for two weeks from the date of test report. In case of dissatisfaction with the results of the tests, the manufacturer may make claim for a rehearing within that time.

Sprocket. A toothed wheel.

Spud. Fig. 1733. A bushing or coupling by which the hole of a sink or water cooler drip is connected with the drain or drain pipe.

Spur Wheel. A toothed wheel.

Square Door Bolt. Fig. 1660. A door bolt made of a square and straight bar of metal. When the bolt has an offset it is termed a square neck door bolt.

Stake. 21, Fig. 80; 7, Fig. 111. A piece of timber inserted in a pocket on the sides and ends of flat cars to hold the load in place. The sides of wooden gondola cars are sometimes held in a similar manner. The side stiffening pieces on steel hopper and gondola cars are frequently called stakes.

Stake Pocket (Gondola and Flat Cars). 10, Fig. 147; Figs. 965, 2803. A metal receptacle or collar, attached to the side and end sills to receive the end of a stake which supports the side or confines the load. Also used near the top of gondola cars to receive the stakes used in applying a coke rack or other appliance for increasing the depth of the car.

Stake Pocket Strap or **U-Bolt.** A U-shaped bolt which sometimes serves as a substitute for the ordinary form of stake pocket, when the stakes are intended as permanent attachments.

Stake Pockets, Permanent. (M. C. B. Recommended Practice).

In 1905, as a result of letter ballot, the following Recommended Practice was adopted regarding Permanent Stake Pockets:

1. That the method of securing permanent stake pockets to cars of wooden construction be by U bolts.

2. That the method of securing permanent stake pockets to cars of steel construction be by rivets or U bolts.

3. That malleable iron be used in the manufacture of permanent stake pockets.

4. That stakes should be located to suit the construction of the car or the requirements of the service, but should not be placed farther apart than 4 feet from center to center.

In 1916 dimensions for stake pockets 4 inches wide by 5 inches deep for flat cars were adopted.

In 1917 a Recommended Practice was adopted that the spacing of stake pockets on flat cars be, minimum 2 ft. 0 in., and maximum 3 ft. 6 in., center to center. A committee report will be found in the 1904 M. C. B. Proceedings, page 137.

Stake Pockets, Temporary. (M. C. B. Recommended Practice).

In 1905, as a result of the letter ballot, the following dimensions were adopted as Recommended Practice for Temporary Stake Pockets:

For flat cars and gondola cars with sides less than 30 inches high, 4 inches wide by 5 inches deep.

For gondola cars with sides 30 inches and over, 4 inches wide by 4 inches deep. A committee report will be found in the 1904 M. C. B. Proceedings, page 137.

Stake Pockets, Temporary, Longitudinal Spacing of M. C. B. Recommended Practice). Fig. 3039.

In 1906 a plan for longitudinal spacing of temporary stake pockets for gondola cars was adopted as Recommended Practice.

Stanchion. A prop or support.

A metal post or hanger with an eye in one end, which holds a rod or other object, as a hand rail or curtain rod. The opposite end is usually fastened by a nut, or with a flange or lugs, which form a part of the stanchion.

Movable stanchions are required in postal cars. See Fig. 1907.

Standard Gage. The most common distance between the rails of railroads, which is throughout the world 4 ft. 8½ in. See GAGE. This gage originated from the use of an even 5 ft. gage, with outside flanges. As inside flanges came to be preferred, and had to run on the same rails (then with much narrower heads than now), the present standard was of necessity used.

Staple. A U-shaped piece of metal which is pointed at the ends, to be driven into wood to hold a hasp, hook, pin, etc. The term is also applied to the keeper, which is screwed or bolted to the door frame, and which holds the door hasp.

Starting Valve. Fig. 2091. A valve on the locomotive to admit steam to the train line for heating purposes.

Stateroom. A compartment in sleeping and private cars sometimes containing a stationary bed and in other designs the usual berths.

Stateroom Sleeping Car. A sleeping car having one or more separate compartments or state-rooms in addition to the standard sections or berths in the main part of the car. A drawing-room sleeping car has one or more separate compartments which are larger than a stateroom.

Stay. A beam, bar, rod, etc., by which two or more objects are connected to prevent lateral deviations of one or both of them.

Stay Rod. A rod which acts as a stay.

Steam and Air Connections for Passenger Equipment Cars (M. C. B. Recommended Practice.) Figs. 3058-3061.

In 1903 the following specifications for steam and air line connections were adopted as Recommended Practice:

Steam hose, 1⅝-inch inside diameter and of such length as to provide 31 inches from face of coupling gasket to end of hose nipple; 1½-inch steam hose couplings of dimensions to agree with those shown on Plate Q, Figs. 3056-3059, with gaskets having 1½-inch diameter opening, gaskets to be so constructed that the normal diameter of opening will always be maintained; couplings not provided with gravity traps; inlet valves to have reduced openings which should be as small as possible and maintain the volume of steam required by the radiating pipes for the severest weather conditions.

That the steam-heat, air-brake and air-signal connections be located as shown on Plate Q herewith.

That the air-brake and air-signal hose should be 1 inch in diameter and 22 inches long.

In 1911 the above dimensions were changed to read: Air-brake hose must be 1⅜ inches inside diameter and 22 inches long, and the air-signal hose must be 1 inch inside diameter and 22 inches long.

In 1911 the angle cock was changed to show 30 degrees from the vertical.

In 1912 the 2-inch train line was adopted as standard.

In 1912 end valves with not less than 1½-inch opening was adopted as standard.

In 1911 the steam and air connections were erroneously shown as standard. In 1912 they were changed to recommended practice and illustrated on Sheet M. C. B.—Q. Changed to Sheet M. C. B.—Q.[1] in 1913.

In 1916 the air signal elbow was changed to show 30 degrees from the vertical

Steam and Air Equipment for Passenger Equipment Cars (M. C. B. Standard).

In 1912 the following items were transferred to standard:

Two-inch train line.

End valves with not less than 1½-inch openings.

Steam Car. A term used to designate ordinary railroad cars when it is desired to distinguish them from electric cars.

A self-propelled car using steam as its motive power. See MOTOR CAR.

Steam Coupler. See STEAM HOSE COUPLER.

Steam Crane. Figs. 450-454, 2687, etc. A crane operated by steam engines. Also frequently provided with gears for propelling itself by means of the same engines that operate the hoisting apparatus. See LOCOMOTIVE CRANE, WRECKING CRANE.

Steam Drum (Car Heating Apparatus). A part of the indirect steam heating system, being the covered coil or nest of tubes in which the circulating water is heated by the steam surrounding the pipes. Also called jacket.

Steam Gage (Steam Heating). A dial or gage for recording the pressure of steam in the steam pipes on a car or locomotive.

Steam Heat Connection. Page 1130.

Steam Hose. See STEAM HOSE COUPLER.

Steam Hose Clamp Lock. Used on the coupler connecting the steam hose between the cars.

Steam Hose Coupler. Figs. 2077, 2143, 2144; Page 1184. Couplers for connecting steam hose between passenger train cars. See Figs. 2064, 2143, for a clamp lock for steam couplers.

Steam Hose Couplings. (M. C. B. Recommended Practice.) M. C. B. Sheet Q. Fig. 3061.

In 1913 the following specifications for steam-hose couplings were adopted as Recommended Practice:

1. Coupling contour to be such that coupling will interchange with the coupler as shown on Fig. 3.

2. Coupler must have a locking attachment which will securely lock the two couplers together without depending on the hose in any way.

3. The angle of the nipple to a line perpendicular to the coupling face of the coupling should not be less than 20 degrees.

4. The coupler should be of the two-piece type, having the nipple separate and screwed into the coupler head with 1½-inch pipe thread. The nipple shall be of the type having a shoulder to engage clamp-nipple shown on Fig. 4.

5. The clamp shall be of the two-piece type, as shown on Fig. 5.

6. The minimum diameter of hose through gasket to be 1 7/16 inches.

7. Gaskets shall be flat face, securely held in place

in coupler head, but so designed that they can be removed and replaced without removing hose or coupler head from car.

In 1913 it was adopted as Recommended Practice that no pipe having an internal diameter less than that of 1-inch standard weight be used on passenger cars, and that on all new equipment 1¼-inch extra-heavy pipe be used.

In 1913 the position of bolting lugs on hose clamps at nipple and coupling ends, as shown on Sheet Q[1], was adopted as Recommended Practice.

Steam Hose, Specifications for. (M. C. B. Standard.) In 1913 specifications for steam hose for passenger equipment cars were adopted as Recommended Practice. Advanced to Standard in 1916. Revised in 1917.

1—MANUFACTURE

Steam-heat hose shall be composed of a tube of rubber, wrapped with at least five plies of cotton fabric and the whole covered with rubber.

2—PHYSICAL PROPERTIES AND TESTS

The railway company's inspector will select for test one piece at random from each lot of 201 pieces. When this hose is received at the test laboratory, a section 2½ inches long will be cut from one end in order to determine the friction, tensile strength and elongation. The remaining portion will then be subjected to steam heat in the digester. After this section has been heated another section 2½ inches long will be cut from it and used to ascertain the friction, tensile strength and elongation, in order to show the change in these characteristics due to the action of heat.

Friction Test Before Steaming.—A section 1 inch long will be cut from the hose and supported in such a manner that it will turn freely on its axis. A twenty-pound weight will be suspended from the separated end of the fabric. The latter must unwind uniformly, if at all, and not faster than 6 inches in ten minutes.

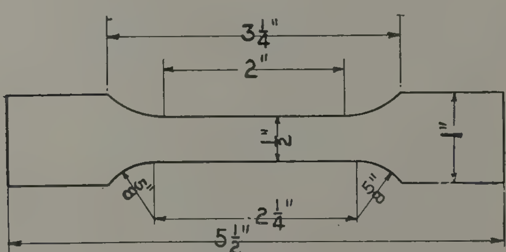


FIG. 1.

Tensile Test Before Steaming.—A strip cut from the tube with a die or other suitable means to the dimensions shown in Fig. 1 will be marked at points 2 inches apart, and the width and thickness will be accurately measured. It will then be slowly stretched in a suitable tensile-testing machine until it breaks. The ultimate tensile strength must not be less than 600 pounds per square inch and the elongation of the 2-inch section at the time of fracture must not be less than 6 inches.

Friction Test After Steaming.—A section 1 inch long will be supported in such a manner that it will turn freely on its axis. A fifteen-pound weight will be suspended from the separated end of the fabric. The latter must unwind uniformly, if at all, and not faster than 6 inches in ten minutes.

Tensile Test After Steaming.—A strip cut from the tube with a die or other suitable means to the dimensions shown in Fig. 1 will be marked at points 2 inches apart, and the width and thickness will be accurately measured. It will then be slowly stretched in a suitable tensile-testing machine until it breaks. The ultimate tensile strength must not be less than 450 pounds per square inch, and the elongation of the 2-inch section at the time of fracture must not be more than 8 inches or less than 4 inches.

Digester Test.—The digester shall consist of a cylinder containing dry saturated steam at a pressure of 45 lb. per sq. in. The hose shall be put into this digester and will remain there for 48 hours continuously. An examination of this section, after being submitted to the heat of the steam, should not disclose any blistering of the inner tube or any loosening of the tube from the fabric. Examination and test after heating, prescribed in the specifications, will be made as soon as possible after the specimen has cooled for 24 hours. The tests will be made at a temperature of not less than 60° F.

3—SIZE AND DIMENSIONS

	Maximum, Inches.	Minimum, Inches.
Length	24¼	23¾
Inner diameter	....	....
Outer diameter	....	....
Thickness of tube	....	⅛
Thickness of cover	....	1/16

4—WORKMANSHIP

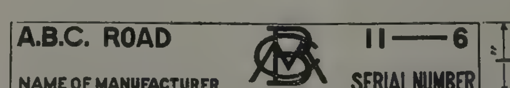
Tube.—The tube should be composed of at least two calenders of rubber. It must be free from holes, bits of wood, bark, sand and other foreign matter, and from other imperfections. It must be so firmly joined to the fabric that it can not be pulled off without tearing it.

Fabric.—The fabric must be of duck, with the warp containing not less than 27 strands, 3 threads per strand, and the filler 18 strands and 4 threads per strand. It must be frictioned on both sides and have, in addition, a distinct layer of rubber on one side, readily visible between the plies when the finished hose is cut open.

Cover.—The material of the cover should be a rubber compound which has good weather-resisting qualities, as firmly attached to the fabric as is the tube, and to be equally free from defects. The end of the hose should be cut off true to length, but shall not be capped.

5—MARKING

Serial Number.—Each lot of 200 hose or less must bear the manufacturer's serial number, beginning with one on the first of each year and continuing consecutively until the end of the year. Serial numbers of hose which are rejected must not be used again. With



each lot of 200 hose or less, one extra piece of hose must be furnished free of cost.

Label.—Each piece of hose must have securely vul-

canized to it a label of white or red rubber, as shown herewith.

6—INSPECTION

Rejection.—If the sample fails to pass the above tests, the lot represented by it will be rejected and the same serial number must not be applied to any other steam hose during the same calendar year.

Inspection.—If the sample passes all the tests, all pieces represented by it will be accepted if free from injurious mechanical defects.

Rejected hose will be returned at the expense of the manufacturer.

Rehearing.—Samples tested in accordance with these specifications, which represent rejected hose, shall be held for two weeks from date of test report. In case of dissatisfaction with the results of test, the manufacturer may make claim for a rehearing within that time.

Steam Motor Car. See MOTOR CAR.

Steam Pipe. The pipe under passenger cars corresponding to the brake pipe and connected with hose and couplings for conveying steam from the locomotive to heat the cars in the train.

A topical discussion on "What are the advantages or disadvantages of 2" main steam pipe with 1⅝" hose?" will be found in the 1904 M. C. B. Proceedings, page 235.

Steam Shovel. Figs. 464-466. A shovel operated by steam hoisting engines mounted on a car. The shovel or dipper holds from 1 to 6 cu. yds. of dirt and is mounted on the end of a heavy beam, which is carried by the boom. The dipper is operated and controlled by engines in such a manner as to permit of its being filled with earth or rock, lifted and swung over an adjacent car and there dumped. Used in construction work. See CAR.

Steam Trap. (Car Heating). Figs. 2079, etc.; Page 1184. A device for catching and liberating the water of condensation in any steam pipe line. For vertical steam trap see Figs. 2078, 2079, 2182.

Steel Car Repairs. See REPAIRS.

Steel Freight Cars. A topical discussion on the relative merits of composite and all-steel freight cars will be found in the 1903 M. C. B. Proceedings, page 172.

Steel Passenger Cars. An individual paper by William Forsyth on the use of steel in passenger car construction will be found in the 1904 M. C. B. Proceedings, page 196.

An elaborate committee report on this subject in the 1908 M. C. B. Proceedings, page 304, includes a general history of such cars up to 1908 and chapters on the standard sectional area, upper decks vs. semi-ellipical roofs, flooring, and the relative merits of various materials for inside finish for fireproof construction.

Steel, Specifications for Galvanized Sheets for Passenger and Freight Equipment Cars (M. C. B. Standard).

In 1915 the following specifications were adopted. Advanced to Standard in 1917.

I. MANUFACTURE

1. *Process.*—The sheet material manufactured under this specification may be either a mild steel or iron made from puddled bars made wholly from pig iron, and shall be thoroughly cleaned before being coated.

II. PHYSICAL PROPERTIES AND TESTS

2. *Bend Test.*—Test specimen as described in Section 3 shall be subjected to the following tests:

(a) Test specimen shall bend double on itself around two thicknesses of the material tested and straightened, without showing any cracking or flaking of the galvanizing on either side of the test specimen.

(b) Test specimen of the base material shall bend twice in the same direction, first around a mandrel the diameter of which is equal to 15 gages of the material tested and straightened, and then bend flat on itself and straightened, without cracking of the specimen.

(c) Gages 26 and lighter shall double-lock seam without cracking of the sheet or galvanizing.

3. *Test Specimen.*—(a) Strips about 8 in. long and 2 in. wide shall be cut from the center of a sheet selected at random from each lot of 1000 sheets or less, and the average thickness or weight of the coating across this width shall be used.

(b) Corrugated sheets shall be flattened with a wooden maul before making the required tests.

III. WORKMANSHIP AND FINISH

4. *Workmanship.*—The sheets shall conform to the sizes ordered.

5. *Finish.*—The sheets shall be free from blackened and acid spots and other surface defects or poor galvanizing.

IV. PERMISSIBLE VARIATIONS

6. *Permissible Variations.*—(a) The inspector shall weigh and check the measurements of one sheet in each 200 sheets in each order or shipment.

(b) A variation in weight of the finished sheet of 2½ per cent either way from that shown in Table No. 1 will be allowed.

TABLE No. 1.

*Gage No.	Thickness of Sheets, In.	Weight of Sheets per Sq. Ft., Oz	Minimum Weight of Coating per Sq. Ft., Oz.	*Gage No.	Thickness of Sheets, In.	Weight of Sheets per Sq. Ft., Oz.	Minimum Weight of Coating per Sq. Ft., Oz.
16	.0625	42.50	2.00	25	.021875	16.50	1.45
18	.0500	34.50	1.90	26	.01875	14.50	1.40
20	.03750	26.50	1.80	27	.017187	13.50	1.35
22	.03125	22.50	1.70	28	.015625	12.50	1.30
23	.028125	20.50	1.60	30	.0125	10.50	1.30
24	.0250	18.50	1.50				

*The above gage is of the finished sheet.

V. INSPECTION AND REJECTION

7. *Inspection.*—(a) The inspector representing the purchaser shall have free entry, at all times while work on the contract of the purchaser is being performed, to all parts of the manufacturer's works which concern the manufacture of the material ordered. The manufacturer shall afford the inspector, free of cost, all reasonable facilities to satisfy him that the material is being furnished in accordance with these specifications.

(b) The purchaser may make the tests and inspection to govern the acceptance or rejection of the material in his own laboratory or elsewhere. Such tests and inspection shall be made at the expense of the purchaser.

(c) All tests and inspection shall be so conducted as not to interfere unnecessarily with the operation of the works.

8. *Rejection.*—Material which, subsequently to above tests at the mills or elsewhere and its acceptance, develops black spots, improper galvanizing, improper trimming or other defects, or fails to pass

any one of the tests herein required, will be rejected, and shall be replaced by the manufacturer at his own expense.

9. *Rehearing.*—Samples tested in accordance with these specifications, which represent rejected material, shall be preserved for 14 days from date of test report. In case of dissatisfaction with results of tests, the manufacturer may make claim for a rehearing within that time.

Steel, Specifications for Mild-Steel Bars for Passenger and Freight Equipment Car (M. C. B. Standard). In 1915 the following specifications were adopted. Advanced to Standard in 1917.

1. *Scope.*—This grade of material will be used for miscellaneous parts, such as arch bars, bolts, hand holds, steps and for general threading and welding material.*

I. MANUFACTURE

2. *Process.*—The steel shall be made by the open-hearth process.

II. CHEMICAL PROPERTIES AND TESTS

3. *Chemical Composition.*—The steel shall conform to the following requirements as to chemical composition:

Carbon	Optional per cent
Manganese	Optional " "
Phosphorus, not over	0.05 " "
Sulphur, not over	0.05 " "

4. *Ladle Analysis.*—An analysis shall be made by the manufacturer from a test ingot taken from the pouring of each melt, to determine the percentage of carbon, manganese, phosphorus and sulphur. Drillings for analysis shall be taken not less than ¼ in. beneath the surface of the test ingot. A copy of this analysis shall be given the purchaser or his representative. This analysis shall conform to the requirements specified in Section 2.

5. *Check Analysis.*—A check analysis shall be made from the finished material representing each melt, if so desired by the purchaser or his representative, and shall meet the requirements specified in Section 2.

III. PHYSICAL PROPERTIES AND TESTS

6. *Tension Tests.*—The steel shall conform to the following requirements as to tensile properties:

Tensile strength, lb. per sq. in.—50,000-60,000 for sizes smaller than 1 in. flats and 2 in. rounds.

Tensile strength, lb. per sq. in.—50,000-65,000 for larger sizes.

Elongation in 8 in., per cent—1,500,000 tensile strength.

7. *Yield Point.*—The yield point as determined by the drop of the beam of the testing machine shall be one-half the ultimate tensile strength.

8. *Bend Test.*—The test specimen for rounds, squares and hexagon bars shall bend cold through 180 deg. without cracking on the outside of the bent portion, as follows: For material ¾ in. or under in thickness, flat on itself; for material over ¾ in. to and including 1¼ in. in thickness, around a pin the diameter of which is equal to the thickness of the specimen; and for material over 1¼ in. in thickness, around a pin the diameter of which is equal to twice the thickness of the specimen.

9. *Test Specimen.*—Tension and bend-test specimens shall be of the full section of material as rolled, if possible; otherwise the specimen shall be machined from the material as rolled. The axis of the specimen shall be located at any point one-half the distance from the center to the surface of round bars, or from the center to the edge of flat bars, and shall be parallel to the axis of the bar.

10. *Number of Tests.*—(a) One tension and one bend test shall be made from each melt; except if material from one melt differs ⅜ in. or more in thickness or diameter, one tension and one bent test shall be made from both the thickest and the thinnest material rolled. When the material from separate melts can not be identified, one sample shall be taken from each lot of 30,000 lb. or fraction thereof. When the bars in any lot are not all of the same diameter or thickness, samples shall be taken so as to represent each size differing in diameter or thickness by ⅜ in., and in all cases the thickest and the thinnest sections shall be represented.

(b) If any test specimen from the bar originally selected to represent a lot of material contains surface defects not visible before testing, but visible after testing, or if a tension-test specimen breaks outside the middle third of the gage length, one retest from a bar will be allowed.

IV. PERMISSIBLE VARIATIONS IN GAGE

11. *Permissible Variations.*—All bars shall conform to the limits as given in the following table.

ROUNDS, SQUARES, HEXAGONS.

Size.	Variations in Size Under.	Over
Up to and including ½ in.	.007 in.	.007 in.
Over ½ in. and including 1 in.	.010 in.	.010 in.
Over 1 in. and including 2 in.	1/64 in.	1/32 in.
Over 2 in. and including 3 in.	1/32 in.	3/64 in.
Over 3 in. and including 5 in.	1/32 in.	3/32 in.
Over 5 in. and including 8 in.	1/16 in.	⅛ in.

FLATS.

Width of Flats.	Variation in Width. Under.	Over.	Thickness in Flats.—Variation in Thickness, Under and Over. 3/16 in. and under.	Over 3/16 in. up to ½ in.	Over ½ in. up to 1 in.	Over 1 in. up to 2 in.
Up to and including 1 in.	1/64 in.	1/32 in.	.006 in.	.008 in.	.010 in.	....
Over 1 in. up to and including 2 in.	1/32 in.	3/64 in.	.008 in.	.012 in.	.015 in.	1/32 in.
Over 2 in. up to and including 4 in.	3/64 in.	1/16 in.	.010 in.	.015 in.	.020 in.	1/32 in.
Over 4 in. up to and including 6 in.	1/16 in.	3/32 in.	.010 in.	.015 in.	.020 in.	1/32 in.

V. FINISH.

12. *Finish.*—The finished material shall be smoothly rolled and free from injurious seams, slivers, flaws and other defects, and shall have a workmanlike finish.

VI. INSPECTION AND REJECTION

13. *Inspection.*—(a) The inspector representing the purchaser shall have free entry, at all times while work on the contract of the purchaser is being performed, to all parts of the manufacturer's works which concern the manufacture of the material ordered. The manufacturer shall afford the inspector, free of cost, all reasonable facilities to satisfy him that the material is being furnished in accordance with these specifications.

(b) The purchaser may make the tests and inspection to govern the acceptance or rejection of the material in his own laboratory or elsewhere. Such tests and inspection shall be made at the expense of the purchaser.

*This material may be used when so desired for rivet steel.

(c) All tests and inspection shall be so conducted as not to interfere unnecessarily with the operation of the works.

14. *Rejection.*—Material which, subsequently to above tests at mills or elsewhere and its acceptance, develops weak spots or imperfections, or fails to pass any one of the tests herein required, will be rejected, and shall be replaced by the manufacturer at his own expense.

15. *Rehearing.*—Samples tested in accordance with this specification, which represent rejected material, shall be preserved for 14 days from date of test report. In case of dissatisfaction with results of tests, the manufacturer may make claim for a rehearing within that time.

Steel, Specifications for Miscellaneous Castings for Passenger and Freight Equipment Cars (M. C. B. Recommended Practice).

In 1915 the following specifications were adopted:

I. MANUFACTURE

1. *Process.*—The steel may be made by the open-hearth, crucible or any other process approved by the purchaser.

2. *Heat Treatment.*—Castings shall be allowed to become cold, they shall then be uniformly reheated to the proper temperature to refine the grain (a group thus reheated being known as an annealing charge), and allowed to cool uniformly and slowly. If, in the opinion of the purchaser or his representative, a casting is not properly annealed, he may at his option require the casting to be reannealed.

II. CHEMICAL PROPERTIES AND TESTS

3. *Chemical Composition.*—The steel shall conform to the following requirements as to chemical composition:

Carbon	Optional	per cent.
Manganese	Optional	"
Phosphorus, not over	0.05	"
Sulphur, not over	0.05	"

4. *Ladle Analysis.*—An analysis shall be made by the manufacturer from a test ingot taken during the pouring of each melt, to determine the carbon, manganese, phosphorus and sulphur. Drillings for analysis shall be taken not less than ¼ in. beneath the surface of the test ingot. A copy of this analysis shall be given the purchaser or his representative. This analysis shall conform to the requirements specified in Section 3.

5. *Check Analysis.*—(a) A check analysis shall be made from the finished material representing each melt, if so desired by the purchaser or his representative, and shall meet the requirements specified in Section 3.

(b) The purchaser shall have the privilege of taking drillings for analysis from a casting so long as it does not destroy or weaken the casting.

III. PHYSICAL PROPERTIES AND TESTS.

6. *Tension Tests.*—The steel shall conform to the following minimum requirements as to tensile properties:

Tensile strength, lb. per sq. in. 60,000
*Elongation in 2 in., per cent. 1 400 000/tensile strength
Reduction of area, per cent, 30.

*Not under 22 per cent.

7. *Alternative Tests to Destruction.*—In the case of small or unimportant castings, a test to destruction on three castings from a lot may be substituted for the tension tests. This test shall show the material to be ductile, free from injurious defects, and suitable for the purpose intended. A lot shall consist of all castings from the same melt, annealed in the same furnace charge.

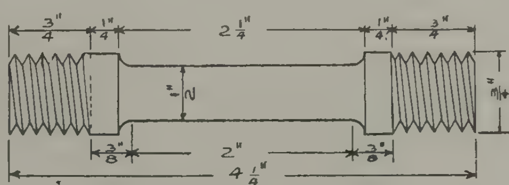
8. *Test Specimens.*—(a) Sufficient test bars, from which the test specimens required in Section 9 may be selected, shall be attached to castings weighing 500 lb. or over, when the design of the castings will permit. If the castings weigh less than 500 lb., or are of such a design that test bars can not be attached, two test bars shall be cast to represent each melt; or the quality of the casting shall be determined by tests to destruction as specified in Section 7. All test bars shall be annealed with the castings they represent.

(b) The manufacturer and the purchaser shall agree whether test bars can be attached to castings, on the location of the bars on the castings, on the castings to which the bars are to be attached, and on the method of casting unattached bars.

(c) If the purchaser or his representative so desires, a test specimen may be cut from the finished casting; such casting so destroyed shall be paid for by the purchaser.

(d) Tension test specimens shall be of the form and dimensions shown on Fig. 1. Annealing coupons shall be located at points agreed upon by the manufacturer and the purchaser.

9. *Number of Tests.*—One tension test shall be made from each melt.



IV. VARIATION IN WEIGHT

10. *Weight.*—All castings shall come within the maximum and minimum weight, where shown on the prints, and when castings weighing more than the allowable maximum weights are presented, such castings shall be accepted at the maximum weight, provided they meet all other tests; the excess weight shall be at the expense of the manufacturer.

V. WORKMANSHIP AND FINISH

11. *Workmanship.*—The castings shall substantially conform to the sizes and shapes shown on the drawings, and shall be made in a workmanlike manner.

12. *Patterns.*—When patterns are furnished by the purchaser, the manufacturer shall make sure that the allowance for shrinkage in these patterns agrees with his own practices, and castings shall be rejected which do not conform closely to dimensions on prints, or if distorted by improperly matched flasks, undue rapping or any other defect caused by molding. Special attention should be given to properly rounding all fillets and corners shown on drawings. Where surfaces are machined, the castings shall have the proper allowance for finish. Under no circumstance shall manufacturer change purchaser's patterns, without written permission from the purchaser.

13. *Finish.*—(a) The castings shall be free from all injurious defects. Castings shall not be painted before inspection. Castings rusted to any extent, or covered with any material to hide defects, shall be rejected.

(b) Any casting found with blow holes, cracks, low spots or thin sections filled with cement, "Smooth-on," or like material will be rejected, and shall not be further considered. Oxy-actylene, electric, or similar welding will not be permitted, unless authorized by the inspector and then only when the defects are cleaned to solid metal and only at locations where the defects will not in any way be detrimental to the strength of the casting; this welding allowed only in order to improve the appearance of the casting.

VI. MARKING

14. *Marking.*—The manufacturer's name or identification mark shall be cast and the melt number stamped on each casting, this at such location as shall be agreed upon by the manufacturer and the purchaser.

VII. INSPECTION AND REJECTION

15. *Inspection.*—(a) The inspector representing the purchaser shall have free entry, at all times while work on the contract of the purchaser is being performed, to all parts of the manufacturer's works which concern the manufacture of the material ordered. The manufacturer shall afford the inspector, free of cost, all reasonable facilities to satisfy him that the material is being furnished in accordance with these specifications.

(b) The purchaser may make the tests and inspection to govern the acceptance or rejection of the material in his own laboratory or elsewhere. Such tests and inspection shall be made at the expense of the purchaser.

(c) All tests and inspection shall be so conducted as not to interfere unnecessarily with the operation of the works.

16. *Rejection.*—Material which, subsequently to above tests at the mills or elsewhere and its acceptance, develops weak spots, shrinkage cracks or imperfections, or is found to have finishing defects or fails to pass any one of the tests herein required, will be rejected and shall be replaced by the manufacturer at his own expense.

17. *Rehearing.*—Samples tested in accordance with this specification, which represent rejected material, shall be preserved for 14 days from date of test report. In case of dissatisfaction with results of tests, the manufacturer may make claim for a rehearing within that time.

Steel, Shearing Values of Structural, Rivet and Mild. (M. C. B. Recommended Practice.)

In 1915 the following rule was adopted for use in all calculations for strength of parts:

The allowable stress per sq. in. for iron or steel, subject to shear in a plane perpendicular to the direction of rolling, shall not exceed 80 per cent of the allowable stress per sq. in. for tension, in the direction of rolling.

Steel, Specifications for, Structural Steel, Steel Plate and Steel Sheets for Passenger-Equipment Cars (M. C. B. Standard).

In 1915 the following specifications were adopted as Recommended Practice. Advanced to Standard in 1917.

1. *Scope.*—These specifications apply to all shapes, plates and sheets.

I. MANUFACTURE

2. *Process.*—The steel shall be made by the open-hearth process.

II. CHEMICAL PROPERTIES AND TESTS

3. *Chemical Composition.*—The steel shall conform to the following requirements as to chemical composition:

Carbon, not over	0.25 per cent.
Manganese	Optional " "
Phosphorus, not over	0.05 " "
Sulphur, not over	0.06 " "

4. *Ladle Analysis.*—An analysis shall be made by the manufacturer from a test ingot taken during the pouring of each melt to determine the percentage of carbon, manganese, phosphorus and sulphur. Drillings for analysis shall be taken not less than ¼ in. beneath the surface of the test ingot. A copy of this analysis shall be given to the purchaser or his representative. This analysis shall conform to the requirements specified in Section No. 3.

5. *Check Analysis.*—A check analysis may be made from the finished material representing each melt, if so desired by the purchaser or his representative, and shall meet the requirements specified in Section No. 3.

III. PHYSICAL PROPERTIES AND TESTS

6. *Tension Tests.*—(a) The material shall conform to the following requirements as to tensile properties:

	Structural Steel.	Plates for Cold Flanging.
Tensile strength, lbs. per sq. in	50,000-65,000	48,000-58,000
Yield point, min. lb. per sq. in.	0.5 tens. str.	0.5 tens. str.
Elongation in 8 in. min. per cent	$\frac{1,500,000}{\text{Tens. str.}}$	$\frac{1,500,000}{\text{Tens. str.}}$

(b) The yield point shall be determined by the drop of the beam of the testing machine.

7. *Modifications in Elongation.*—(a) For material over ¾ in. in thickness, a deduction of 1 from the percentage of elongation specified in Section 6 (a) shall be made for each increase of ⅛ in. in thickness above ¾ in., to a minimum of 18 per cent.

(b) For material under 5/16 in. in thickness, a deduction of 2.5 from the percentage of elongation in 8 in., specified in Section 6 (a), shall be made for each decrease of 1/16 in. in thickness below 5/16 in.

8. *Bend Test.*—(a) The test specimen for structural steel shall bend cold through 180 deg. without cracking on the outside of the bent portion, as follows: For material ¾ in. or under in thickness, flat on itself; for material over ¾ in. to and including 1¼ in. in thickness, around a pin the diameter of which is equal to the thickness of the specimen; and for material over 1¼ in. in thickness, around a pin the diameter of which is equal to twice the thickness of the specimen.

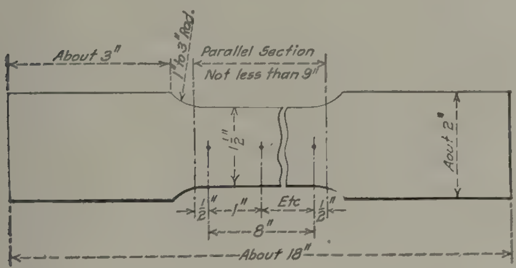
(b) The test specimen for plates for cold flanging shall bend cold through 180 deg. flat on itself without cracking on the outside of the bent portion.

9. *Test Specimens.*—(a) Tension and bend test specimens shall be taken from the rolled material.

(b) Tension and bend test specimens, except as specified in paragraph (c), shall be of the full thickness of material as rolled; and may be machined to the form and dimensions shown in Fig. 1, or with both edges parallel.

(c) Tension and bend tests specimen for plates and bars over 1½ in. in thickness or diameter may be machined to a thickness or diameter of at least ¾ in. for a length of at least 9 in.

10. *Number of Tests.*—(a) One tension and one bend test shall be made from each melt; except that if material from one melt differs ⅜ in. or more in thickness, one tension and one bend test shall be made from both the thickest and the thinnest material rolled. Shapes less than 1 sq. in. in section need not be subjected to a tension test.



NOTE.—The shoulders required when threaded ends are not used may be formed by the fillets terminating the body or by other fillets continuing these, or may be formed in the ends beyond these fillets.

(b) If any test specimen shows defective machining or develops flaws, it may be discarded and another specimen substituted.

(c) If the percentage of elongation of any tension-test specimen is less than that specified in Section 6 (a), and any part of the fracture is outside the middle third of the gage length, as indicated by scribe scratches marked on the specimen before testing, a retest shall be allowed.

IV. PERMISSIBLE VARIATIONS IN WEIGHT AND GAGE

11. *Permissible Variations.*—(a) The cross section, or weight per lineal ft. of shapes, shall not vary more than 2.5 per cent from that specified.

(b) *When Ordered to Weight per Square Foot.*—The weight of each lot[1] of sheets in each shipment shall not vary from the weight ordered more than the amount given in Table No. I. One cu. in. of steel is assumed to weigh 0.2833 lb.

(c) *When Ordered to Thickness.*—The thickness of each sheet shall not be more than 0.01 in. under that ordered. The overweight of each lot[2] of sheets in each shipment shall not exceed the amount given in Table II.

(d) A variation from the length ordered of ⅛ in. under and ¼ in. over will be permitted for sheets or shapes under 12 ft. in length, and a variation of ¼ in. under and ½ in. over will be permitted for sheets or shapes 12 ft. and over in length.

V. FINISH

12. *Finish.*—(a) The finished material shall be free from injurious defects and shall have a workmanlike finish.

(b) Material ⅛ in. and under shall be flattened so that the sheets are practically free from waves or buckles and shall be free from all mill scale and rust. For all sheets less than 1/10 in. there are no further requirements. For sheets 1/10 in. or more in thickness material should be a medium soft steel capable of being formed hot or cold by pressing, and should meet requirements of Section 12-c.

(c) Blue enameled sheets and patent leveled sheets, etc., will be used in passenger car construction as called for by the blue-print. These sheets shall be practically flat, free from easily discernible waves, buckles, and furnished resquared.

(d) Material for molding shall be such that it can be successfully drawn and pressed cold without rupture. This material, when so ordered, shall have a bright, finished surface, entirely free from mill scale, rust, and shall otherwise be reasonably flat, but need not be leveled. No test for either of these grades, other than successful working, is required.

VI. MARKING

13. *Marking.*—The name or brand of the manufacturer and the melt number shall be legibly rolled or stamped on all finished material, except that bars and other small sections shall, when loaded for shipment, be properly separated and marked for identification. The melt number shall be legibly marked, by stamping if practicable, on each test specimen.

VII. INSPECTION AND REJECTION

14. *Inspection.*—(a) The inspector representing the purchaser shall have free entry at all times, while work on the contract of the purchaser is being performed, to all parts of the manufacturer's works which concern the manufacture of the material ordered. The manufacturer shall afford the inspector, free of cost, all reasonable facilities to satisfy him that the material is being furnished in accordance with these specifications.

(b) The purchaser may make the tests and inspection to govern the acceptance or rejection of the material in his own laboratory or elsewhere. Such tests and inspection shall be made at the expense of the purchaser.

TABLE I.—PERMISSIBLE VARIATIONS OF PLATES ORDERED TO WEIGHT

PERMISSIBLE VARIATIONS IN AVERAGE WEIGHTS PER SQUARE FOOT OF PLATES FOR WIDTHS GIVEN, EXPRESSED IN PERCENTAGES OF ORDERED WEIGHTS

Ordered Weight, Lb. per Sq. Ft.	Under 48 In.		48 to 60 In., Excl.		60 to 72 In., Excl.		72 to 84 In., Excl.		84 to 96 In., Excl.		96 to 108 In., Excl.		108 to 120 In., Excl.		120 to 132 In., Excl.		132 In. or Over.		Ordered Weight, Lb. per Sq. Ft.
	Over.	Under.	Over.	Under.	Over.	Under.	Over.	Under.	Over.	Under.	Over.	Under.	Over.	Under.	Over.	Under.	Over.	Under.	
Under 5.......	5	3	5.5	3	6	3	7	3	....	....	....	....	....	....	....	....	....	....	Under 5.
5 to 7.5 excl...	4.5	3	5	3	5.5	3	6	3	....	....	....	....	....	....	....	....	....	....	5 to 7.5. excl.
7.5 to 10, excl..	4	3	4.5	3	5	3	5.5	3	6	3	7	3	8	3	....	....	....	....	7.5 to 10, excl.
10 to 12.6, excl.	3.5	2.5	4	3	4.5	3	5	3	5.5	3	6	3	7	3	8	3	9	3	10 to 12.5, excl.
12.5 to 15, excl.	3	2.5	3.5	2.5	4	3	4.5	3	5	3	5.5	3	6	3	7	3	8	3	12.5 to 15, excl.
15 to 17.5, excl.	2.5	2.5	3	2.5	3.5	2.5	4	3	4.5	3	5	3	5.5	3	6	3	7	3	15 to 17.5, excl.
17.5 to 20, excl.	2.5	2	2.5	2.5	3	2.5	3.5	2.5	4	3	4.5	3	5	3	5.5	3	6	3	17.5 to 20, excl.
20 to 25, excl...	2	2	2.5	2	2.5	2.5	3	2.5	3.5	2.5	4	3	4.5	3	5	3	5.5	3	20 to 25, excl.
25 to 30, excl...	2	2	2	2	2.5	2	2.5	2.5	3	2.5	3.5	3	4	3	4.5	3	5	3	25 to 30, excl.
30 to 40, excl...	2	2	2	2	2	2	2.5	2	2.5	2.5	3	2.5	3.5	3	4	3	4.5	3	30 to 40. excl.
40 or over......	2	2	2	2	2	2	2	2	2.5	2	2.5	2.5	3	2.5	3.5	3	4	3	40 or over.

NOTE.—The weight per square foot of individual plates shall not vary from the ordered weight by more than 1⅓ times the amount given in this table.

[1] The term "lot" applied to Table I means all of the plates of each group width and group weight.
[2] The term "lot" applied to Table II means all of the plates of each group width and group thickness.

(c) All tests and inspection shall be so conducted as not to interfere unnecessarily with the operation of the works.

15. *Rejection.*—Material which, subsequently to above tests at the mills or elsewhere and its acceptance, develops weak spots, brittleness, cracks or other imperfections, or fails to pass any one of the tests herein required, will be rejected and shall be replaced by the manufacturer at his own expense.

16. *Rehearing.*—Samples tested in accordance with this specification which represent rejected material shall be preserved for 14 days from date of test report. In case of dissatisfaction with results of tests, the manufacturer may make claim for a rehearing within that time.

Steel, Specifications for Structural Steel, Steel Plate and Steel Sheets for Freight-Equipment Cars (M. C. B. Standard).

(M. C. B. STANDARD.)

In 1915 the following specifications were adopted as Recommended Practice. Advanced to Standard in 1917.

1. *Scope.*—These specifications apply to all shapes, plates and sheets.

I. MANUFACTURE

2. *Process.*—The steel shall be made by the open-hearth process.

II. CHEMICAL PROPERTIES AND TESTS

3. *Chemical Composition.*—The steel shall conform to the following requirements as to chemical composition:

Carbon, not over..............0.25 per cent.
Manganese ....Optional per cent.
Phosphorus, not over..........0.05 per cent.
Sulphur, not over.............0.06 per cent.

4. *Ladle Analysis.*—An analysis shall be made by the manufacturer from a test ingot taken during the pouring of each melt, to determine the percentage of carbon, manganese, phosphorus and sulphur. Drillings for analysis shall be taken not less than ¼ in. beneath the surface of the test ingot. A copy of this analysis shall be given the purchaser or his representative. This analysis shall conform to the requirements specified in Section 2.

5. *Check Analysis.*—A check analysis may be made from the finished material representing each melt, if so desired by the purchaser or his representative, and shall meet the requirements specified in Section 2.

III. PHYSICAL PROPERTIES AND TESTS

6. *Bend Tests.*—(a) The test specimen for structural steel shall bend cold through 180 deg. without fracture on the outside of the bent portion as follows: For material ¾ in. in thickness and under, flat on itself; for material over ¾ in. to and including 1¼ in. in thickness, around a pin the diameter of which is equal to the thickness of the specimen; and for thicknesses over 1¼ in. around a pin the diameter of which is equal to twice the thickness of the specimen.

(b) Angles ¾ in. or under in thickness shall open flat, and angles ½ in. or under in thickness shall bend shut, cold, without fracture.

NOTE.—The above tests may be made either by pressure or by blows.

(c) Bend test specimens shall be 1½ in. or over in width by the thickness of the material, with planed or milled edges.

7. *Number of Tests.*—At least one bend test for structural steel shall be made for each thickness from each melt, and shall be taken from the finished product.

IV. PERMISSIBLE VARIATIONS IN WEIGHT AND GAGE

8. *Permissible Variations.*—(a) The cross section, or weight per lineal foot of shapes shall not vary more than 2.5 per cent from that specified.

(b) *When Ordered to Weight per Square Foot.*—The weight of each lot[1] of sheets in each shipment shall not vary from the weight ordered more than the amount given in Table I. One cu. in. of steel is assumed to weigh 0.2833 lb.

(c) *When Ordered to Thickness.*—The thickness of each sheet shall not be more than 0.01 in. under that ordered. The overweight of each lot[2] of sheets in each shipment shall not exceed the amount given in

(d) A variation from the length ordered of ⅛ in. under and ¼ in. over will be permitted for sheets or shapes under 12 ft. in length, and a variation of ¼ in. under and ½ in. over will be permitted for sheets or shapes 12 ft. and over in length.

V. FINISH

9. Finish.—The finished material shall be free from injurious seams, slivers, flaws and other defects, and shall have a workmanlike finish.

VI. MARKING

10. *Marking.*—The name of the manufacturer and the melt number shall be legibly stamped or rolled on all finished material, but small pieces may be shipped in securely fastened bundles, with the above marks legibly stamped on an attached metal tag.

VII. INSPECTION AND REJECTION

11. *Inspection.*—(a) The inspector representing the purchaser shall have free entry at all times, while work on the contract of the purchaser is being performed, to all parts of the manufacturer's works which concern the manufacture of the material ordered. The manufacturer shall afford the inspector, free of cost, all reasonable facilities to satisfy him that the material is being furnished in accordance with these specifications.

(b) The purchaser may make the tests and inspection to govern the acceptance or rejection of the mate-

TABLE II.—PERMISSIBLE OVERWEIGHTS OF PLATES ORDERED TO THICKNESS

PERMISSIBLE EXCESS IN AVERAGE WEIGHTS PER SQUARE FOOT OF PLATES FOR WIDTHS GIVEN, EXPRESSED IN PERCENTAGES OF NOMINAL WEIGHTS.

Ordered Thickness, In.	Under 48 In.	48 to 60 In., Excl.	60 to 72 In., Excl.	72 to 84 In., Excl.	84 to 96 In., Excl.	96 to 108 In., Excl.	108 to 120 In., Excl.	120 to 132 In., Excl.	132 In., or Over.	Ordered Thickness In.
Under ⅛	9	10	12	14	......	......	......	......	......	Under ⅛.
⅛ to 3/16, excl....	8	9	10	12	......	......	......	......	......	⅛ to 3/16, excl.
3/16 to ¼, excl....	7	8	9	10	12	......	......	......	......	3/16 to ¼, excl.
¼ to 5/16, excl....	6	7	8	9	10	12	14	16	19	¼ to 5/16, excl.
5/16 to ⅜, excl....	5	6	7	8	9	10	12	14	17	5/16 to ⅜, excl.
⅜ to 7/16, excl....	4.5	5	6	7	8	9	10	12	15	⅜ to 7/16, excl.
7/16 to ½, excl....	4	4.5	5	6	7	8	9	10	13	7/16 to ½, excl.
½ to ⅝, excl....	3.5	4	4.5	5	6	7	8	9	11	½ to ⅝, excl.
⅝ to ¾, excl....	3	3.5	4	4.5	5	6	7	8	9	⅝ to ¾, excl.
¾ to 1, excl.....	2.5	3	3.5	4	4.5	5	6	7	8	¾ to 1, excl.
1 or over........	2.5	2.5	3	3.5	4	4.5	5	6	7	1 or over.

rial in his own laboratory or elsewhere. Such tests and inspection shall be made at the expense of the purchaser.

(c) All tests and inspection shall be so conducted as not to interfere unnecessarily with the operation of the works.

12. *Rejections.*—Material which, subsequently to above tests at the mills or elsewhere and its acceptance, develops weak spots, brittleness, cracks or other imperfections, or fails to pass any one of the tests herein required, will be rejected, and shall be replaced by the manufacturer at his own expense.

13. *Rehearing.*—Samples tested in accordance with this specification, which represent rejected material, shall be preserved for 14 days from date of test report. In case of dissatisfaction with results of tests, the manufacturer may make claim for a rehearing within that time.

Steel Tired Wheel. A wheel with a steel tire which is usually shrunk on, welded, bolted or fastened with retaining rings. See CAR WHEEL.

Stenciling. See MARKING ON FREIGHT EQUIPMENT CARS.

Step. 6, Fig. 260; Figs. 598-614; Fig. 641. A ledge on a stair or round or rung of a ladder. A footpiece for ascending to or descending from a car or for standing in certain places or positions. Passenger car steps are from their location generally called platform steps and sometimes box steps. In freight cars a U-shaped iron, called a SILL STEP, is used. A small ledge on the end of a freight car near the top for a brakeman to stand on when applying brakes, called the brake step, is also sometimes used. A bracket called a tank step is attached to the tanks of tank cars. Steps in stairs are connected by vertical risers.

Step Box. Fig. 608; Page 1164. A step for use between the bottom car step and a low platform.

Step Hanger. A vertical board or metal plate by which the steps are supported from the corner of a car and from the platform end sill.

Step Iron (Platform Steps). A flat iron bar bent to conform to the shape of the steps and their risers, and to which they are fastened. It is bolted at the upper end to the platform end sill.

Step Ladder (Sleeping Car). Figs. 1626, 1627, etc. A folding step ladder for use in a sleeping car, to reach the lamps, upper berths, etc. Fig. 2911. See POSTAL CARS, U. S. GOV'T SPEC.

Step Nosing. Fig. 605. A metallic facing or molding for the tread of steps.

Step Riser. The vertical portion of a step in stairs.

Step Timber. A timber bolted to the end sill and platform end sill, to which the platform steps are hung.

Step Treads. Figs. 599, 600, 604-607, 609-614.

Stiffener. Figs. 967, 969. A reinforcing member. The term is commonly applied to bars used to strengthen the doors of freight cars.

Stile. The upright pieces on the outer edge of a door or sash, as door stile, sash stile, window stile, etc.

Stirrup. A kind of ring or bent bar of iron resembling somewhat the stirrup of a saddle. A drawbar carry iron is sometimes called a stirrup.

Stock Car. Figs. 182-201; Page 1228. A car for the transportation of live stock, equipped with roof, slatted sides and side doors, single or double deck and frequently with feed and water troughs. See DOUBLE DECK STOCK CAR, and CAR.

Stock Cars, Rounding Corners of Doors, etc. See DOORS, DOOR JAMBS and ALL OTHER INSIDE CORNERS, etc.

Stop Bar. See SASH LOCK STOP.

(Sleeping Car.) A bar to connect the two seats on which the seat bottoms may rest when drawn down to make up a lower berth. It rests upon a stop bar plate.

Stop Bar Guide. An attachment to hold a stop bar in place laterally.

Stop Bar Hinge. The hinge which enables the stop bar to swing horizontally.

Stop Bolt (of Car Door Lock). An attachment for throwing a door latch out of gear.

Stop Cock. A simple form of COCK having a body and tapered plug which has an opening through it. When the plug is turned so that the holes in it correspond to the ports in the body the liquid flowing in the pipe can pass through the cock. When the plug is turned so that the openings do not correspond, the flow is stopped.

Stop Key Journal Bearing. A key or wedge with a lug or projection which bears against the end of the axle to restrain lateral motion and thus dispense with a collar on the axle.

Stop Latch. A spring door latch with a stop bolt by which the latch can be fastened on one side so as not to act.

Storage Battery (Electric Lighting). Figs. 2516-2548; Pages 1168, 1169, 1183. An electro-chemical device, consisting of a number of cells connected in series when used for car lighting purposes, each cell containing two groups of plates peculiarly constructed and prepared, immersed in a liquid electrolyte, the functions and properties of which are to receive and store electrical energy and to deliver it to the lighting circuit of the car as occasion may require. Storage batteries are used in connection with axle generators on the car and also in "straight storage systems" where the batteries are charged at some central point and placed in the cars after charging. Storage batteries are of two kinds, one known commercially as Edison Alkaline and the other as Lead-Sulphuric Acid. The Edison storage battery is constructed throughout of nickel-plated steel. The active materials are nickel hydrate for the positive plates and iron-oxide for the negative plates. The electrolyte is an alkaline solution, potassium hydrate in water. The lead-sulphuric acid battery consists of specially prepared lead plates immersed in dilute sulphuric acid. Storage batteries are generally carried in boxes attached to the underside of the car body.

See MOTOR CAR for cars propelled entirely by electric current from storage batteries.

Storage Gas Tank (Acetylene Lighting). Fig. 2385. An iron tank filled with asbestos discs saturated with ACETONE, into which acetylene gas is forced under pressure.

Storage Heaters (Car Heating). Figs. 902-904.

Storage System of Acetylene Gas Lighting. Figs. 2315, etc.

Storage System of Car Heating. Figs. 902-904. A direct system of car heating, in which the radiating pipes are enlarged and inclose a smaller pipe or tube which is filled with salt water or other heat-retaining substance, and which when heated continues to radiate heat after the steam is shut off.

Stove. An apparatus in which a fire is made for warming a room, house or car by direct radiation. Stoves are out of use for heating passenger cars, but cast iron stoves are largely used for caboose cars.

A cook stove permanently fixed against the side of a room and directly connected with the chimney without the use of stove pipe, is called a range; used in dining cars, etc. See RANGES and COOK STOVES.

Alcohol and oil stoves are used for heating refrigerator cars or produce cars for the transportation of perishable products in cold weather.

Stove Pipe. A tube, usually of sheet iron, for conveying the smoke from a stove or heater, and creating a draft. A SMOKE FLUE.

Stove Pipe Damper. A circular disc in the stove pipe for regulating the draft.

Stove Pipe Jack. A covering or bonnet for the aperture of a stove pipe on the outside of a car.

Stove Pipe Ring. A metal plate or ring attached to the ceiling of a passenger car around the opening through which the stove pipe passes from the inside to the outside of the car. It is used for ornament or to make a finish around the opening for the stove pipe.

Straight Air Brake. A term applied to the original form of the Westinghouse air brake, which is still used on street cars. With this form of brake, the compressed air is used as a direct force from the main reservoir supply of the locomotive through direct piping to the brake cylinders on the vehicles to apply the brakes. The valve on the locomotive is used to admit air to the brake pipe and brake cylinders in order to apply the brakes, to hold it there when admitted, and to exhaust it when desiring to release the brakes. This form of brake was superseded by the plain automatic air brake. See AUTOMATIC AIR BRAKE.

Strainer. See BRAKE PIPE AIR STRAINER, REDUCING VALVE STRAINER, SIGNAL PIPE STRAINER, BRANCH PIPE STRAINER. For a combination of a strainer and nipple used in car heating see Fig. 2075. A cross pipe fitted with a strainer prevents sediment, etc., from passing out of the train pipe into the heating apparatus.

Strap. A term commonly applied to long, narrow pieces of wrought iron used to bind members of a structure together.

Strap Bolt or Lug Bolt. A round bolt with a flat bar of iron welded to it, and usually with a hook on the end which serves the purpose of a head. The flat bar has holes in it, by which it is attached to a piece of timber or other object by one or more separate bolts or screws.

Strap Brake (Hoisting Gear). A method of controlling the spools by an iron strap which is pressed down upon the spool.

Strap Hinge. A door hinge, the two parts of which are made longer than those of a butt hinge, and of a triangular shape.

Strap Washer or **Washer Plate.** A wrought iron strap which takes the heads of several bolts.

Strike Plate. The keeper for a beveled latch bolt against which it strikes, so as to snap shut automatically.

Striker Arm. A SEAT ARM. The term striker arm, seat back arm and seat arm are commonly used.

Striker Plate. See STRIKE PLATE.

Striking Casting. See STRIKING PLATE.

Striking Horn. Standard. In 1899 the vertical height of the stop shoulder, or horn of coupler, was fixed at not less than 3½ inches.

In 1899 the recommendation of the Coupler Committee that the horn of the coupler be arranged to touch the striking plate before the back of the head of the coupler strikes the ends of the draft timbers, was adopted as a standard of the Association.

In 1916 the "D" coupler, as shown on M. C. B. Sheet 23 was adopted as Standard.

Striking Plate. 12, Figs. 34, 35; 11, Fig. 80; 13, Fig. 111; Page 1154. 29, Fig. 260; Fig. 969. A metal plate placed on the end sills of freight cars against which the horn of the coupler strikes, preventing damage to the end sill.

String Board (Passenger Car Steps). A vertical board which supports the ends of the steps. A step hanger.

Stringer. 3, Figs. 34, 35, 147; 14, Fig. 210.

A term sometimes applied to a floor nailing strip or a steel member which acts as a support for a nailing strip. A longitudinal floor stringer sometimes occupies a position similar to that of an intermediate sill but is not designed to perform its duties. See NAILING STRIP.

Stringer Pocket. A casting for supporting the end of a beam or stringer. In automobile and similar cars, for facilitating the use of a second or upper deck for increasing the loading capacity for small freight.

Stringer Support. See FLOOR BEAM.

Strut (of a Truss). A member subjected to a strain of compression. A vertical strut is usually called a post. See BRAKE BEAM STRUT.

Stud. A comparatively short vertical wooden post in the side or end framing, usually to act as a brace or support for some other member of the frame. Also used as a nailing strip or furring. See NAILING STRIP and FURRING.

A headless bolt, threaded on both ends. A standing bolt, pin, boss or protuberance designed to hold an attached object in place, especially one formed of a headless bolt permanently screwed into a tapped hole in a casting or forging so as to become a part thereof.

Sub-Carline (Refrigerator Car). A strip of wood under the main carline, supporting the sub-roof. See CARLINE.

Sub-Floor (Refrigerator Car). A layer of flooring boards under the main floor, and usually separated from it by an air space and hair felt or some form of special insulation.

Sub-Roof (Refrigerator Car). The inside layer of boards of the roof proper, supported on sub-carlines.

Sub-Sill. Fig. 469. A sill or timber bolted under another sill to reinforce it. See BUFFING SUB-SILL.

Suburban Car. A passenger car for use on short runs, particularly between large cities and their suburbs. See PASSENGER CAR, CAR COACH.

Subway Car. Pages 1186-1188, 1318. An electric motor car for use in subways in large cities.

Sugar Cane Car. A flat car especially arranged for carrying sugar cane. See CANE CAR.

Supply Pipe (Air Compressor). A pipe sometimes connected to the air inlet of an air compressor by means of which the air supply is drawn from a point away from the compressor.

(Lavatory Fittings.) Pipes which carry hot or cold water to the basin faucets.

Supply Valve (Steam Heating). Fig. 2068; Page 1184. A valve for regulating the supply of steam in the radiator pipes of a car.

Suspension. The method of supporting a railway motor. Except in the case of gearless motors, the suspension is designed to put as little dead weight as possible on the axle.

Fig 2474, etc. The iron work and fittings which are attached to a truck for supporting or suspending the axle generator and which include the belt tightening and aligning devices. The generator is almost invariably carried outside the truck frame, the four most-used systems of suspension being the bottom pivoted, top pivoted, parallel link and sliding. The parallel link is most used.

Sweeping Car or **Sweeper.** Figs. 461, 462. A car with rotary brooms for sweeping snow from a railroad track. The brooms are attached to a horizontal shaft which is connected by suitable gearing with the axles, and the brooms are thus made to revolve.

Swing Back Car Seat. A car seat the back of which swings over the cushion, without reversing, top-to-bottom. It requires that both sides of the seat back be upholstered so that either side may be used. Such a seat back requires but one head roll.

Swing Bolster. A truck bolster (so called in distinction from a rigid bolster) which bears on springs that are supported by a transverse timber called a spring plank, which is suspended by hangers or links so that it can swing laterally in relation to the truck. As the springs rest on this plank and they support the bolster, the latter can swing with the spring plank. The object of providing this swinging motion to the bolster is to prevent, as much as possible, lateral blows and shocks from being communicated to the car body, and, vice versa, to prevent the momentum of the car body from acting with its full force on the truck frame and wheel flanges.

Swing Bolster Spring. See LATERAL MOTION SPRING.

Swing Cables (Steam Shovel). The wire ropes passing around the swinging circle and carried back to the swing gear and drum.

Swing Engine (Steam Shovel). The engine geared to the swing drum and used to revolve the swinging circle.

Swing Figurehead (Steam Shovel). The fixed pulley or sheave about which one of the swing cables is passed to be led back to the swing gear and drum.

Swing Gear (Steam Shovel). The gear and drum about which the swing cables are wound and which controls the movement of the swinging circle.

Swing Hanger. 46, Fig. 1003. Bars or links, attached at their upper ends to the transoms or some other rigid member of a swing motion truck, and carrying the spring plank at their lower ends. Various forms are (1) solid bars with an eye at each end; (2) swing link hangers, made like a long link of a chain; (3) those made with a fork or clevis at one end and an eye at the other, and used commonly on passenger equipment trucks; and (4) those made with a very short link attached to an eye bolt passing through the transom. Also called bolster hanger. See EYE BOLT LINK HANGER.

Swing Hanger Carrier. A bearing for the upper swing hanger pin.

Swing Hanger Friction Block. A casting or bearing of considerable diameter, on which the upper end of a swing hanger rests.

Swing Hanger Friction Washer (Lower and Upper). A cast iron chafing block serving no other purpose than to take the wear. It is only occasionally used. A friction block is almost synonymous, but is usually a larger casting.

Swing Hanger Pin or **Axle** (Lower and Upper. 48, Fig. 1003. An iron bar by which a swing hanger on a car truck is suspended, or which supports a spring plank. The lower swing hanger pivot is sometimes called a cross bar or mandrel pin or axle. The upper one is carried in a swing hanger pin bearing attached to the transom.

Swing Hanger Pin Bearing. A casting acting as a bearing for a swing hanger pin.

Swing Hanger Shaft. See SWING HANGER PIN.

Swing Joint. See FLEXIBLE METALLIC JOINT.

Swing Link. See SWING HANGER.

Swing Link Hanger. A SWING HANGER made in the form of an open link.

Swing Motion. A term applied to an arrangement of hangers and other supports for the springs and truck bolster which enables a car body to swing laterally on the truck. See SWING BOLSTER, SWING HANGER.

Swing Motion Truck. Figs. 980, 987-982, 995, 996, 1018. A truck with a bolster and spring plank suspended on swing hangers so that they can swing laterally in relation to the truck frame. Also called swing bolster truck in distinction from a rigid bolster truck.

Swing Spring Plank. A transverse timber underneath the bolster of a four-wheeled truck, or the spring beam of a six-wheeled truck, on which the bolster springs rest. A swing spring plank differs from an ordinary spring plank in being supported by hangers or links. See SPRING PLANK.

Swinging Circle or **Mast Wheel** (Steam Shovel). A large wheel at the foot of the mast or boom about which is wound a chain for revolving the boom.

Swinging Platform (Pile Driver). A platform carrying the entire pile driving gear in such manner that it can be swung about at right angles to the car so as to project for a considerable distance on either side. It swings upon a center plate, and its movements are controlled by the SLEWING GEAR.

Switch. Page 1192. An arrangement of rails, movable at one end by means of a lever or other mechanism, which may be moved to connect with either of two tracks.See LINE SWITCH, ELECTRO-PNEUMATIC COMPRESSOR SWITCH.

Switch Group (Motor Cars). Figs. 2601, etc. A combination of two or more unit-switches or contactors mounted in a suitable frame and protected by a removable cover.

Switch Box Support. A bracket for securing an electric lighting switch to the underframe or car body.

Switch, Regulating. See ELECTRIC HEATER.

Switch Stand. Page 1193. Usually a housing containing the switching apparatus and provided with lamp and other signals.

Swivel (of a Chain). A twisting link, consisting of a headed pin, entering an eye or ring in an adjacent link. The object is to avoid kinking. Hence the term is applied to many forms of equivalent devices, consisting essentially of a ring surrounding a headed bolt in such manner as to permit rotation.

T

T or **Tee** (Pipe Fitting). A T-shaped tube for uniting one pipe at right angles to two others in the same line. The pipes are screwed into the arms of the T. A Reducing Tee has the arms of different diameters.

T-Hinge. A door hinge, one part of which is made like a strap hinge, and the other like a butt hinge, so that the shape of the whole resembles a letter T. See HINGE.

Table. 19, Figs. 2626, 2627. A removable board attached to the side of the car by inserting a table hook fixed to the table into a table hook plate fixed to the side of the car. The outer end of the table is supported by a table leg, which is sometimes vertical and sometimes slanting and which folds back against the table when not in use. The tables of dining cars are generally permanently fastened to the floor and sides of the car. A drop table is sometimes used in the kitchens of dining cars. See DISTRIBUTING TABLE.

Table Fastener. A latch by which a folding table is fastened up out of the way.

Table Hinge. A hinge for a folding table.

Table Holder. A special form of table hook. See TABLE.

Table Hook. See TABLE.

Table Leg Hook. A metal hook which is attached to a slanting table leg. It engages in a plate attaching to the side of the car.

Tail Coupling (Alcove Faucet). Fig. 1727.

Tail Gate. See PLATFORM TAIL GATE.

Tail Gate Sockets. Figs. 619-624.

Tail Lamp or **Tail Light.** Figs. 2212, etc.; Page 1185. A signal used to indicate the rear of a train, and carried on a bracket or socket at the side of the car in order to be visible from the engine. Two are used, one on each side of the train, on the rear of the rear car.

Tail Lamp Socket. See SIGNAL LAMP SOCKET.

Take-Up Reservoir Check Valve (Triple Valve). 37, Fig. 1382-A.

Tandem Spring Draft Gear. Figs. 769, 780. A draft gear in which the springs are arranged in tandem.

Tank (Passenger Cars). A water tank for the wash room.

(Gas Lighting Apparatus.) More properly RECEIVER or HOLDER.

(Tank Car.) 8, Fig. 173. The body of a tank car. Usually a metal cylinder, but also made of wood and rectangular. Glass lined tanks are also in use for carrying mineral water and liquids which would attack metal.

Tank Band. An iron strap which passes around the tank of a tank car to hold it in place on the underframe.

Tank Car. Figs. 165-181, 2816, 2872-2875; Pages 1187, 1206, 1274. A car the body of which consists of a tank for carrying liquids, such as oil, molasses, vinegar, etc.

Tank Cars, Specifications for (M. C. B. Standard). In 1903 a report was submitted embodying certain specifications for the repairs of old equipment and the construction of new equipment. These specifications were submitted to letter ballot and adopted as Recommended Practice.

The committee made a progress report; 1904 Proceedings, page 284.

They were revised in 1906, 1907, 1908 and 1909.

In 1910 they were advanced to Standard.

The report of the committee in the 1912 Proceedings, page 413, contains an appendix giving the results of tests made to determine what changes would be necessary in existing tank cars to provide for carrying natural gas gasoline. Another appendix on page 434 gives the results of a series of tests to determine the effect of a 2" magnesia lagging insulation on the tank. Other reports will be found in the 1913 Proceedings, page 522; 1914 Proceedings, page 337; and 1916 Proceedings, page 404.

In 1912 they were revised and new specifications added for special tank cars for the transportation of liquefied petroleum gas (casinghead gasoline) and of liquid chlorine gas. In 1913 minor changes were made. In 1914 the requirements for testing tanks and safety valves were revised and provision made for the certification of the tests to the Bureau of Explosives. In 1916 the specifications covering existing tank cars (Classes I and II) were revised, and new specifications added for tank cars (Class III) for general service, and for tank cars (Class IV) for highly volatile inflammable liquid products, to be built after May 1, 1917.

In 1917 specifications for Classes I and II cars were revised to permit restricted use after January 1, 1918, of tanks tested to 40 lb. per square inch; detailed specifications for tank cars (Class V) for transportation of liquid chlorine gas and liquid sulphur dioxide were added, and some minor changes made.

In 1918, owing to the conditions brought about by the war, the requirement that flange quality steel be used in the construction of Class III tanks was suspended until July 1, 1919, and the requirements for hydraulic retests of all classes of tanks were suspended until January 1, 1920. Some modifications were made in Figs. 6, 9-A, 10-A and 13.

DEFINITION

Tank Car.—Any car to which one or more metal tanks, used for the transportation of liquids or compressed gases, are permanently attached.

NOTE.—These specifications do not apply to cars having wooden or glass lined tanks, nor to gas transport cars with one or more tanks or containers permanently attached; nor to tanks enclosed in box or other house cars.

Section 23, Test of Tanks, does not apply to cars specially designed for the transportation of solids, such as lime nitrogen.

To indicate to inspectors and others handling cars with wooden or glass lined tanks or cars specially designed for the transportation of solids that such cars do not come under the provisions on the Tank Car Specifications, the words "Wooden-lined Tank—Pressure Test Not Required," or "Glass-lined Tank—Pressure Test Not Required," or "For Solids Only—Pressure Test Not Required," as the case may be, should be stenciled on the tank in place of the record of test of tank in the location shown by Fig. 6. (M. C. B. Sheet 26A. Fig. 3000.)

CLASSIFICATION

Tank cars shall be classified as follows:

Class I.—Tank cars for general service, with wooden or steel underframes or without underframes, built prior to 1903.

Class II.—Tank cars for general service, with steel

underframes or without underframes, built between 1903 and May 1, 1917.

Class III.—Tank cars for general service, built after May 1, 1917.

Class IV.—Tank cars for the transportation of volatile inflammable products whose vapor pressure at a temperature of 100° F. exceeds ten lb. per sq. in., built after May 1, 1917.

Class V.—Insulated tank cars of specially heavy construction, built after January 1, 1918, for the transportation of liquid products whose properties are such as to involve danger of loss of life in the event of any leakage or rupture of the tank.

Designs for tank cars of Classes IV and V shall be submitted to and approved by the Master Car Builders' Association before the cars are put into service.

If products are offered for transportation, the characteristics of which are such that they can not properly be transported in any of these classes of cars, special specifications will be made by the Master Car Builders' Association, but in all such cases the designs of the cars shall be submitted to and be approved by the Association before the cars are put into service.

SERVICE

(a) Classes II and III tank cars, with tanks tested as prescribed by the specifications to 60 lb. per sq. in., shall be used for the transportation of the following products, because of their inflammable or corrosive nature, or their value:

Acid, Sulphuric.	Glycerine.
Acid, Nitrating.	Gas Drips, Crude.
Alcohol, Denatured or Wood.	Gasoline.
	Naphtha.
Alcohol, other than Denatured or Wood.	Naphtha Distillates.
	Rum, Denatured.
Ammoniacal Gas Liquor, Crude.	Toluol.
	Turpentine, Spirits of, or Wood Turpentine.
Aqua Ammonia.	
Benzine.	*Paints, Compounded.
Benzol.	*Petroleum Crude Oil.
Bisulphide of Carbon.	*Turpentine Substitutes.
Carbon Tetrachloride.	*Paint or Varnish Dryers, Liquid.
Coal Tar Oil, Crude.	
Coal Tar Naphtha, Light Oil.	

*If inflammable vapors are given off at or below 80° F.

(b) Classes I and II tank cars, with tanks tested as prescribed by the specifications to 40 lb. per sq. in., may be used for the transportation of other products whose vapor pressure at a temperature of 100° F. does not exceed 10 lb. per sq. in., and which do not give off inflammable vapors at or below a temperature of 80° F.

(c) Class IV tank cars, with tanks tested as prescribed by the specifications to 75 lb. per sq. in., shall be used for the transportation of volatile inflammable products whose vapor pressure at a temperature of 100° F. exceeds 10 lb. per sq. in.

Typical product of this description: Casinghead Gasoline (Liquefied Petroleum Gas).

(d) Class V tank cars, with tanks tested as prescribed by the specification to 300 lb. per sq. in., shall be used for the transportation of liquid products whose properties are such as to involve danger of loss of life in the event of leakage or rupture of the tank; provided that shipment of such products in tank cars is authorized by the Interstate Commerce Commission's Regulations Governing the Transportation of Dangerous Articles Other than Explosives.

Liquid products of this description whose shipment has been so authorized are: Chlorine, Sulphur Dioxide.

TRANSPORTATION REQUIREMENTS

(a) A tank offered for movement over the lines of a railroad must conform to the specifications corresponding to the product transported in the car.

(b) A tank which bears evidence of damage to the metal by fire shall be withdrawn from transportation service. Provided, however, that where the damage to the tank is local only, or confined to a section not exceeding 25 per cent. of the tank surface, the damaged material may be replaced. Before car is returned to service after such replacement the tank and valves shall be again submitted to the prescribed tests and be properly stenciled.

(c) A tank which does not meet the prescribed tests shall be withdrawn from transportation service.

The design and construction of the tanks and cars throughout shall be at least as strong as required by the following detailed specifications.

NOTE.—These specifications cover only such features of design and construction as are peculiar to tank cars. Other features are covered by the Standards and Recommended Practice of the Master Car Builders' Association, and the requirements of the Federal Government as to Safety Appliances, etc., applying to all classes of freight cars.

CLASS I TANK CAR
(Built prior to 1903)

TANK

1. *Bursting Pressure*.—Not specified.
2. *Material*.—Not specified.
3. *Riveting*.—Not specified.

NOTE.—Tanks built prior to 1903, having head blocks and head seams single riveted, may continue in service until heads require repair or renewal, when they shall be double riveted; or preferably, the tanks secured against end shifting by some means other than by the use of head blocks. (See Sec. 13 (b).)

4. *Calking*.—Not specified.

5. *Tank Heads*.—If tank heads less than 7/16 in. thick bear evidence of distress due to damage from contact with head blocks, they shall be reinforced at bottom by steel shoes not less than 3/8 in. thick, riveted to head and shell.

This requirement shall apply, also, where head blocks have been removed and the tank anchored to the underframe.

6. *Dome*.—(a) Where tank cars are fitted with cast-iron dome heads and covers not sufficiently strong to stand the 40-lb. or 60-lb. hydraulic test they shall be replaced by others of cast or pressed steel, or of malleable iron.

(b) The dome cover shall be secured either by screw joint, or by bolting, or by yoke with center screw.

The joint of the dome cover shall be made tight against vapor pressure, and when necessary to insure this a satisfactory gasket shall be used.

For cars to be used for the transportation of inflammable liquids with flash points below 20° F. the mechanical arrangement for closing the dome cover shall either be such as to make it practically impossible to remove the dome cover while the interior of the car is subjected to pressure, or suitable vents that will be opened automatically by starting the

operation of removing the dome cover, shall be provided. An approved method is shown by Fig. 1. Other methods may be used if approved by the Master Car Builders' Association.

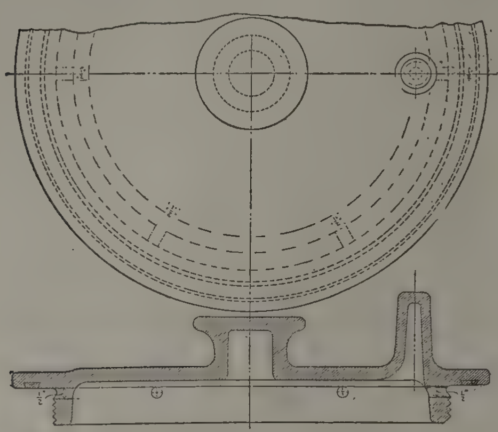


FIG. 1.—APPROVED METHOD OF AUTOMATICALLY VENTING PRESSURE IN TANK UPON STARTING REMOVAL OF DOME COVER.

7. *Bottom Outlet Valve.*—(a) If tank is provided with bottom outlet valve, the valve shall be so located that breakage of the connection pipe will not unseat the valve. The preferable construction is to have the outlet valve casing scored to confine the breakage at the scoring (Fig. 2).

(b) Wooden and steel underframe tank cars shall have a longitudinal clearance for bottom outlet valve extension as follows:

Not less than 6 in. on each side of valve, if tank is secured from end shifting by means of head blocks.

Not less than 3 in. on each side of valve, if tank is secured by center anchorage.

(c) If bottom outlet valve is used, it is preferred that the handle shall be within the tank or dome, but in the event that the rod is carried through the dome, leaking shall be prevented by packing and cap nut.

UNDERFRAME, ANCHORAGE, ETC.

8. Tank cars built prior to 1903 may have either wooden or steel underframes or reinforced shell.

9. *Cars with Wooden Underframes.*—(a) *Center Sills.*—If cars are not equipped with intermediate sills the underframe shall have two center sills, each not less than 5 in. wide by 10 in. deep, or the equivalent in strength. If the car is equipped with intermediate sills, the center sills shall not be less than 5 in. wide by 9 in. deep, or the equivalent in strength. Center sills shall not be spaced more than 18 in. apart.

(b) *Center Sill Filling Timber.*—Where draft timbers are underneath the center sills, the space between the center sills shall be filled in with timbers not less in depth than center sills, extending from end sill to the center of nearest cross-bearer or cross-timber, provided the latter is located not less than 4 ft. 6 in. from center of bolster. On cars where the draft arrangement is between center sills the filler timber shall be extended to the cross-tie timber when the cars go to shop for repairs to center sills. Center sills and filling timbers shall be securely bolted together by means of ¾-in. bolts. On cars having center or intermediate sills not less than 10 in. wide by 10 in. deep, which may be made up of two 5 by 10-in. sills bolted together, the filling timbers may be omitted.

(c) *End Sills.*—End sills not reinforced by buffer blocks shall not be less than 9 in. wide by 10 in. deep. End sills 6 in. wide by 12 in. deep, reinforced with buffer blocks not less than 6 in. wide by 10 in. deep, and of sufficient length to overlap center sills, will be acceptable as a substitute for 9 in. by 10 in. end sills.

On existing cars, if buffer blocks are used for the purpose of reinforcing end sills which do not come within the specified requirements, the buffer blocks in no case shall be less than 4 in. thick, nor end sills less than 6 in. thick. The total strength of the end sill and buffer block shall be equal to the strength of the construction specified.

(d) *Draft Timbers.*—Draft timbers secured to inside of center sills and extending to cross-bearer or cross-timber will be accepted as a substitute for filling timbers referred to in paragraph (b). Where center sills are 9 in. wide by 10 in. deep, or over, and draft timbers are placed between same, they need not extend farther back than body bolster, provided they are adequately secured to center sills by means of seven ⅞-in. bolts, or their equivalent, and butt against body bolster. Draft timbers located underneath the center sills shall not be less than 4 in. wide by 8 in. deep, and each draft timber shall be held to center sills, end sills and buffer blocks by means of seven or more ⅞-in. bolts or six 1-in. bolts. Where an arrangement for supporting draft timbers is substituted for one or more bolts and the construction is of equal strength, the same will be acceptable. Draft timbers extending beyond bolster shall be secured to center sills by additional bolts.

9-A. *Cars with Steel Underframes.*—(a) Material.—Not specified. (b) Center Sills.—Construction not specified.

Any underframe rebuilt shall conform to the requirements for new tank cars.

10. *Cars without Underframes.*—For cars without underframes built prior to 1903 the thickness of bottom sheet and the riveting were not specified.

11. *Bolsters.*—Cars with steel underframe shall be equipped with steel body and truck bolsters.

12. *Draft Gear.*—(a) *Wooden Underframe Cars.*—The draft gear and draft attachments shall be at least as strong as the design shown in Fig. 5.

Cars should be provided with draft gear stops gained into draft gear timbers or heeled on end sills, filler timber or body bolster, and secured with five ¾-in. bolts; but cars having stops gained into draft timbers or heeled on end sills, filler timber or body bolster, secured with three ¾-in. bolts, may be continued in service until such time as they go to shop for repairs, when five stop bolts must be provided.

In all cases, tail yokes or attachments of equal strength shall be used. Tail bolts, tail straps, or American continuous draft gear will not be accepted.

(b) Steel underframe cars and cars without underframes shall be equipped with draft gear of approved design, having a minimum capacity of 60,000 lb.

13. *Anchorage.*—(a) *Head Blocks, Wooden Underframe Cars.*—Head blocks shall not be less than 10 in. wide unless reinforced by metal plates, and of sufficient depth to extend at least 6 in. above bottom of tank, and may be made of two pieces bolted together and bolted to underframe by means of not

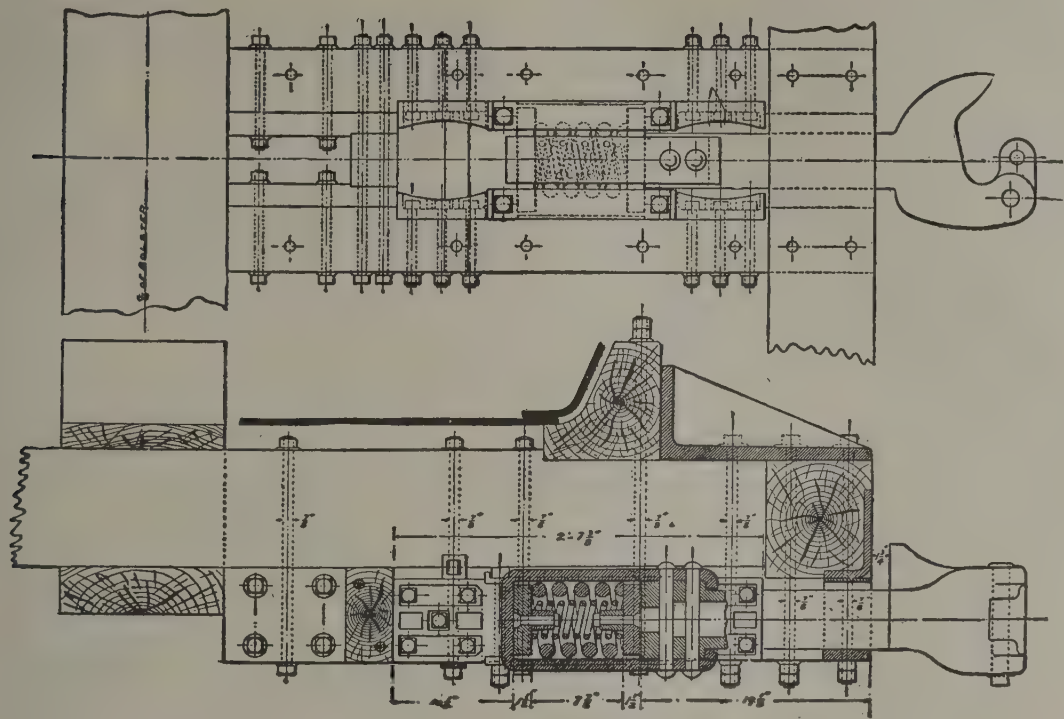


FIG. 5.—MINIMUM REQUIREMENTS, DRAFT GEAR AND ATTACHMENTS, CLASS I TANK CAR WITH WOODEN UNDERFRAME.

less than four ⅞-in. vertical bolts. They shall be cut out to suit curve of tank. The ends of each head block should preferably be tied to corresponding ends of head block at the other end of car by means of rods not less than 1 in. in diameter, with 1⅛-in. threaded ends, and each head block supported at center by means of a substantial casting securely bolted to end and center sills. Where the construction of the car does not permit of this fastening, the following may be substituted:

The ends of each head block tied to corresponding ends of head block at the other end of car by rods not less than 1 in. in diameter, with 1⅛ in. threaded ends, and each head block secured by two stay rods 1 in. in diameter, anchored to center sills:

Or, head block supported at center by means of a substantial casting securely bolted to end and center sills, and two 1-in. rods passing diagonally through head block toward bolster and secured to underframe;

Or, head block secured by two stay rods 1⅜ in. in diameter, anchored to center sills;

Or, head block secured by two stay rods 1 in. in diameter, anchored to center sills, and two 1-in. rods passing diagonally through head block toward bolster and secured to underframe;

Or, head block secured by two stay rods 1 in. in diameter, anchored to center sills, and two straps not less than ¾ in. thick and 3 in. wide, passing over head blocks and securely fastened to underframe.

(b) When tanks are transferred from wooden to steel underframes they shall be secured against end shifting by some approved means other than by the use of head blocks. In such case the longitudinal anchorage of tank to underframe shall be of metal throughout and the minimum requirements shall be as follows:

Connection of anchorage to tank:

Shearing area of rivets, 25 sq. in. Bearing area of rivets, 20 sq. in..	For tanks of 8,500 gal. capacity or over.
Shearing area of rivets, 18 sq. in. Bearing area of rivets, 14 sq. in..	For tanks of less than 8,500 gal. capacity.

Connection of anchorage to underframe:

Shearing area of rivets or bolts, 12½ sq. in.................... Bearing area of rivets or bolts, 10 sq. in......................	For tanks of 8,500 gal. capacity or over.
Shearing area of rivets or bolts, 9 sq. in....................... Bearing area of rivets or bolts, 7 sq. in......................	For tanks of less than 8,500 gal. capacity.

Where bolts are used for securing the anchorage rigidly to the frame, they shall be turned bolts and be driven in reamed holes.

(c) *Dome Yokes, Tank Bands, Etc.*—The tank shall be secured from turning on the underframe either by an anchorage or by dome yokes, and shall also be secured to underframe by tank bands.

If tank bands are used, there shall be two for tanks not more than 76 in. in diameter, and four for tanks of greater diameter, or their equivalent.

The sectional area of tank bands shall at no place be less than ¾ of a sq. in. A threaded end 1⅛ in. in diameter or more, with a body consisting of a flat band 2 by ⅜ in., or equivalent section, or round iron 1 in. in diameter, will be accepted as meeting this requirement.

If the dome yoke is used, it may be a rod ¾ in. in diameter, or its equivalent, to which are secured the bands which are fastened to the underframe. The

sectional area of dome yoke bands shall be the same as required for tank bands.

Where tanks are equipped with a greater number of tank bands than called for, the sectional area of all bands will be considered as meeting the requirements, if they equal the total sectional area of the bands specified.

Cars having no underframes, with tanks securely riveted to body bolsters, do not require dome yokes or tank bands.

14. *Push-pole Pockets.*—There shall be a push-pole pocket at each corner of the car. Where, from the construction of the car the push-pole pockets can not well be placed on the corners of the underframe, they shall be applied to the trucks, so placed above the journal boxes that the push-pole will push toward the center of the truck.

15. *Couplers.*—M. C. B. Standards and Recommended Practice.

16. *Brakes.*—Each car shall be equipped with air brakes of a capacity equal to not less than 70 per cent. of the light weight of car, and at least one hand brake operating the brakes of both trucks.

Note.—By action of the Executive Committee, December 20, 1917, amended March 20, 1918, existing tank cars not having a total hand braking power measured at the brake shoes equal to 70 per cent of the light weight of the car based upon 1,500 lb. pull at the chain, should have the hand brake leverage changed by January 1, 1921, to give such hand braking power.

17. *Trucks.*—Each truck shall have a strength equal to or greater than the strength of the axles used.

18. *Marking.*—When tank cars are repainted the marking shall be made to conform to Fig. 6 (M. C. B. Sheet 26-A) as closely as the construction will permit.

19. *Safety Appliances.*—United States Safety Appliances.

20. *Safety Valves.*—(a) Tanks carrying products that give off volatile inflammable vapors at or below

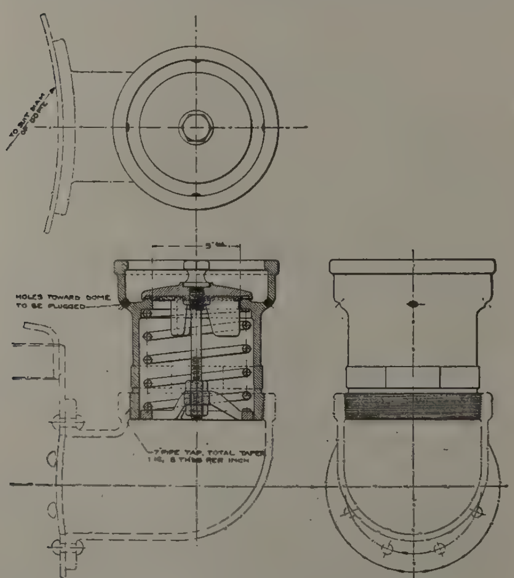


FIG. 8.—5-IN. SAFETY VALVE, ORIGINAL DESIGN.

a temperature of 20° F., and have a vapor pressure of not more than 10 lb. per sq. in. at a temperature of 100° F. (see Note), shall be equipped with 5-in. safety valves of approved design. Existing safety valves of the design shown by Fig. 8, with 25-lb. spring, will be accepted, but new safety valves shall be of the design shown by Fig. 9. Safety valves shall be set to open at a pressure of 25 lb. per sq. in., a tolerance of 3 lb. above or below this pressure being allowed.

Note.—Typical liquid products of this description are: Benzine, Benzol, Carbon Bisulphide, Ether, Gasoline, Hydrocarbon (gas drips), Naphtha.

(b) Tanks carrying products that give off volatile inflammable vapors above 20° F., and at or below 150° F., and have a vapor pressure of not more than 10 lb. per sq. in. at a temperature of 100° F. (see Note),

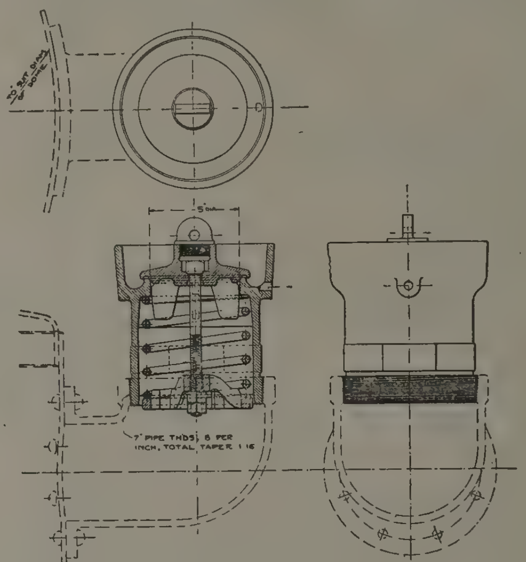


FIG. 9.—5-IN. SAFETY VALVE, STANDARD, APPLIED TO SIDE OF DOME.

shall be equipped with 5-in. safety valves of approved design. Existing safety valves of the design shown by Fig. 8 will be accepted, but new safety valves shall be of the design shown by Fig. 9. Safety valves may be set to open at a pressure of 12 lb. per sq. in., a tolerance of 1 lb. above or below this pressure being allowed. Tanks with safety valves set at 25 lb. may also be used for such products.

Note.—Typical liquid products of this description are: Alcohol, Acetone, Distillates, Gas Oil, Illuminating Oil, Kerosene, Refined Oil, Turpentine, Turpentine Substitute, Toluol.

(c) One valve shall be provided for a tank of a capacity of 6,500 gal. or less, and two valves for a tank of a capacity of more than 6,500 gal.

Where tanks carrying such products are divided into compartments each compartment shall be provided with a safety valve.

21. *Safety Vents.*—(a) Tanks carrying volatile non-inflammable products whose vapor pressure at a temperature of 100° F. does not exceed 25 lb. per sq. in. (see Note) need not be equipped with safety valves; but if not so equipped, shall be provided with a 5-in. vent depending on a frangible lead disk for safety, which vent shall be of approved design, as shown by Fig. 11, the disk to be of a thickness that will insure rupture at a pressure not higher than 30 lb. per sq. in.

Note.—Typical liquid products of this description are: Ammonia Liquor, Ammonia Water.

(b) Tanks carrying non-volatile products, or products that do not give off inflammable vapors at or

below a temperature of 150° F. (see Note) need not be equipped with safety valves, but, if not so equipped, shall be provided with an open vent equal to not less than 2 in. in diameter of approved design (Fig. 12).

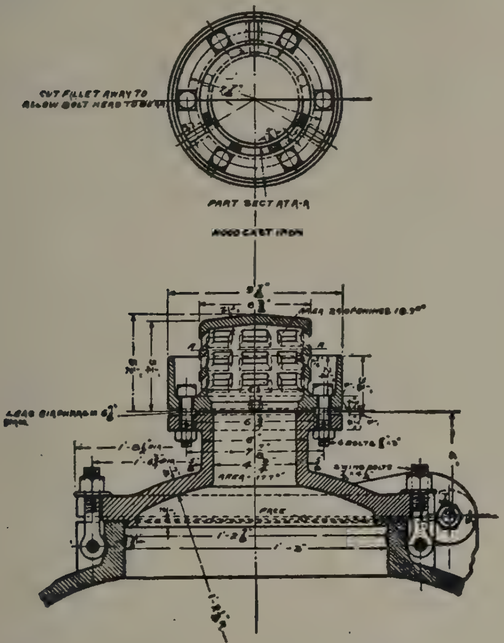


FIG. 11.—5-IN. SAFETY VENT, WITH FRANGIBLE LEAD DISK.

NOTE.—Typical liquid products of this description are: Calcium Chloride, Caustic Soda, Cottonseed Oil, Fish Oil, Glucose, Lard Oil, Linseed Oil, Molasses, Silicate of Soda, Sulphuric Acid, Mixed Sulphuric and Nitric Acids, Tannery Products, Vinegar.

Provided, that where vent is used, and it is necessary to avoid evaporation or splashing of the liquid, or contamination by moisture, the vent shall be closed with a frangible disk of lead, or other suitable material, of a thickness that will insure rupture at a pressure not higher than 30 lb. per sq. in. (Fig. 12).

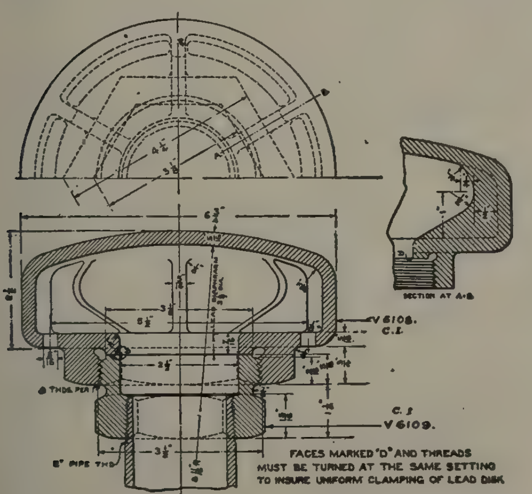


FIG. 12.—2-IN. SAFETY VENT, WITH FRANGIBLE DISK.

TESTS

22. *Certification of Tests.*—Tests of all tanks and their safety valves shall be certified by the party making the tests to the owner of the tank car and to the Chief Inspector, Bureau of Explosives, in the form prescribed by the Bureau.

23. *Tests of Tanks.*—Tanks shall be tested at intervals of not over five years.

Any tank damaged to the extent of requiring patching or renewal of one or more sheets, or extensive reriveting or recalking of seams, shall be retested before being returned to service.

NOTE.—By action of the Executive Committee, December 15, 1917, the requirement of retests was suspended as to tanks for which such tests shall become due prior to January 1, 1920, except when the cars are shopped for repairs.

The requirement that tanks damaged to the extent of requiring patching or renewal of one or more sheets, or extensive reriveting or recalking of seams, shall be retested before being returned to service, was not suspended.

Tanks shall be tested to a pressure of either 40 or 60 lb. per sq. in.

All tests shall be made by completely filling the tank with water, or other approved liquid safe to use, of a temperature which shall not exceed 70° F. during the test, and applying the pressure in any suitable manner. The tank shall hold the prescribed pressure for not less than ten minutes without leak or evidence of distress after the tank has been calked tight.

When tanks are tested the date, pressure to which tested, place where test was made, and by whom, shall be stenciled on the tank in accordance with the Master Car Builders' Standard Marking for Freight Cars (Fig. 6) (M. C. B. Sheet 26A).

24. *Tests of Safety Valves.*—Safety valves shall be tested at intervals of not over two years.

The test may be made without the removal of the valve from the car, provided the valve unseats at a total pressure corresponding with the area of the seat multiplied by the required pressure (Fig. 13).

When valves are tested, the date, pressure to which tested, place where test was made, and by whom, shall be stenciled on the tank, in accordance with the Master Car Builders' Standard Marking for Freight Cars (Fig. 6) (M. C. B. Sheet 26A).

INSPECTION

25. *Inspection.*—All tank cars at home on a railroad shall be inspected by inspectors in the employ of that railroad company, and when such tank cars

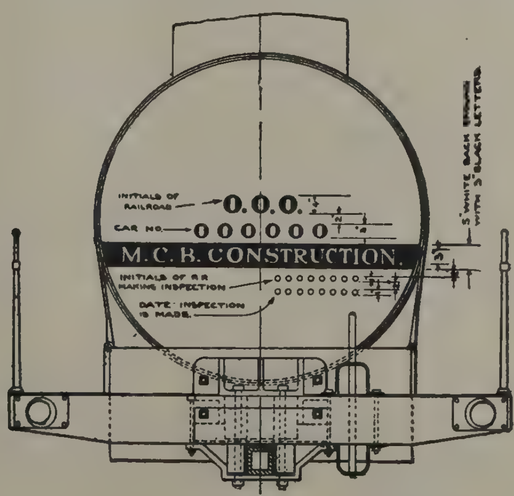


FIG. 6-A.—MARKING—LEGEND TO SHOW COMPLIANCE WITH M. C. B. SPECIFICATION, CLASSES I AND II TANK CARS, UNTIL RESTENCILED, WHEN FIG. 6 SHALL BE FOLLOWED.

meet the requirements of the Master Car Builders' Standard Specifications for Class I Tank Cars, the legend "M. C. B. Construction," with the initials of the railroad company making such inspection, and the date the inspection is made, shall be stenciled on the tank in accordance with the Master Car Builders' Standard Marking for Freight Cars (Fig. 6) (M. C. B. Sheet 26-A) (Fig. 3000).

NOTE.—If foreign cars and individual tank cars at home on foreign lines stenciled with the legend "M. C. B. Construction" by a foreign road, are offered for movement over another railroad, and some of the details do not conform to the requirements of the Tank Car Specification, a report of same should be made through the proper officers to the official in charge of equipment, and the car allowed to proceed until further notice.

blocks are not used head seams need not be double riveted.

NOTE.—Tanks having head blocks and head seams single riveted, may continue in service until heads require repair or renewal, when they shall be double riveted; or, preferably, the tanks secured against end shifting by some means other than by the use of head blocks. (See Section 13 (a).)

4. *Calking.*—Not specified.

5. *Tank Heads.*—Same as Class I.

6. *Dome.*—Same as Class I.

7. *Bottom Outlet Valve.*—Same as Class I.

UNDERFRAME, ANCHORAGE, ETC.

8. Tank cars built subsequent to 1903 shall have either steel underframe or reinforced shell.

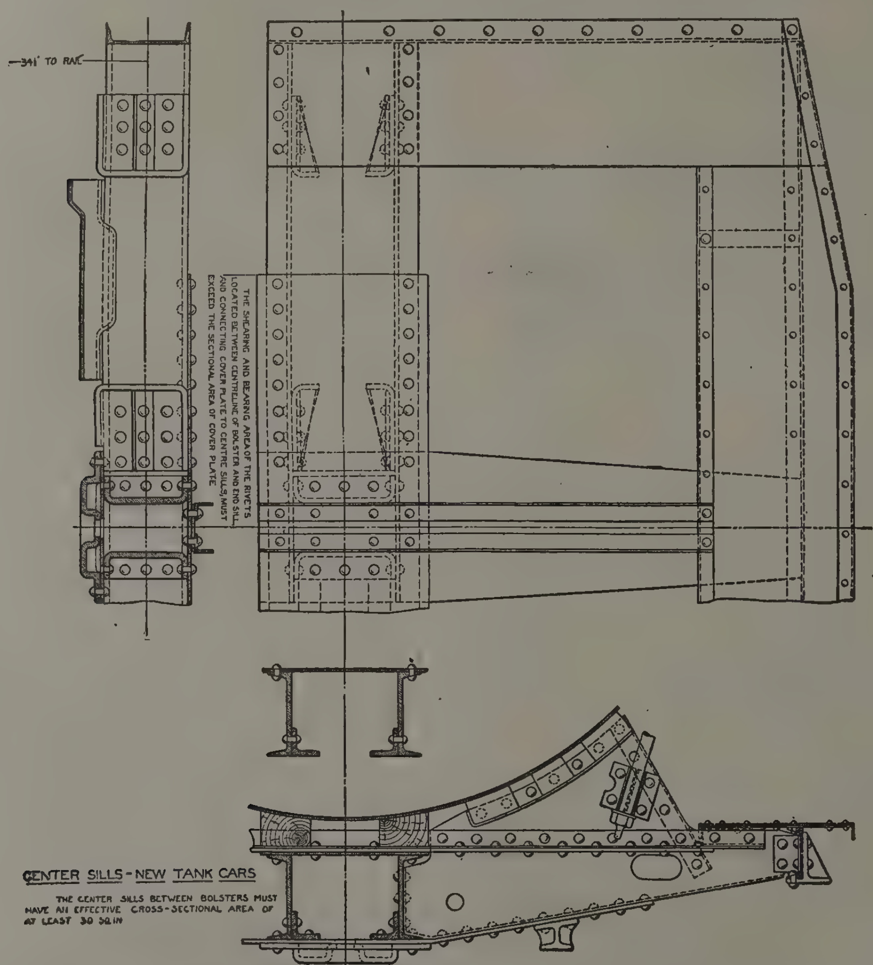


FIG. 3.—CENTER-SILL CONSTRUCTION, CLASS II TANK CAR.

Class II Tank Car

(Built between 1903 and May 1, 1917)

TANK

1. *Bursting Pressure.*—Steel or iron tanks constructed subsequent to 1903 shall be designed for a bursting pressure of not less than 240 lb. per sq. in.

2. *Material.*—Not specified.

3. *Riveting.*—All longitudinal and head seams shall be double riveted, with the exception that where head

9. *Cars with Underframe.*—(a) Material. Not specified.

(b) *Center Sills.*—For cars built after 1906 the center sill construction of the underframe between bolsters shall have an effective cross-sectional area of at least 30 sq. in., distributed as shown in Fig. 3, or equivalent.

Any underframe rebuilt shall conform to the requirements for new tank cars.

10. *Cars without Underframe.*—For cars built after 1906 tank shell at bottom shall be at least ⅝ in. thick,

and all circumferential seams in bottom sheet, except head seams, shall be double riveted.

11. *Bolsters.*—Cars shall be equipped with steel body and truck bolsters.

12. *Draft Gear.*—Cars shall be equipped with a draft gear of approved design, having a minimum capacity of 60,000 lb.

13. *Anchorage.*—(a) *Longitudinal.*—The longitudinal anchorage of the tank shall be thoroughly substantial to prevent injurious end shifting. The preferable method of securing tank against end shifting is by anchorage at the center, or at the bolster, or by securing it to the underframe by some means other than by the use of head blocks. The method of anchorage shall be one approved by the Master Car Builders' Association.

If the longitudinal anchorage is by means of head blocks, each head block shall be bolted to underframe or head block casting by not less than two bolts. The head block shall be cut out to suit curve of tank, and be supported at center by means of a substantial casting securely riveted to center sills.

For cars built after 1909 and for cars changed after January 1, 1917, from head blocks to approved anchorage, the minimum requirements for longitudinal anchorage of tank to underframe shall be as follows:

Connection of anchorage to tank:

Shearing area of rivets, 25 sq. in. Bearing area of rivets, 20 sq. in.	For tanks of 8,500 gal. capacity or over.
Shearing area of rivets, 18 sq. in. Bearing area of rivets, 14 sq. in.	For tanks of less than 8,500 gal. capacity.

Connection of anchorage to underframe:

Shearing area of rivets or bolts, 12½ sq. in. Bearing area of rivets or bolts, 10 sq. in.	For tanks of 8,500 gal. capacity or over.
Shearing area of rivets or bolts, 9 sq. in. Bearing area of rivets or bolts, 7 sq. in.	For tanks of less than 8,500 gal. capacity.

Where bolts are used for securing the anchorage to the frame, they shall be turned bolts and be driven in reamed holes.

(b) *Dome Yokes, Tank Bands, Etc.*—The tank shall be secured from turning on the underframe either by an anchorage or by dome yokes, and shall also be secured to underframe by tank bands, or other approved means of equal strength and security.

If tank bands are used, there shall be two for tanks not more than 76 in. in diameter, and four for tanks of greater diameter, or their equivalent.

The sectional area of tank bands shall at no place be less than ¾ of a sq. in. A threaded end 1⅛ in. in diameter or more, with a body consisting of a flat band 2 by ⅜ in., or equivalent section, or round iron 1 in. in diameter, will be accepted as meeting this requirement.

If dome yoke is used, it may be a rod ¾ in. in diameter, or its equivalent, to which are secured the bands which are fastened to the underframe. The sectional area of dome yoke bands shall be the same as required for tank bands.

Where tanks are equipped with a greater number of tank bands than called for, the sectional area of all bands will be considered as meeting the requirements, if they equal the total sectional area of the bands specified.

Cars having no underframes, with tanks securely riveted to body bolsters, do not require dome yokes or tank bands.

14. *Push-pole Pockets.*—Same as Class I.

15. *Couplers.*—M. C. B. Standards and Recommended Practice.

16. *Brakes.*—Same as Class I.

17. *Trucks.*—Same as Class I.

18. *Marking.*—Same as Class I.

19. *Safety Appliances.*—United States Safety Appliances.

20. *Safety Valves.*—Same as Class I.

21. *Safety Vents.*—Same as Class I.

TESTS

22. *Certification of Tests.*—Same as Class I.

23. *Tests of Tanks.*—Tanks shall be tested before being put into service, again at the expiration of ten years, and after that at intervals of not over five years; with the exception that where tanks are used for the transportation of such corrosive products that deterioration is to be expected in a shorter time, the first test period for such tanks shall be reduced to five years. Tanks requiring this five-year test shall be those used for the transportation of chemicals, such as acids, ammonia liquors, etc., and such other products as hereafter may be specified.

Any tank damaged to the extent of requiring patching or renewal of one or more sheets, or extensive reriveting or recalking of seams, shall be retested before being returned to service.

NOTE.—By action of the Executive Committee, Decemebr 15, 1917, the requirement of retests aw ssuspended as to tanks for which such tests shall become due prior to January 1, 1920, except when the cars are shopped for repair.

The requirement that tanks damaged to the extent of requiring patching or renewal of one or more sheets, or extensive reriveting or recalking of seams, shall eb retested before being returned to service, was not suspended.

Tanks shall be tested to a pressure of either 40 or 60 lb. per sq. in.

All tests shall be made by completely filling the tank with water or other approved liquid safe to use, of a temperature which shall not exceed 70° F. during the test, and applying the pressure in any suitable manner. The tank shall hold the prescribed pressure for not less than ten minutes without leak or evidence of distress after the tank has been calked tight.

When tanks are tested, the date, pressure to which tested, place where test was made, and by whom, shall be stenciled on the tank in accordance with the Master Car Builders' Standard Marking for Freight Cars (Fig. 6) (M. C. B. Sheet 26A).

24. *Tests of Safety Valves.*—Same as Class I.

INSPECTION

25. *Inspection.*—Same as Class I.

CLASS III TANK CAR
(Built after May 1, 1917)

TANK

1. *Bursting Pressure.*—The calculated bursting pressure, based on the lowest tensile strength of the plate or casting and the efficiency of the seam or attachment, shall not be less than 300 lb. per sq. in.

2. *Material.*—(a) All plates for tank and dome shall be of steel complying with the American Society

for Testing Materials Specifications for Boiler Plate Steel, Flange Quality.

Note.—By action of the Executive Committee, May 29, 1917, the effective date of this section was extended to *July* 1, 1919.

The use of material other than steel will be permitted where desirable because of the nature of the product to be transported; provided that the tank shall be subject to the same requirement as to bursting pressure, and that the thicknesses of the plates shall be increased to correspond to those specified in the case of steel, based upon the lowest tensile strength of the material, and be approved by the Master Car Builders' Association.

(b) Rivets shall comply with the Master Car Builders' Association Specifications for Rivet Steel and Rivets for Passenger and Freight Equipment Cars.

(c) Minimum thicknesses of plates shall be as follows:

Diameter of Tanks.	Bottom Sheet.	Shell Sheet.	Dome Sheet.	Tank Heads.	Dome Heads.
60 in. or under.....	7/16 in.	1/4 in.	5/16 in.	1/2 in.	5/16 in.
Over 60 in. to 78 in..	7/16 in.	5/16 in.	5/16 in.	1/2 in.	5/16 in.
Over 78 in. to 96 in..	1/2 in.	3/8 in.	5/16 in.	1/2 in.	5/16 in.

For tanks without underframes the minimum thickness of bottom sheet shall be 5/8 in.

For tanks built in rings the thickness specified for bottom sheet shall apply to the entire cylindrical shell.

For car with underframe the minimum width of bottom sheet of tank shall be 60 in., but in all cases the width shall be sufficient to bring the entire width of the longitudinal seam, including overlaps, above the cradle.

3. *Riveting.*—(a) All seams shall be double riveted, with the exception of the dome head seam, which may be single riveted.

Seams shall be riveted metal to metal, without the interposition of other material.

(b) For double riveting the size and pitch of rivets shall be as follows:

Thickness of Plate.	Diameter of Rivet.	Longitudinal Pitch.	Back Pitch.
1/4 in.	5/8 in.	2 1/2 to 2 3/4 in.	1 1/2 to 1 3/4 in.
5/16 in.	5/8 in.	2 1/2 to 2 3/4 in.	1 1/2 to 1 3/4 in.
3/8 in.	3/4 in.	2 1/2 to 3 in.	1 3/4 to 2 in.

The efficiency of the seam shall not be less than 70 per cent. of the strength of the thinnest plate.

For single riveting the size and pitch of rivets shall be as follows:

Thickness of Plate.	Diameter of Rivet.	Pitch.
5/16 in.	5/8 in.	1 3/4 to 2 in.
3/8 in.	3/4 in.	1 7/8 to 2 1/8 in.

(c) The extreme calking edge distance, measured from center line of rivet hole, shall not be less than one and one-half times the diameter of the hole, and not more than one and one-half times the diameter of the hole plus 1/4 in.

The angle of the calking edges shall be between 60 and 70 degrees with the flat surface of the plate.

4. *Calking.*—Seam shall be calked both inside and outside. The purpose of the inside calking is to prevent access of contents of tank to the seams. Calking may be done by the electric welding process.

5. *Tank Heads.*—Tank heads shall be dished to a radius of 10 ft. for pressure on concave side.

In the case of compartment cars each compartment shall have two heads, convex outward.

6. *Dome.*—(a) The tank shall have a dome with a minimum capacity, measured from the inside top of shell of tank to the top of dome, of not less than 2 per cent. of the total capacity of the tank, that is, the shell and dome capacity combined. (See Exception (a).)

(b) Dome head shall be of steel plate, or the dome head and ring in one casting may be of cast steel.

Dome ring and cover shall be of cast or pressed steel or of malleable iron.

If of steel plate, dome head shall be dished to a radius of 8 ft.

The opening in shell for dome shall not exceed 22 by 28 in. (See Exceptions (a) and (b).)

(c) The dome cover shall be secured either by screw joint, or by bolting, or by yoke with center screw.

If screwed dome cover is used, the depth of inside ring of cover shall not be less than 2 1/2 in.

The joint of the dome cover shall be made tight against vapor pressure, and when necessary to secure this a satisfactory gasket shall be used.

For cars to be used for the transportation of inflammable liquids with flash points below 20° F. the mechanical arrangement for closing the dome cover shall either be such as to make it practically impossible to remove the dome cover while the interior of the car is subjected to pressure or suitable vents that will be opened automatically by starting the operation of removing the dome cover shall be provided. An approved method is shown by Fig. 1. Other methods may be used if approved by the Master Car Builders' Association.

Exceptions.—(a) In the case of tank cars used exclusively for the transportation of acids:

1. The dome capacity may be not less than 1 per cent. of the total capacity of the tank; that is, the shell and dome capacity combined.

2. The opening in shell for dome may be cut out to full size of dome; provided, that if the longitudinal diameter of the opening exceeds one-third of the width of the center course, the thickness of the center course shall be increased sufficiently to compensate for the excess opening.

(b) A larger opening in the shell for dome may be made where it is desirable because of the nature of the product to be transported; provided, that the shell shall be reinforced in an approved manner to compensate for the larger opening.

7. *Bottom Outlet Valve.*—(a) If tank is provided with bottom outlet valve, the outlet valve casting shall be so designed that breakage will not unseat the valve. The preferable construction is to have the outlet valve casting scored to confine the breakage at the scoring. (Fig. 2.)

The bottom of the main portion of the outlet valve casting, or some fixed attachment thereto, shall have external "V" threads 5 1/4 in. in diameter, and a pitch of four threads to the inch. Additional attachments thereto, having threads of other dimensions, may be used. (Fig. 2.)

Where a 6-in. bottom outlet valve is used, the bottom outlet valve casting shall be designed to have a diameter of 8 in. over threads, and a pitch of four threads to the inch, in addition to connections as above. (Fig. 2.)

Cars used for the transportation of acids or other corrosive substances, if fitted with bottom outlet valve castings, need not have threads as above, but may be designed for the use of a bolted cover, to insure

a tight joint. A suitable gasket shall be used when necessary.

Bottom outlet valve castings when applied to tanks having center sills shall be of such length that the threaded end of the casting will project below the bottom face of the sills sufficiently to facilitate the application and removal of caps and other attachments.

All outlet valve casting caps and attachments shall be secured to the car to prevent loss.

(b) Where the tank is anchored rigidly to the underframe there shall be a longitudinal clearance of not less than 3 in. on each side of the bottom outlet valve casting. Where the anchorage used provides for a limited longitudinal movement of the tank, there shall be a clearance of not less than 3 in. on each side of the bottom outlet valve casting when the tank has reached the limit of longitudinal movement provided for by such anchorage. There shall be a transverse clearance of not less than ½ in. on each side of the bottom outlet valve casting.

(c) If bottom outlet valve is used, it is preferred that the handle shall be within the tank or dome, but in the event that the rod is carried through the dome, leaking shall be prevented by packing and cap nut.

UNDERFRAME, ANCHORAGE, ETC.

8. Tank cars may be built either with or without underframes.

9. *Cars with Underframes.*—Material. (a) Underframes shall be of steel which complies with the Master Car Builders' Association Specifications for Structural Steel, Steel Plates and Steel Sheets for Freight Equipment Cars.

(b) Rivets shall comply with the Master Car Builders' Association Specifications for Rivet Steel and Rivets for Passenger and Freight Equipment Cars.

(c) Underframes shall be equipped with cast or forged steel center plates. Malleable iron may be used for other details, such as striking plates, draft lugs, side bearings, push-pole pockets, etc. Steel and malleable iron castings shall comply with the Master Car Builders' Association specifications for these materials.

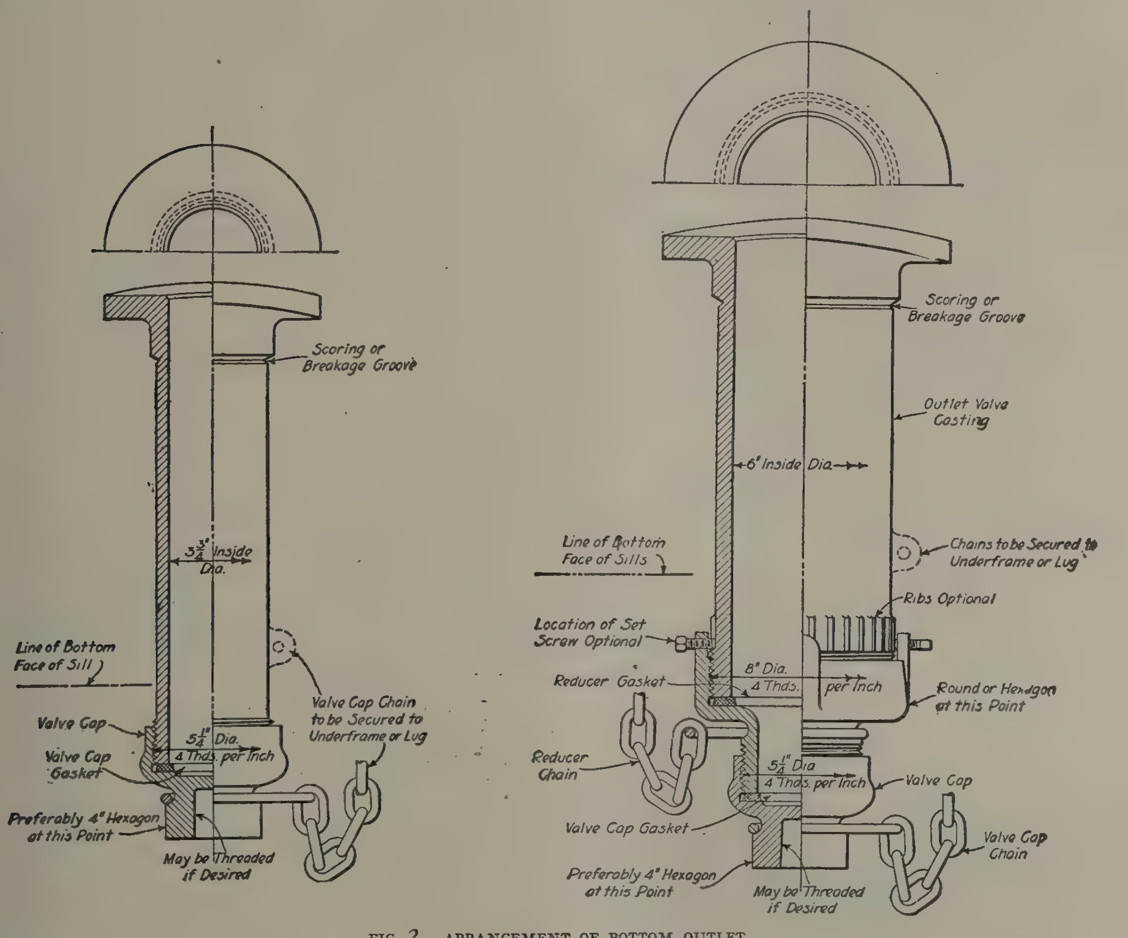


FIG. 2.—ARRANGEMENT OF BOTTOM OUTLET.

9A. *Center Sills.*—The center sill construction shall meet the following requirements:

Minimum center sill area between points of impact, 30 sq. in.

Ratio, stress to end load, not more than 0.05.

Length of center or draft sill members between braces shall not be more than twenty times the depth of the member, measured in the direction in which buckling may take place (Fig. 4).

Continuous sills having cover plates are preferable. If other construction is used, the effective cross-

sectional area, including connections, must be at least as strong as continuous sills.

9B. *Draft Attachments.*—The strength value of the draft attachments and the center sill construction shall be equivalent to at least 12½ sq. in. of steel in tension and compression, 8 sq. in. of rivet bearing area, and 15 sq. in. in shear. The ratio of unit stress to end load shall not exceed 0.12.

(See Master Car Builders' Association Recommended Practice for Center Sills for New Cars, and report of Committee on Car Construction, page 389, 1914 Proceedings.)

NOTE.—Until the M. C. B. Standards for coupler yoke and key are changed to conform to the requirements of Section 9-B, the present M. C. B. Standards for coupler yoke and coupler key will be accepted as a minimum.

10. *Cars without Underframes.*—Cars without underframes shall have shell reinforced in thickness as provided for in Sec. 2 (c).

11. *Body Bolsters.*—Body bolsters shall be of steel castings or of the built-up type, thoroughly substantial, and sufficient in strength to take at least one-half the total weight of loaded tank car on each side bearing.

12. *Draft Gear.*—Cars shall be equipped with a draft gear having a minimum capacity of 150,000 lb.

13. *Anchorage.*—(a) *Longitudinal.* The tank shall be secured against end shifting by anchorage at the center, or at the bolster, or be secured to the underframe by some means other than by the use of head blocks. The method of anchorage shall be one approved by the Master Car Builders' Association.

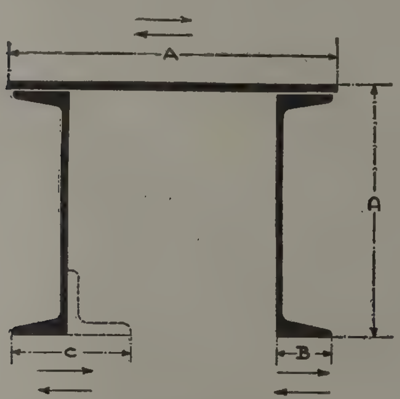


FIG. 4.—CENTER SILL. DIRECTION IN WHICH BUCKLING MAY TAKE PLACE. CLASSES III, IV, AND V TANK CARS.

The longitudinal anchorage of tank to underframe shall be of metal throughout, and the minimum requirements shall be as follows:

Connection of anchorage to tank:

Shearing area of rivets....................30 sq. in.
Bearing area of rivets.................... 24 sq. in.

Connection of anchorage to underframe:

Shearing area of rivets or bolts............15 sq. in.
Bearing area of rivets or bolts..............12 sq. in.

When bolts are used for securing the anchorage rigidly to the underframe, they shall be turned bolts and be driven in reamed holes.

Where either tank or underframe has more than one connection, if these connections hold the tank rigidly to the underframe, the total rivet or bolt value shall be 20 per cent in excess of the requirements specified; if the connections do not hold the tank rigidly to the underframe, the total rivet or bolt value shall be double that specified.

(b) *Dome Yokes, Tank Bands, Etc.*—The tank shall be secured from turning on the underframe either by an anchorage or by dome yokes, and shall also be secured to underframe by tank bands, or other approved means of equal strength and security. If tank bands are used, there shall be two for tanks not more than 78 in. in diameter, and four for tanks of greater diameter.

The sectional area of tank bands shall at no place be less than 1 sq. in. A threaded end 1⅜ in. in diameter or more, with a body consisting of a flat band 2 by ½ in., or equivalent section, or round iron 1⅛ in. in diameter, will be accepted as meeting this requirement.

If the dome yoke is used, it may be a rod 1 in. in diameter, or its equivalent, to which are secured the bands which are fastened to the underframe. The sectional area of dome yoke bands shall be the same as required for tank bands.

Cars having no underframes, with tank securely riveted to body bolsters, do not require dome yokes or tank bands.

14. *Push-pole Pockets.*—There shall be a push-pole pocket at each corner of the car. Where, from the construction of the car, the push-hole pockets can not well be placed on the corners of the underframe, they shall be applied to the body bolsters.

15. *Couplers.*—M. C. B. Standards and Recommended Practice.

16. *Brakes.*—M. C. B. Standards and Recommended Practice.

NOTE.—By action of the executive committee, December 20, 1917, amended March 20, 1918, all new equipment built after July 1, 1918, shall have a total hand braking power measured at the brake shoes equal to 70 per cent. of the light weight of the car based upon 1,500 lb. pull at the chain.
By January 1, 1921, existing cars not conforming to this standard should have the hand brake leverage changed.

17. *Trucks.*—The truck as a whole shall be equal in strength to the carrying capacity of the axles. Wheels, axles, journal boxes, bearings, center plates, etc., shall be in accordance with the M. C. B. Standards and Recommended Practice.

18. *Marking.*—M. C. B. Standard Marking for Freight Cars (Fig. 6).

19. *Safety Appliances.*—Safety appliances shall be in accordance with Fig. 7 and specifications therewith, which conform to the United States Safety Appliances, Standard.

20. *Safety Valves.*—(a) Tanks carrying products that give off volatile inflammable vapors at or below a temperature of 150° F., and have a vapor pressure of not more than 10 lb. per sq. in. at a temperature of 100° F. (see Note), shall be equipped with 5-in. safety valves of approved design, Fig. 9 or Fig. 10, which shall be set to open at a pressure of 25 lb. per sq. in., a tolerance of 3 lb. above or below this pressure being allowed.

NOTE.—Typical liquid products of this description are: Alcohol, Acetone, Benzine, Benzol, Carbon Bisulphide, Distillates, Ether, Gas Oil, Gasoline, Hydrocarbon (gas drips), Illuminating Oil, Kerosene, Naphtha, Refined Oil, Toluol, Turpentine, Turpentine Substitute.

(b) One valve shall be provided for a tank of a capacity of 6,500 gal. or less, and two valves for a tank of a capacity of more than 6,500 gal.

Where tanks carrying such products are divided into compartments, each compartment shall be provided with a safety valve.

21. *Safety Vent.*—Tanks carrying non-volatile products or products that do not give off inflammable vapors at or below 150° F. (see Note) need not be equipped with safety valves, but if not so equipped, shall be provided with one open vent equal to not less than 2 in. in diameter, of approved design (Fig. 12).

NOTE.—Typical liquid products of this description are: Calcium Chloride, Caustic Soda, Cottonseed Oil, Fish Oil, Glucose, Lard Oil, Linseed Oil, Molasses, Silicate of Soda, Sulphuric Acid, Mixed Sulphuric and Nitric Acids, Tannery Products, Vinegar.

Provided, that where vent is used and it is necessary to avoid evaporation or splashing of the liquid, or contamination by moisture, the vent shall be closed with a frangible disk of lead or other suitable material, of a thickness that will insure rupture at a pressure not higher than 30 lb. per sq. in. (Fig. 12).

TESTS.

22. *Certification of Tests.*—Tests of all tanks and their safety valves shall be certified by the party making the tests to the owner of the tank car and to the Chief Inspector, Bureau of Explosives, in the form prescribed by the bureau.

23. *Tests of Tanks.*—Tanks shall be tested before being put into service, again at the expiration of ten years, and after that at intervals of not over five years; with the exception that where tanks are used for the transportation of such corrosive products that deterioration is to be expected in a shorter time, the first test period for such tanks shall be reduced to five years. Tanks requiring this five-year test shall be those used for the transportation of chemicals, such as acids, ammonia liquors, etc., and such other products as hereafter may be specified.

Any tank damaged to the extent of requiring patching or renewal of one or more sheets, or extensive reriveting or recalking of seams, shall be retested before being returned to service.

NOTE.—By action of the Executive Committee, December 15, 1917, the requirement of retests was suspended as to tanks for which such tests shall become due prior to January 1, 1920, except when the cars are shopped for repairs.

The requirement that new tanks shall be tested before being put into service and that tanks damaged to the extent of requiring patching or renewal of one or more sheets, or extensive reriveting or recalking of seams, shall be retested before being returned to service, was not suspended.

Tanks shall be tested to a pressure of 60 lb. per sq. in.

All tests shall be made by completely filling the tank with water, or other approved liquid safe to use, of a temperature which shall not exceed 70° F. during the test, and applying the pressure in any suitable manner. The tank shall hold the prescribed pressure for not less than ten minutes without leak or evidence of distress after the tank has been calked tight.

When tanks are tested, the date, pressure to which tested, place where test was made, and by whom, shall be stenciled on the tank in accordance with the Master Car Builders' Standard Marking for Freight Cars (Fig. 6). (M. C. B. Sheet 26A.)

24. *Tests of Safety Valves.*—Safety valves shall be tested at intervals of not over two years, those on new cars to be tested before the cars are placed in service.

The test may be made without the removal of the valve from the car, provided the valve unseats at a total pressure corresponding with the area of the seat multiplied by the required pressure (Fig. 13).

When valves are tested, the date, pressure to which tested, place where test was made, and by whom, shall be stenciled on the tank in accordance with the Master Car Builders' Standard Marking for Freight Cars (Fig. 6). (M. C. B. Sheet 26-A).

25. *Inspection.*—Tank cars shall be inspected as to their construction and equipment before being placed in service, by inspectors in the employ of the car builder or the car owner.

The car builder shall furnish to the car owner and to the Chief Inspector, Bureau of Explosives, before the car is placed in service, a certificate in the form given on page 43, that such car complies in all details with the requirements of the Master Car Builders' Association Standard Specification for Class III Tank Car, which are in effect.

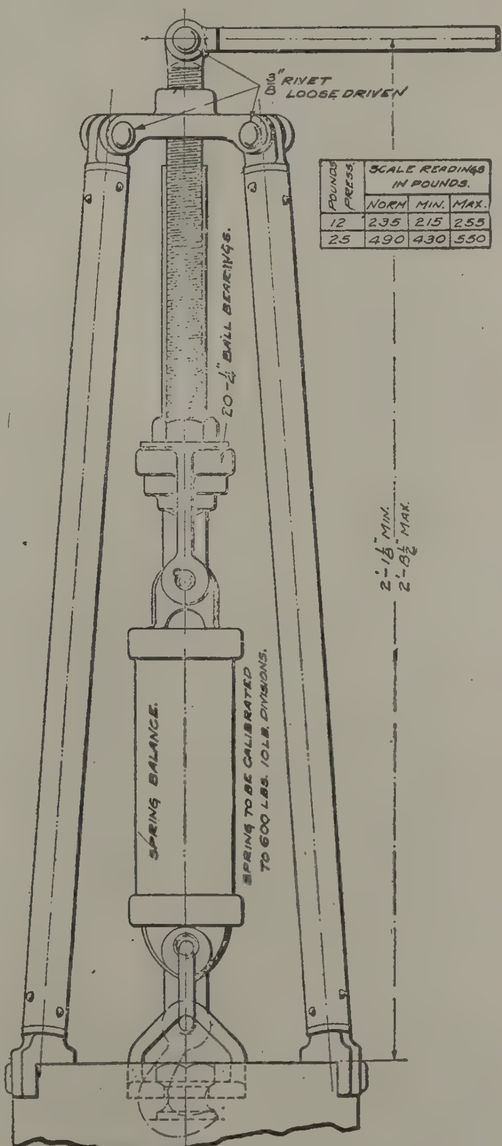


FIG. 13.—APPARATUS FOR TESTING SAFETY VALVES IN PLACE ON CAR.

When the car and its equipment meet the requirements of the Specification, the legend "M. C. B. Construction," with the initials of the party whose inspectors made the inspection, and the date of the inspection, shall be stenciled on the tank in accordance with the Master Car Builders' Standard Marking for Freight Cars (Fig. 6). (M. C. B. Sheet 26-A.)

Class IV Tank Car.
(Built after May 1, 1917)

Designs for this class of car shall be submitted to and approved by the Master Car Builders' Association.

Note.—The requirements of the Specification for Class IV Tank Car as to Safety Valves, Tests of Safety Valves and Tanks and Marking (when cars are repainted) shall apply also to insulated tank cars built under "Specification for Special Tank Car for Carrying Volatile Inflammable Products with a Vapor Pressure of Over Ten Pounds Per Square Inch at a Temperature of 100° F.," adopted by the Master Car Builders' Association in 1912, which the Class IV Specification supersedes.

TANK.

1. *Bursting Pressure.*—Same as Class III.

2. *Material.*—(a) All plates for tank and dome shall be of steel, complying with the American Society for Testing Materials Specifications for Boiler Plate Steel, Flange Quality.

(b) Rivets shall comply with the Master Car Builders' Association Specifications for Boiler Rivet Steel and Rivets for Passenger and Freight Equipment Cars.

(c) Minimum thicknesses of plates shall be as follows:

Diameter of Tanks.	Bottom Sheet.	Shell Sheet.	Dome Sheet.	Tank Heads.	Dome Heads.
60 in. or under.....	7/16 in.	1/4 in.	5/16 in.	1/2 in.	5/16 in.
Over 60 in. to 78 in.	7/16 in.	5/16 in.	5/16 in.	1/2 in.	5/16 in.
Over 78 in. to 96 in.	1/2 in.	3/8 in.	5/16 in.	1/2 in.	5/16 in.

For tanks without underframes the minimum thickness of bottom sheet shall be 5/8 in.

For tanks built in rings the thickness specified for bottom sheet shall apply to the entire cylindrical shell.

For car with underframe the minimum width of bottom sheet of tank shall be 60 in., but in all cases the width shall be sufficient to bring the entire width of the longitudinal seam, including overlaps, above the cradle.

3. *Riveting.*—(a) All seams shall be double riveted with the exception of the dome head seam, which may be single riveted.

Seams shall be riveted metal to metal without the interposition of other material.

(b) For double riveting the size and pitch of rivets shall be as follows:

Thickness of Plate.	Diameter of Rivet.	Longitudinal Pitch.	Back Pitch.
1/4 in.	5/8 in.	2 1/2 to 2 3/4 in.	1 1/2 to 1 3/4 in.
5/16 in.	5/8 in.	2 1/2 to 2 3/4 in.	1 1/2 to 1 3/4 in.
3/8 in.	3/4 in.	2 3/4 to 3 in.	1 3/4 to 2 in.

The efficiency of the seam shall be not less than 70 per cent of the strength of the thinnest plate.

For single riveting the size and pitch of rivets shall be as follows:

Thickness of Plate.	Diameter of Rivet.	Pitch.
5/16 in.	5/8 in.	1 3/4 to 2 in.
3/8 in.	3/4 in.	1 7/8 to 2 1/8 in.

(c) The extreme calking edge distance, measured from center line of rivet hole, shall not be less than one and one-half times the diameter of the hole, and not more than one and one-half times the diameter of the hole plus 1/4 in.

The angle of the calking edges shall be between 60 and 70 degrees with the flat surface of the plate.

4. *Calking.*—Same as Class III.

5. *Tank Heads.*—Same as Class III.

6. *Dome.*—Same as Class III without exceptions a and b.

7. *Bottom Outlet Valve.*—(a) If tank is provided with bottom outlet valve, the outlet valve casting shall be so designed that breakage will not unseat the valve. The preferable construction is to have the outlet valve (casting scored to confine the breakage at the scoring (Fig. 2).

The bottom of the main portion of the outlet valve casting, or some fixed attachment thereto, shall have external "V" threads 5 1/4 in. in diameter, and a pitch of four threads to the inch. Additional attachments thereto, having threads of other dimensions, may be used (Fig. 2).

Where a 6-in bottom outlet valve is used the bottom outlet valve casting shall be designed to have a diameter of 8 in. over threads, and a pitch of four threads to the inch, in addition to connections as above (Fig. 2).

Bottom outlet valve castings, when applied to tanks having center sills, shall be of such length that the threaded end of the casting will project below the bottom face of the sills sufficiently to facilitate the application and removal of caps and other attachments.

All outlet valve casting caps and attachments shall be secured to the car to prevent loss.

(b) Where the tank is anchored rigidly to the underframe there shall be a longitudinal clearance of not less than 3 in. on each side of the bottom outlet valve casting. Where the anchorage used provides for a limited longitudinal movement of the tank, there shall be a clearance of not less than 3 in. on each side of the bottom outlet valve casting when the tank has reached the limit of longitudinal movement provided for by such anchorage. There shall be a transverse clearance of not less than 1/2 in. on each side of the bottom outlet valve casting.

(c) If bottom outlet valve is used, it is preferred that the handle shall be within the tank or dome, but in the event that the rod is carried through the dome, leaking shall be prevented by packing and cap nut.

7-A. *Lagging.*—The barrel, ends and dome of tank, with the exception of the seating of the tank on the bolster and the seating of the pads of the fixtures, shall be lagged with 85 per cent carbonate of magnesia; or compressed cork board properly molded to fit; or hair felt, felted in sections and covered with a coating not soluble in gasoline; or other approved equivalent. The lagging shall have a thickness of 2 in., and the whole shall be covered with a jacket of metal 1/8 in. in thickness. Tank shall be well painted before being lagged and inside of jacket shall be painted before it is applied, with paint not affected by gasoline. Openings through the lagging shall be flashed around projections to prevent admission of water.

UNDERFRAME, ANCHORAGE, ETC.

8. Tank cars may be built either with or without underframes.

9. *Cars with Underframes.*—Same as Class III.

9-A. *Center Sills.*—Same as Class III.

9-B. *Draft Attachments.*—Same as Class III.

10. *Cars without Underframes.*—Same as Class III. Cars without underframes shall have shell reinforced in thickness as provided for in Section 2 (c).

11. *Body Bolsters.*—Same as Class III.

12. *Draft Gear*—Same as Class III.

13. *Anchorage.*—Same as Class III.

14. *Push-pole Pockets.*—Same as Class III.

15. *Couplers*—M. C. B. Standards and Recommended Practice.

16. *Brakes.*—Same as Class III.

17. *Trucks.*—Same as Class III.

18. *Marking.*—M. C. B. Standard Marking for Freight Cars (Fig. 6). M. C. B. Sheet 26-A.)

19. *Safety Appliances.*—Safety Appliances shall be in accordance with Fig. 7 (M. C. B. 19-S, Fig. 2979) and specifications therewith, which conform to the United States Safety Appliances, Standard.

20. *Safety Valves.*—(a) Tanks shall be equipped with 5-in. safety valves of approved design, Fig. 10, which shall be set to open at a pressure of 25 lb. per sq. in., a tolerance of 3 lb. above or below this pressure being allowed.

(b) One valve shall be provided for a tank of a capacity of 6500 gal, or less, and two valves for a tank of a capacity of more than 6500 gal.

Where tanks are divided into compartments, each compartment shall be provided with a safety valve.

21. *Safety Vent.*—Not used with this class of car.

22. *Certification of Tests.*—Same as Class I.

23. *Tests of Tanks.*—Tanks shall be tested before being put into service, and after that at intervals of not over five years.

Any tank damaged to the extent of requiring patching or renewal of one or more sheets, or extensive reriveting or recalking of seams, shall be retested before being returned to service.

NOTE.—By action of the Executive Committee, December 15, 1917, the requirements of retests was suspended as to tanks for which such tests shall become due prior to January 1, 1920, except when the cars are shopped for repairs.

The requirement that new tanks shall be tested before being put into service and that tanks damaged to the extent of requiring patching or renewal of one or more sheets, or extensive reriveting or recalking of seams, shall be retested before being returned to service, was not suspended.

Tanks shall be tested to a pressure of 75 lb. per sq. in.

All tests shall be made by completely filling the tank with water of a temperature which shall not exceed 70° F. during the test, and applying the pressure in any suitable manner. The tank shall hold the prescribed pressure for not less than ten minutes without leak or evidence of distress after the tank has been calked tight.

When tanks are tested, the date, pressure to which tested, place where test was made, and by whom, shall be stenciled on the tank in accordance with the Master Car Builders' Standard Marking for Freight Cars (Fig. 6).

24. *Tests of Safety Valves.*—Safety valves shall be tested at intervals of not over six months, those on new cars to be tested before the cars are placed in service.

The test may be made without the removal of the valve from the car, provided the valve unseats at a total pressure corresponding with the area of the seat multiplied by the required pressure (Fig. 13).

When valves are tested, the date, pressure to which tested, place where test was made, and by whom, shall be stenciled on the tank in accordance with the Master Car Builders' Standard Marking for Freight Cars (Fig. 6). (M. C. B. Sheet 26-A.)

25. *Inspection.*—Same as Class III.

CLASS V TANK CAR.

Effective January 1, 1918.

Designs for this class of car, including details, the approval of which is specifically required, shall be submitted to and approved by the Master Car Builders' Association.

NOTE.—The requirements of the Specification for Class V Tank Car as to pressure at which safety valves shall be set to open, Tests of Safety Valves and Tanks, and Marking (when cars are repainted), shall apply also to insulated tank cars built under "Specifications for Special Tank Cars for Transportation of Liquefied Chlorine Gas (also Sulphur Dioxide)," adopted by the Master Car Builders' Association in 1912, which the Class V Specification supersedes.

TANK.

NOTE.—It is so vitally important, because of the character of the commodities to be shipped in these cars, that the tank shall be absolutely tight, that riveted tanks will not be permitted, and all seams shall be welded.

1. *Bursting Pressure.*—The calculated bursting pressure, based on thel owest tensile strength of the plate, shall be not less than 960 lb. per square inch.

2. *Material.*—(a) All plates for tank, and for dome if dome is made of plate, shall be of steel complying with the American Society for Testing Materials Specifications for Boiler Plate Steel, Fire-Box Quality. For the purpose of welding, the lowest carbon content consistent with the strength prescribed for this quality is desired.

(b) Minimum thicknesses of plates shall be as follows:

Diameter of Tank.	Shell Sheet.	Tank Heads.	Dome Sheet (if Plate).
60 in. or under........	¾ in.	¾ in.	¾ in.

3. *Welding.*—All seams, including longitudinal, circumferential and dome seams, and the connection of the anchorage to the shell, shall be welded by the water-gas process, hammered or rolled, the seams to be annealed after welding, or such other welding process as may be approved.

4. *Calking.*—No calking shall be permitted.

5. *Tank Heads.*—Tank heads shall be dished to a radius of not over 5 ft., for pressure on the concave side.

6. *Dome.*—(a) The coefficients of expansion of the products for the transportation of which this class of car is required are such that it is not practicable to provide dome capacity sufficient to take care of their expansion, which must be allowed for in the tank.

Therefore, the inside diameter of the dome should not be greater than is necessary to permit access to the tank, and the proper arrangement of the inlet, outlet and safety valves. The inside height of the dome need not exceed the thickness of the insulation.

(b) Dome shell and dome head or cover shall be of steel plate or steel casting.

(c) Dome cover shall be secured by through bolts or studs. The joint of the dome cover shall be of approved form, tight against vapor pressure, and when necessary to secure this a satisfactory gasket shall be used.

7. *Inlet and Outlet Valves.*—(a) These valves shall be of the flange type, and shall be made of material not subject to destruction by the lading.

(b) The valves shall be directly bolted to seatings on the dome cover, and shall be protected from accidental injury by a cast-steel housing.

(c) Provision shall be made for plugging the pipe connections of the valves.

(d) The designs of the valves, their arrangement

in the dome head, and the design of the housing shall be submitted for approval.

(e) There shall be no inlet or outlet connections other than those on the dome head covered by the housing; but for cleaning purposes one bottom opening closed by a plug screwed from within will be permitted.

7-A. *Lagging.*—The tank must be completely lagged with compressed cork board, molded to fit, or other approved equivalent. The lagging shall have a thickness of not less than 4 in., and the whole shall be covered with a jacket of metal ⅛ in. in thickness. Tank shall be well painted before being lagged and inside of jacket shall be painted before being applied.

UNDERFRAME, ANCHORAGE, ETC.

8. Tank cars shall be built with underframe.

9. *Underframe. Material.*—(a) Underframes shall be of steel which complies with the Master Car Builders' Association Specifications for Structural Steel, Steel Plate and Steel Sheets for Freight Equipment Cars.

(b) Rivets shall comply with the Master Car Builders' Association Specifications for Rivet Steel and Rivets for Passenger and Freight Equipment Cars.

(c) Underframes shall be equipped with cast or forged steel center plates. Malleable iron may be used for other details, such as striking plates, draft lugs, side bearings, push-pole pockets, etc. Steel and malleable iron castings shall comply with the Master Car Builders' Association specifications for these materials.

9-A. *Center Sills.*—Same as Class III.

9-B. *Draft Attachments.*—Same as Class III.

10. *Cars without Underframes.*—Shall not be permitted.

11. *Body Bolsters.*—Same as Class III.

12. *Draft Gear.*—Same as Class III.

13. *Anchorage.*—(a) Longitudinal. The tank shall be secured against end shifting by anchorage at the center, or at the bolster, or be secured to the underframe by some means other than by the use of head blocks. The method of anchorage shall be one approved by the Master Car Builders' Association.

The longitudinal anchorage of tank to underframe shall be of metal throughout, and the minimum requirements shall be as follows:

Connection of anchorage to underframe:

Shearing area of rivets or bolts............ 15 sq. in.
Bearing area of rivets or bolts............. 12 sq. in.

When bolts are used for securing the anchorage rigidly to the underframe, they shall be turned bolts and be driven in reamed holes.

Where either tank or underframe has more than one connection, if these connections hold the tank rigidly to the underframe, the total rivet or bolt value shall be 20 per cent in excess of the requirements specified; if the connections do not hold the tank rigidly to the underframe, the total rivet or bolt value shall be double that specified.

(b) Dome Yokes, Tank Bands, Etc. The tank shall be secured from turning on the underframe, either by an anchorage or by dome yokes, and shall also be secured to underframe by tank bands or other approved means of equal strength and security.

If tank bands are used, there shall be two for tanks not more than 78 in. in diameter.

The sectional area of tank bands shall at no place be less than 1 sq. in. A threaded end 1⅜ in. in diameter or more, with a body consisting of a flat band 2 by ½ in., or equivalent section, or round iron 1⅛ in. in diameter, will be accepted as meeting this requirement.

If the dome yoke is used, it may be a rod 1 in. in diameter, or its equivalent, to which are secured the bands which are fastened to the underframe. The sectional area of dome yoke bands shall be the same as required for tank bands.

14. *Push-pole Pockets.* Same as Class III.

15. *Couplers.*—M. C. B. Standards and Recommended Practice.

16. *Brakes.*—Same as Class III.

17. *Trucks.*—Same as Class III.

18. *Marking.*—M. C. B. Standard Marking for Freight Cars (Fig. 6), with the additional marking, "Chlorine Gas (or Sulphur Dioxide, as the case may be) Tank Car—Tank and Valve Must Be Tested Every Two Years," on each side of tank below dome.

19. *Safety Appliances.*—Safety appliances shall be in accordance with Fig. 7 and specifications therewith, which conform to the United States Safety Appliances, Standard.

Fastenings for safety appliances must not be screwed or riveted to the shell of tank; they shall be either welded to the tank or secured to pads on the jacket or to suitable tank bands.

20. *Safety Valve.*—(a) Tank shall be equipped with one safety valve, which shall be set to open at a pressure of 200 lb. per sq. in., a tolerance of 5 lb. above or below this pressure being allowed.

(b) Valve shall preferably be of the flanged type, and shall be made of material not subject to destruction by the lading.

(c) The valve shall be directly bolted to seating on the dome cover, and shall be protected from accidental injury by the cast-steel housing prescribed in Section 7.

(d) The design of valve and its arrangement in the dome head shall be submitted for approval.

21. *Safety Vent.*—Not used with this class of car.

22. *Certification of Tests.*—Same as Class I.

23. *Tests of Tanks.*—Tanks shall be tested before being put into service, and after that at intervals of not over two years.

Any tank damaged to the extent of requiring patching or renewal of one or more sheets, shall be retested before being returned to service.

NOTE.—By action of the Executive Committee, December 15, 1917, the requirements of retests was suspended as to tanks for which such tests shall become due prior to January 1, 1920, except when the cars are shopped for repairs.
The requirement that new tanks shall be tested before being put into service and that tanks damaged to the extent of requiring patching or renewal of one or more sheets, or extensive reriveting or recalking of seams, shall be retested before being returned to service, was not suspended.

Tanks shall be tested to a pressure of 300 lbs. per sq. in.

All tests shall be made by completely filling the tank with water, or other approved liquid safe to use, of a temperature which shall not exceed 70° F. during the test, and applying the pressure in any suitable manner. The tank shall hold the prescribed pressure for not less than thirty minutes without any leak whatever. Calking to stop leaks developed during the test will not be permitted.

When tanks are tested, the date, pressure to which

tested, place where test was made, and by whom, shall be stenciled on the tank in accordance with the Master Car Builders' Standard Marking for Freight Cars (Fig. 6). (M. C. B. Sheet 26-A.)

24. *Tests of Safety Valves.*—Safety valves shall be tested at intervals of not over two years, those on new cars to be tested before the cars are placed in service.

When valves are tested, the date, pressure to which tested, place where test was made, and by whom, shall be stenciled on the tank in accordance with the Master Car Builders' Standard Marking for Freight Cars (Fig. 6). (M. C. B. Sheet 26A.)

25. *Inspection.*—Same as Class III.

SAFETY APPLIANCES FOR TANK CARS

All tank cars built after May 1, 1917, or old tanks placed on new steel underframes after that date must be equipped with safety appliances in accordance with the following specifications and Fig. 7. This arrangement conforms to the United States Safety Appliances, Standard.

END OF CAR

Shall be constructed with a platform similar to flat cars. Maximum height of platform from top of rail shall be fifty (50) in.

HAND-BRAKES

Number.—Same as specified for "Box and Other House Cars."

Dimensions.—Same as specified for "Box and Other House Cars."

Location.—Each hand-brake shall be so located that it can be safely operated while car is in motion. The brake-shaft shall be located on end of car to the left of center.

Manner of Application.—Same as specified for "Box and Other House Cars."

RUNNING-BOARDS

Number.—One continuous running-board around sides and ends. End platform shall form continuation of side running-board.

Dimensions.—Minimum thickness one and three-quarters (1¾) in. Minimum width on sides, ten (10) in.

Location.—Continuous around sides and ends of cars. End platform shall form continuation of side running-board.

Manner of Application.—Outside edge of side running-board shall extend not less than seven (7) inches beyond bulge of tank, safety hand-railing and dome ladder. In case of large tanks, where road limits will not permit the clearances specified, the outer edge of running-boards shall extend not less than seven (7) inches beyond bulge of tank and the foot of ladder shall have a clearance of at least seven (7) inches from outer edge of running-board.

Outside edge of end-platform shall extend not less than seven (7) inches beyond bulge of tank-head and safety hand-railing.

Running-boards shall be supported to prevent sagging. Where running-boards are spliced joints must be flush and both ends supported.

Running-boards shall be securely fastened to platform and running-board supports.

SILL STEPS

Number.—Same as specified for "Box and Other House Cars."

Dimensions.—Same as specified for "Box and Other House Cars."

Location.—When located on side sill: Same as specified for "Box and Other House Cars." When located on running-board: One (1) near each end on each side, flush with outside edge of running-board, so that there shall be not more than eighteen (18) in. from end of car to center of tread of sill step. Tread shall be not more than twenty-four (24), preferably not more than twenty-two (22) in. above the top of rail.

Manner of Application.—When located on side sill: Same as specified for "Box and Other House Cars." When located on running-board: Steps exceeding eighteen (18) in. in depth shall have an additional tread and be laterally braced. Sill steps shall be securely fastened with not less than one-half (½) in. bolts with nuts outside (when possible) and riveted over, or with one-half (½) in. rivets.

SIDE HANDHOLDS

Number.—Eight (8).

Dimensions.—Same as specified for "Box and Other House Cars."

Location.—Four (4) horizontal: One (1) on face of each side sill near each end on tank cars with side sills; or one (1) near each end on each side of car over sill step, on running-board, projecting downward or outward. Clearance of outer end of handhold shall be not more than twelve (12) in. from end of car.

Four (4) vertical: One (1) as near as possible over each sill step, securely fastened to tank or tank band.

Manner of Application.—Same as specified for "Box and Other House Cars."

END HANDHOLDS

Number.—Four (4).

Dimensions.—Same as specified for "Box and Other House Cars."

Location.—Horizontal: One (1) near each side of each end of car on face of end sill; or one (1) near each side on each end of car on platform, projecting downward or outward. Clearance of outer end of handhold shall be not more than sixteen (16) in. from side of car.

Manner of Application.—Same as specified for "Box and Other House Cars."

SAFETY RAILINGS

Number.—One (1) continuous running around sides and ends of tank.

Dimensions.—Minimum diameter, seven-eighths (⅞) of an in., wrought iron or steel rod or one and one-quarter (1¼) in. pipe. Minimum clearance, two and one-half (2½) in.

Location.—Running around sides and end of tank, not less than thirty-six (36) nor more than fifty-four (54) in. above platform or running-board.

Manner of Application.—Safety-railings shall be securely fastened to tank or tank bands with a minimum of four brackets for each side of tank and one bracket on head at each end of tank, and secured against end shifting.

Uncoupling Levers.—Same as specified for "Box and Other House Cars."

End Ladder Clearance.—No part of car above end sills within thirty (30) in. from side of car, except

buffer block, brake shaft, brake-shaft brackets, brake wheel, running-boards or uncoupling lever shall extend to within twelve (12) in. of a vertical plane parallel with end of car and passing through the inside face of knuckle when closed with coupler horn against the buffer block or end sill, and no other part of end of car or fixtures on same, above end sills, other than exceptions herein noted, shall extend beyond the outer face of buffer block.

LADDER, DOME PLATFORM, DOME PLATFORM HANDHOLD AND DOME HANDHOLD

Number.—One (1) ladder, one (1) dome platform, one (1) dome platform handhold and one (1) dome handhold.

Dimensions.—Ladder: Ladder stiles three-eighths by two (3/8 by 2) in. or equivalent, wrought iron or steel.

Ladder treads, minimum diameter, five-eighths (5/8) of an in., wrought iron or steel.

Minimum clear length of tread, fourteen (14) in.

Maximum spacing of treads, nineteen (19) in. Safety railing will be considered a ladder tread.

Minimum clearance of treads and ladder stiles, two (2), preferably two and one-half (2½) in.

Dome Platform.—Minimum width, seven (7) in.; minimum thickness one and three-quarters (1¾) in.

Dome Platform Brackets.—Three-eighths by one and and one-half (3/8 by 1½) in., or equivalent, wrought iron or steel.

Dome Platform and Dome Handholds.—Minimum diameter, five-eighths (5/8) of an in., wrought iron or steel.

Minimum clear length, fourteen (14) in., preferably sixteen (16) in.

Minimum clearance, two (2), preferably two and one-half (2½) in.

Location.—On brake mast side of car leading to dome. When car is equipped with more than one dome, the step board shall be lengthened so that all dome covers will be accessible from same; or, ladder, dome platform and handholds provided leading to each dome.

Dome platform handhold to be applied in line with ladder, not more than two (2) in. back from outside edge of platform, projecting downward and outward with horizontal portion of handhold flush with or extending one (1) in. beyond edge of platform. Top ladder rung will be considered dome platform handhold if located within not less than two (2) or more than three (3) in. from bottom of dome platform. Dome handhold to be applied to dome over dome platform, in line with ladder.

Manner of Application.—Ladders shall be securely fastened at bottom to running-board with not less than one-half (½) in. bolts with nuts underneath and riveted over, or with not less than one-half (½) in. rivets. Ladders shall be secured at top to safety railing or to underside of dome platform. If fastened to dome platform the stiles shall be secured with not less than one-half (½) in. bolts riveted over nuts, or with one-half (½) in. rivets.

The dome platform shall be supported by wrought iron or steel brackets, which shall be securely fastened to tank or tank bands.

Dome platform handholds same as specified for "Box and Other House Cars."

Dome handholds shall be securely fastened.

NOTE.—In lieu of dome platform specified, any efficient design of platform encircling dome will be acceptable.

TANKS COVERED WITH JACKETS

Manner of Application of Safety Appliances.—On tanks covered with jackets, metal pads should be attached to the shell proper with studs or rivets, to which brackets should be fastened for securing the safety appliances attached to the tanks; or, the safety appliances (with the exception of the running-board brackets and dome-platform brackets) may be secured to the jackets reinforced with metal pads at point of attachment, which pads must extend at least two (2) in. from center line of rivet holes. The running-board brackets must be attached, preferably to the underframe or to metal pads attached to shell proper. The dome-platform brackets must be attached to suitable bands on the outside of the jacket. When the safety appliances are attached to the jacket covering of the tank the jacket must be tightened so that there will be no danger of its slipping around.

METHOD OF TESTING SAFETY VALVES IN PLACE ON CAR

In testing safety valves with the device shown by Fig. 13, the tripod is set on the rim of the valve and the forging at lower end of spring balance is slipped under the knob of the valve, on valves equipped with knobs, or the hook at lower end of spring balance is attached to eyelet of valve, on valves so equipped, by inserting hook through eyelet. The spring balance is graduated in five (5) lb. readings. The pressure is applied by operating screw at top of device.

SCALE READING IN POUNDS FOR VALVES SET TO OPEN AT 12 AND 25 LB. PRESSURE PER SQ. IN.

Valve Setting, Lb. Per Sq. In.	Scale Reading in Lb.		
	Normal.	Minimum.	Maximum.
12	235	215	255
25	490	470	510

The Normal Scale Readings correspond to the pressure at which the valves when properly set will open. The Minimum and Maximum Scale Readings are the limits within which the valves must open when being tested to come within the tolerance of 1 lb. above or below the normal pressure per sq. in. at which the valve is supposed to open. Example:

A valve set to open at 12 lb. pressure per sq. in. should open when the scale reads 235 lb. (Normal), and does not require adjustment if it opens between the scale readings of 215 lb. (Minimum) and 255 lb. (Maximum). Any valve which, when tested, fails to open between the Minimum and Maximum Scale Readings for the 12 and 25 lb. pressure, according to the lb. pressure at which the valve is set, must be adjusted to the Normal Scale Reading.

Spring balances are to be tested once every six months to prove the accuracy of the scales.

CERTIFICATE OF CONSTRUCTION*
OF
CLASS ...... TANK CARS

It is hereby certified that .... (Number).......
Tank Cars, numbered..............................
built by..............(Name of builder).............
at....... (Location of works)........, and completed
.... (Date) .... for ....
(Name of buyer)...................................

were designed by said builder and conform in factors of strength, material (see Note) and workmanship, and in all features of construction, equipment and marking to the requirements of the Master Car Build-

ers' Association Specification for Tank Cars, Class...., Revised 1918, and amendments thereto; that the tanks and safety valves (if tanks are equipped with safety valves) have been tested and the tests certified to the car owner and to the Bureau of Explosives, as required by said specifications, and that the capacity, principal dimensions and equipment of each car are as follows:

Capacity: Tank, ... gallons; dome, ... gallons
Length over striking plates, ...
Extreme width, ...Extreme height, ...
Distance, center to center of trucks..................
Has type of anchorage to underframe been approved by Master Car Builders' Association? ....
Tank, inside diameter, ...
Tank, length, center to center of outer row of head rivets, ...

Equipment:

(a) Safety Valve: ......(Number)......; located on {side / top} of dome, and set to open at pressure of .... lb. per sq. in.

(b) Safety Vent: ......(Number)......; size of opening, ...

(c) Provision for automatically venting internal pressure upon starting to remove dome cover, as shown by Fig. 1 of specifications.

....

{Class ...... IV / V} Car: Have all features of car been approved by Master Car Builders' Association?

....

Signature: ....(Name of Builder)..........
......(By) ....
......(Title) ....
.......(Place)......., ...(Date)......., 19.....

Note.—Builder must furnish certificate that materials comply as to chemical analysis and physical qualities with the requirements of the specifications prescribed for them.

*One copy of this certificate to be sent to Chief Inspector, Bureau of Explosives, 30 Vesey street, New York city, and one copy to car owner.

V. R. HAWTHORNE,
Acting Secretary.

Tank Dome. 10, Fig. 173. A vertical cylinder attached to the top of a tank on a tank car. It permits of the application of a manhole cover which need not be air tight, and also permits the tank proper to be filled full, which would be impossible if there were no dome.

Tank Head. 9, Fig. 173. The circular end sheet of a cylindrical tank.

Tank Head Block. A block securely bolted to the underframe transverse to the sills at either end of the tank, to prevent any longitudinal motion of the tank with respect to the car. The block is shaped to fit the end of the tank. See Filler Block and Tank Car, Specifications for, Center Anchor.

Tank Nozzle. A short pipe used to empty the tank. It is usually cast in one piece with the Tank Valve.

Tank Saddle. The bearing which supports the tank. In some tank cars the saddle is the body bolster.

Tank Slabbing. Longitudinal strips or filling pieces between the tank and the saddle of a tank car.

Tank Step (Tank Car). A metal shelf or bracket fastened to the tank to facilitate access to the top of the dome.

Tank Valve (Tank Car). 14, Fig. 173. A valve attached to the bottom of the tank to draw off the contents.

(Water Cooler.) Page 1122. A valve used with water tanks which extend to the roof, and sometimes with other smaller fixed tanks, for enabling them to be completely drained when desired. Also called water cooler valve.

Tank Valve Rod. An iron rod for opening and closing a tank valve, usually extending from the valve to the top of the dome.

Tank Valve Rod Bracket. An iron brace in the tank having a threaded hole or bushing through which the tank valve rod screw passes.

Tank Valve Rod Screw. The screw on the upper end of a tank valve rod which passes through the tank valve rod bracket and causes the valve to open or close when the rod is turned.

Taper Charge Vibrator or Relay (Electric Lighting). An automatic and sensitive electrical device similar in construction to the battery voltage relay. It acts as an auxiliary regulator in connection with the generator regulator to taper the charging current of the generator after the voltage of the battery has reached a predetermined value, indicating that the latter is fully charged. Its action on the regulation differs from that of the battery voltage relay in that instead of abruptly cutting off the charging current it tapers the same, causing the charging current to decrease gradually to zero. The taper charge vibrator or relay gradually assumes control of the apparatus and finally regulates the axle generator as a constant potential machine.

Telegraph Blank Rack. Fig. 2011.

Telegraph Cock or Faucet. A self-closing cock, the lever of which resembles the key of a telegraph instrument. See Lever Faucet. When the water enters the cock horizontally they are called horizontal telegraph cocks. When it enters vertically they are called vertical telegraph cocks. See Faucet.

Temperature Regulator. Figs. 2049-2053. A device for automatically controlling the supply of steam to maintain any desired temperature in the car.

Temporary Safety Chains. See Safety Chains for Steel and Wooden Freight Cars.

Tenon. The projecting end of a piece of timber fitted for insertion into a mortise by cutting away a portion on one or more sides. Sometimes the tenon is made cylindrical. Tenons are secured in their mortises by pins or by giving them a dovetail.

Tension Bar. Any bar subjected to a tensile stress, as the top cover plate of a body bolster.

Terminal. The part of a storage battery plate to which the wires are connected.

Terms and Gaging Points for Wheels and Track. See Wheels and Track, Terms and Gaging Points for.

Testing Air Brakes. See Air Brakes, Cleaning and Testing of.

Test Weight Car. Figs. 419-422. A car built in compact form and equipped with weights for the testing of track scales, etc.

Testing Machine, Knuckle Pivot Pin. (Standard.) Sheet M. C. B. 29-D. Fig. 3011. In 1907 a design of apparatus for testing knuckle pivot pins was adopted as Recommended Practice, and is shown on Sheet M. C. B. 29-D.

Texoderm. An artificial leather used for curtains and upholstering. It is made by coating a cloth fabric

with a compound which gives it the appearance of leather.

Thermo Jet (Steam Heating). A direct steam heating system which maintains the car temperature constant by means of an injector with steam supply valve controlled by the expansion or contraction of a part of the radiating pipes, the steam supply valve being set to a position indicating the temperature of radiation desired.

Thermometer, Electric. Fig. 2052. Used in connection with the regulation of steam heat in passenger train cars.

Thermostat. Figs. 2052, 2134-2137. An electric control device for heating apparatus.

Thermostatic Steam Trap (Car Heating). Figs. 2105, etc. Pages 1184, 1299. A device to regulate the escape of steam in proportion to the condensation that has taken place.

Thimble. A bushing. A sleeve or tube through which a bolt passes. A filler. See BOLSTER THIMBLE.

Third Rail Clearances. The use of the third rail on electrified sections of steam railways made it necessary to establish new limiting dimensions for cars, and particularly freight cars. This was first called to the attention of the Master Car Builders' Association by George Gibbs; M. C. B. Proceedings, 1903, page 102.

A committee, appointed to investigate this subject, reported in the 1904 Proceedings, page 104, that the railroads entering New York City had found it necessary to confer and decide upon the necessary clearances. These were accepted by the association and it was felt that no further action was necessary.

Third Rail Shoe or **Collector.** Figs. 2590, 2609, 2610, etc. A metallic sliding contact, usually of cast iron, mounted on the car truck, and insulated therefrom, for collecting current from an insulated third rail located alongside the running rails. Positive contact between shoe and rail is maintained by gravity or by a stiff spring.

Thread. See SCREW THREAD.

Three-Pipe Manifold. A pipe fitting forming a return bend for three pipes instead of two.

Three-Stem Equipment. Figs. 551, 692, 694. An improved form of the original Janney draft gear for passenger equipment cars. The coupler head is connected to the center stem and the two side stems and its movement to either side of the center line of the car is resisted by the side stem springs. The center stem is backed by the draft spring proper which is held in a pocket between the sills and which absorbs most of the shocks. The buffer plate is backed by two buffer stem springs which aid in absorbing buffing shocks.

Threshold or Threshold Plate. (Passenger Equipment Cars.) A plate placed across the bottom of a door opening. See DOOR SILL.

(Vestibule.) The plate which covers the buffer plate and connects it with the platform.

Throat (of a Car Wheel). The interior angle of a flange where it joins the tread of the wheel.

Throat Piece (Snow Plow Framing). The curved ribs connecting the inclined plane of the plow with the deck. Being curved they give a projection to the deck, which lessens the tendency of the snow to ride over the top of the plow.

Thumb Piece. A general term applied to many forms of lugs or projections for moving springs, catches, or other movable mechanical parts.

Thumb Screw. A screw with two projecting flat sided flanges adapted to be turned with the finger and thumb.

Ticket Holder. Fig. 1940.

Tie. A beam or rod which secures parts together and is subjected to a tensile strain. A track tie. Page 1193.

Tie Bar. A bar or rod which acts as a tie.

Tie Timber. See CROSS TIE TIMBER.

Timber Key. See SILL TIMBER KEY.

Timber Pocket. Fig. 509; Page 1303. An iron casting used as a seat or pocket at the junction of timbers in wooden car framing. It avoids the necessity of dovetailing or mortising the timbers together. See POST POCKET.

Tip Car. A car from which the load is discharged by tipping the car body. See also DUMP CAR.

Tire. A heavy hoop or band of iron or (usually) steel forming the ring or periphery of a wheel to impart strength to it and to resist wear. See TIRE FASTENING.

Tire Bolt. A bolt for holding a tire on a wheel center. When retaining rings are used the bolts pass through the rings and hold them and the center and tire together.

Tire Fastening. See WHEELS.

Tire Fastening for Steel Tired Wheels. See WHEELS, STEEL-TIRED, TIRE FASTENING FOR.

Tires, Minimum Thickness for Steel. (M. C. B. Standard.) Sheet M. C. B. 16-A. Fig. 2949.

In 1894 a Recommended Practice was adopted for Minimum Thickness for Steel Tires of Car Wheels, to be 1 inch, to be measured normal to the tread and radial to the curved portions of the flange through the thinnest part within 4¼ inches from the back of the flange; the thickness from the latter point to the outer edge of tread to be not less than ½ inch at thinnest part as shown on Sheet M. C. B.—C.

A further practice was adopted of cutting a small groove, as shown in the outer face of all tires when wheels are new, at a radius ¼ inch less than that of the tread of tire when worn to the prescribed limit, to facilitate inspection.

Advanced to Standard in 1917.

Tires Mounting. (M. C. B. Recommended Practice.)

In 1914, by letter ballot, it was adopted that wheel centers should be machined to the exact diameter specified and the tires' finish bored to the diameter of the center, less 1-1,000 inch for each inch in diameter.

Toe Nail. A nail driven in obliquely to fasten the end of a board or other piece of timber to the surface of another. The timber so fastened is said to be toed, or toe nailed.

Toggle Arms (Hopper Doors). The two arms of a toggle joint, which form a strut between the two opposite hopper doors, holding them closed.

Toilet. Another name for a saloon or lavatory.

Toilet Rack. Figs. 1738, etc. A rack for toilet articles, etc.

Tongs or Crabs (Pile Driver and Wrecking Cars). A device for anchoring the body of the car to the track when in use. A jack screw is used in connection with the tongs to raise the body of the car, so as to bring a strain upon the tongs. See BOLSTER JACK SCREW.

Tool Car (Wreck Train Equipment). A car used for carrying chains, cables, blocking, jacks, and all the necessary tools used in clearing wrecks.

Top Chord (of a Truss). The upper outside member of a truss, particularly one divided up into panels. The members of mere trussed beams are not commonly designated as chords.

Top Door Rail. The uppermost horizontal bar or piece of a door frame.

Top Door Track. See DOOR TRACK.

Top Equalizer Truck. Figs. 1014, etc.

Top Rail (of Door). See TOP DOOR RAIL.

Top Side Bearing. A body side bearing. See SIDE BEARINGS.

Torch (Pintsch System). A special device combining the ordinary wax taper torch, and a key, which fits the cock of any Pintsch lamp, and will open or close the globe of any lamp from the floor of the car.

Tornado Lamp. A general term applied to lamps which receive their supply of air through a long tube, usually connected with the supports or arms of the lamp, so as to check the effect of sudden gusts of wind. Hurricane lamp is another name.

Torpedo. A cylindrical detonating cap provided with clips for folding under the head of the rail for the purpose of making a loud alarm as a signal on the passage of engines over them. The basis of the detonating compound is fulminate of mercury. The interior pieces of iron, to insure the explosion of the fulminate, are termed anvils.

Tourist Sleeping Car or **Tourist Car.** A sleeping car more plainly finished than a standard sleeping car and generally upholstered in rattan or leather, for the accommodation of travelers who cannot afford to use a standard sleeping car. See SLEEPING CAR.

Towel Rack. Figs. 1738, 1741, 1744. A tray of rods for holding towels.

Towel Rod. Fig. 1718. A rod fitted to the wall with brackets or otherwise, upon which towels may be hung.

Towel Rod Bracket. Fig. 1729. See TOWEL ROD.

Towel Roller Bracket. A bracket for supporting a towel roller. There are two, the fixed end and loose end bracket. The principal supply of towels, however, is usually carried in a towel rack or hung on towel rods.

Towel Vendor. Fig. 1749.

Track Laying Car. A low push car, primarily for carrying rails short distances in construction. They are frequently without a floor or platform and are provided with fixed rollers at the side for running the rails forward.

A platform car with a cantilever truss extending out from one end of the car or over the track and on which rails may be run out and distributed on the ties. Some track layers are equipped with carriers which carry the rails and ties forward from cars in the rear.

Track Sweeper. See SWEEPING CAR, SNOW SWEEPER.

Track and Wheels, Terms and Gaging Points for. See WHEELS and TRACK.

Traction Air Brake. Figs. 1459, etc. The adaptation of air brake equipment to electrically propelled cars or trains. The changed conditions of motive power and method of operating such cars or trains, have necessitated various changes in the details of the equipments. See AIR COMPRESSOR, GOVERNOR SYNCHRONIZING SYSTEM, AIR BRAKE.

Trailer or **Trailer Car.** Fig. 389. A car without its own motive power for use in trains operated by motor cars.

Trailer Truck. A motor car truck which is not equipped with motors.

Train Air Signal Apparatus. Figs. 1365-1427. A substitute for the bell cord arranged to give train signals by compressed air. A separate line of signal pipe, similar to the brake pipe, extends throughout the train, connected between the cars by hose and couplings. A car discharge valve, connected to this signal pipe, is located in each car and attached to the bell cord in such manner that pulling on the cord releases air from the signal pipe. In the cab on the engine or motor car is a signal valve, which is also connected with the main signal pipe and a small signal whistle. The supply of air is received from the main reservoir through a reducing valve, which maintains a pressure of about 45 lbs. per square inch in the signal apparatus.

When the car discharge valve is opened, by pulling on the cord, the diaphragm in the signal valve is operated so as to blow the whistle. Signals can be given in this way with rapidity and great certainty. If the train breaks in two the whistle is blown loudly for a considerable time.

Train Air Signal Stop Cock. A stop cock in the air signal pipe. There is one at each end of a car.

Train Brake Pipe. See BRAKE PIPE.

Train Car. A CABOOSE CAR.

Train Lighting. (M. C. B. Recommended Practice). See ELECTRIC LIGHTING.

A topical discussion on the progress made and the present state of the art of car lighting will be found in the 1902 M. C. B. Proceedings, page 312. Other reports will be found in the 1903 Proceedings, page 294; 1910 Proceedings, page 484; 1911 Proceedings, page 338; 1912 Proceedings, page 327; 1913 Proceedings, page 511; 1914 Proceedings, page 329; 1915 Proceedings, page 423; and 1916 Proceedings, page 376. See also ACETYLENE GAS LIGHTING, AND VAPOR SYSTEM.

Train Lighting Instruction Car. Fig. 370. A car equipped with train-lighting apparatus for the purpose of instructing employees.

Train Line (Steam Heat). See STEAM AND AIR CONNECTIONS FOR PASSENGER EQUIPMENT CARS.

Train Line (Electric Lighting). A system of heavy conductors, generally three in number, running the entire length of the car either over the roof or under the car body and terminating at each end of the car in a suitable connection device, located either above the vestibule opening or below the platform. Two of these conductors are tapped and connections carried down inside of the car, where connections may be made with the electric lighting system of the car. The other conductor generally has no connection to it in the car. Its purpose is to act as an end feeder or equalizer when a head end generator is employed. The other two conductors or lines may be employed for tying together in parallel the lighting systems of the different cars, irrespective of whether a head end generator is used or not.

Train Line End Valve. See END TRAIN PIPE VALVE.

Train Line Connector (Electric). A device for connecting the train lines of one car to those of another in such a manner as to insure the proper connection of the conductors of one car with those of another independently of sequence or end relations of the various cars; that is to say, the conductor must always join wire No. 1 of one car with wire No. 1 of the next car, etc., no matter whether the cars have been turned end for end or in what order they may stand in the train.

Train Line Jumper. A connection made generally at the rear end of the train on the end farthest from the head end generator connecting the conductor which is not tapped in the cars to one of the conductors that is tapped. The current is carried from the generator clear through to the end of the train and by means of the jumper brought back on one of the other wires. This arrangement of train lines, known as the equipotential or return loop, insures uniform voltage at each of the cars, irrespective of the drop or loss that may take place in the conductors themselves.

Train Pipe (Air Brake). See BRAKE PIPE.

Train Pipe or Brake Pipe Bracket. Fig. 970.

Train Pipe Valve (Car Heating). See END TRAIN PIPE VALVE.

Train Resistance. The force in a train which tends to counteract the pulling effort of the locomotive. This resistance is due to journal friction, wheel flange friction, air, wind and the rolling of the wheels on the rail; and varies from 2½ lb. per ton under the most favorable conditions to 24 lbs. per ton of train weight under unfavorable conditions.

Trainagraph. Figs. 1510, 1511. A testing and recording device by means of which the action of air brakes may be observed.

Transfer Table. A platform and section of track on wheels, its length being equal to or greater than the length of a car. Its chief use is to transfer cars from one section of a shop to another, connecting with parallel tracks and running transversely to them.

Transformer (Electricity). Fig. 2603. A device used with alternating currents for transforming a quantity of energy from one pressure or voltage to another, either higher or lower. It consists of a primary coil supplied with current from some source or generator, a secondary coil, in which the energy is utilized, and an iron core that connects the two coils magnetically. The periodical alternating induction caused by the current in the primary coil induces an electromotive force in the secondary coil; and the primary and secondary electromotive forces are directly proportional to the relative number of turns on the two coils, thus providing means of either raising or lowering the voltage.

Transom. Primarily a cross piece.

(Carpentry.) A horizontal piece framed across a door or double light window. The term is also applied in the general sense of a cross piece in other ways.

(Trucks.) 20, Fig. 1003. B, Fig. 980. One of two horizontal cross beams attached to the side frames, between which the swing bolster is placed.

Transom Bearing Block. A piece of wood or iron placed on top of a transom under the bearing of a swing hanger to raise it.

Transom or Bolster Chafing Plate. See FRICTION BLOCK, and BOLSTER CHAFING PLATE.

Transom Casting. A casting used to attach a transom to a truck frame.

Transom Corner Plate (Passenger Equipment Trucks). 131, Fig. 1003. A plate or casting connecting and bracing the transom and wheel pieces. See TRUCK FRAME CORNER PLATE.

Transom Draft Gear. Figs. 744-747; Page 1154. A special arrangement of draft gear.

Transom and End Piece Tie Rod. A rod extending through the transom and end piece to stiffen the truck frame.

Transom Opener. A device for opening a transom over a door; very similar to a deck sash opener.

Transom Plate. Iron plates on both sides of wooden transoms of passenger equipment trucks for strengthening purposes.

Transom Tie Rod or Bar. 23, Fig. 1003. A bar passing across a truck close to the transom to hold the wheel pieces and transoms rigidly together.

Transom Tie Rod Washer. 26, Fig. 1003. A bearing for the nut on a transom tie rod.

Transom Truss Rod. A transverse rod attached at its end to the wheel pieces, extending alongside the transoms and inclined downward under a central transom truss block, so as to strengthen the transoms. Generally, two such rods are used with each truck.

Transom Truss Rod Seat. A bearing for the transom truss rod on the under side of the transom.

Trap (for Refrigerator Car). An S-shaped pipe, largely used in all forms of plumbing work for permitting the exit of water, while preventing the entrance of air. See STEAM TRAP.

Trap Door. A door in a floor or roof, closing flush therewith when shut. See PLATFORM TRAP DOOR.

Trap Door Latch (Vestibule). Figs. 1840, etc.; Pages 1170, 1288. The latch for the vestibule trap door.

Trap Door Lock. Figs. 1840-1846. See TRAP DOOR LATCH.

Traversing Jack. A jack that can be moved horizontally on a bed or track while under its load. See JACK.

Tread (of a Step). The part on which the foot is placed. See TREAD BOARD and SAFETY TREAD.

(Of a Car Wheel.) The exterior cylindrical surface of a car wheel inside of the flange which comes in contact with the rail. See WHEEL.

Tread Board (of a Step). The horizontal part on which the foot is placed. Usually covered with rubber or metal safety treads to prevent slipping. See TREAD and SAFETY TREAD.

Triangular Washer. An iron plate or block, the cross section of which is triangular, and which forms a bearing for the nut or head of an inclined brace rod. Also called beveled washer, but the latter term is chiefly used when the angle between the two faces is small.

Triple Valve (Air Brake). Figs. 1366, 1367, 1382-A, 1390-1392, 1440, 1446, etc.; Pages 1306-1311. A valve device consisting of a body or case, called the triple valve body, which has connections to the brake pipe, the auxiliary reservoir and the brake cylinder, in which a slide valve is operated by a piston, so that when the pressure of the air in the brake pipe is increased the auxiliary reservoir is charged and the air in the brake

cylinder is released to the atmosphere; and so that, when the air pressure in the brake pipe is reduced, air from the auxiliary reservoir is discharged into the brake cylinder for applying the brakes. A triple valve performing only these functions is now known as the plain triple valve.

The quick-action triple valve has all the features and performs all the functions of the plain triple valve, and has the additional function of causing a discharge of air from the brake pipe to the brake cylinder, when, in emergencies, the maximum force of the brakes is instantly required. More recent developments have added retarded release and uniform recharge features.

(For Freight Air Brake Gear.) A special form, not differing in principle from the passenger brake valve but generally combined with the reservoir and brake cylinder in one single part for economy and convenience of attachment.

Triple Valve Body. 2, Fig. 1382-A. See Triple Valve.

Triple Valve Branch Pipe (Air Brake). A short pipe by which the triple valve is connected with the brake pipe.

Triple Valve, Cleaning and Lubricating. See Air Brakes, Cleaning and Testing of.

Triple Valve Gasket. A gasket placed in the joint between the triple valve and the brake cylinder.

Triple Valves, Mounting of. See Air Brakes; Cleaning and Testing of.

Triple Valve Piston (Air Brake). 4, Fig. 1382-A. See Triple Valve.

Triple Valve Tests. See Air Brakes, Cleaning and Testing of.

Trolley. See Pantagraph Trolley.

Truck. 19, Fig. 111; Figs. 390, 973-1032, 2797-2799, 2820, 2886, 2887; Pages 1127, 1128, 1139, 1152, 1190, 1275-1277, 1300. A small, low, four-wheel or six-wheel car, carrying one-half the weight of a car body. The car body is carried on a pair of center plates (truck center plate and body center plate), with a center pin or king bolt passing through them, about which the truck swivels. There are now some types of trucks in use in which the weight of the car is transmitted to the truck through side bearings. The trucks commonly used under freight cars have four wheels, but six-wheel trucks are used in special cases. Passenger equipment cars use either four or six-wheel trucks, the latter being generally used under very heavy cars. See Diamond Arch Bar Truck, Flexible Truck, Logging Truck, Pedestal Truck, Rigid Bolster Truck, Roller Side Bearing Truck, Side Bearing Truck, Swing Motion Truck.

The term is applied to different kinds of small vehicles used on and about stations for handling freight and baggage by hand. Many large terminal stations now use motor driven baggage trucks.

Truck Bolster. Figs. 513-516; 519, 522, 1138-1163, 2888, 2889; Pages 1126, 1137, 1182, 1197, 1205, 1230, 1263. A cross beam in the center of a truck, to which the lower center plate is fastened, and on which the car body rests. The truck bolster is connected to the body by a center pin, which passes through it.

Truck Bolster Chafing Plate. A plate attached to a wooden swing bolster to protect it from wear.

Truck Bolster Flitch Plate. See Bolster Flitch Plate.

Truck Bolster, Gages for Cast and Pressed Steel (M. C. B. Recommended Practice). Sheet M. C. B.—D. Fig. 3038.

In 1914 gages for cast and pressed steel truck bolsters for 80,000, 100,000 and 140,000 lb. capacity cars were adopted as Recommended Practice.

Truck Bolster Guide Bar. See Bolster Guide Bar.

Truck Bolster Guide Block. A cast iron shoe for the end of a truck bolster, which slides vertically between the columns or bolster guide bars.

Truck Bolster Truss Rod (Rigid Bolster Trucks). A rod attached near the ends of a wooden truck bolster and passing over a central truss block. In swing bolster trucks, rods of a similar nature are sometimes used, and are termed transom truss rods.

Truck Car. A car used in a wreck train for carrying spare trucks.

Truck Center Bearing Truss. The truss formed by the center bearing top and bottom arch bars.

Truck Center Frame. A frame made in one piece, riveted to the side frames or wheel pieces of steel passenger equipment trucks and taking the place of the transoms in the older types.

Truck Center Plate. See Center Plate.

Truck Frame. A structure composed of wooden beams, iron bars or of cast steel in one piece, to which the journal boxes or pedestals, springs and other parts are attached, and which forms the skeleton of a truck. See Truck Side Frame.

Truck Frame Corner Plate (Passenger Trucks). See End Piece Corner Plate and Transom Corner Plate.

Truck Frame End Piece or End Sill. See End Piece.

Truck Frame Knee Iron (Passenger Trucks). An interior angle plate of cast or wrought iron to connect the truck frame together. See End Piece Corner Plate and Transom Corner Plate.

Trucks, Freight Car. Reports on freight car trucks wil be found in the M. C. B. Proceedings, 1901, page 390; 1912 Proceedings, page 455; 1913 Proceedings, page 503; 1914 Proceedings, page 307; 1915 Proceedings, page 428; and 1916 Proceedings, page 374.

Truck, Passenger. A topical discussion of 4-wheel vs. 6-wheel trucks for passenger cars will be found on page 66 of the 1903 M. C. B. Proceedings.

Truck Side Bearing. 61, Fig. 1003; Pages 1128, 1149, 1204, 1225, 1275-1277, 1286, 1314, 1316. A device attached to the top of the truck bolster, on which a corresponding bearing fastened to the body bolster rests. See Side Bearings.

Truck Side Frame. A, Fig. 981, Figs. 1164-1173, 2890; Pages 1127, 1131, 1138, 1182, 1260-1261, 1275-1277. The longitudinal portion of a truck frame, on the outside of the wheels, which extends from one axle to the other, and to which the journal boxes and bolsters or transoms are attached.

Truck Sides, Cast Steel, Gages for (M. C. B. Recommended Practice). Sheet M. C. B.—B1. Fig. 3033. Sheet M. C. B.—B1.

In 1914 gages for cast-steel truck slides for cars of 80,000, 100,000 and 140,000 lb. capacity were adopted as Recommended Practice.

In 1917, as the result of the adoption of brake beam recommended, the gage for brake beam hanger pin was changed to 1¼ in. in diameter by 7 in. under the head.

Truck Sides, Cast Steel, Limiting Dimensions (M. C. B. Recommended Practice). Sheet M. C. B.—B. Fig. 3034.

In 1914 the limiting dimensions shown on Sheet M. C. B.—B for cars of 80,000, 100,000 and 140,000 lb. capacity were adopted as Recommended Practice.

In 1917, as a result of the adoption of a 1¼ in. brake beam hanger pin, the hole for same was increased to 1 5/16 in. in diameter.

Truck Sides, Cast Steel Limiting Dimensions for Pedestal Jaws. (M. C. B. Recommended Practice.) Sheet M. C. B.—H. Fig. 3044.

Journals 5 by 9 inches, 5½ by 10 inches and 6 by 11 inches.

In 1916 limiting dimensions for pedestal jaws for cast-steel truck sides were adopted as Recommended Practice.

In 1917 the limiting dimensions B for 70-ton truck frames and journal box were changed.

Truck Sides, Cast Steel, Specifications for (M. C. B. Recommended Practice).

In 1912 specifications for cast-steel truck sides were adopted.

In 1914, by letter ballot, Section 16, Article VII, was amended to provide that all castings not meeting requirements of proof test should be rejected. Modified in 1915.

SPECIFICATIONS

1. When the manufacturer is ready to make a shipment of material he shall notify the purchaser of that fact and await the arrival of the purchaser's inspector, to whom he shall furnish free any assistance and labor needed to make satisfactory inspection test and prompt shipment.

2. Manufacturer shall protect all castings, so that they do not become covered with rust.

3. *Cleaning.*—At his option the inspector may require that any or all castings be subjected to sand blast in order to make an examination of the surface for checks or cracks.

4. *Painting.*—They shall not be painted before being inspected unless otherwise specified.

I. MANUFACTURE

5. *Process.*—Castings furnished under these specifications shall be made by the open-hearth process in accordance with the best foundry methods.

II. CHEMICAL PROPERTIES AND TESTS

6. *Chemical Composition.*—The steel shall conform to the following requirements as to chemical composition:

Carbon	not below 0.20 or above 0.30 per cent
Manganese	not above 0.70 per cent
Phosphorus	not above 0.05 per cent
Sulphur	not above 0.05 per cent

7. *Ladle Analysis.*—To determine whether the material conforms to the requirements specified in Section 6 an analysis shall be made by the manufacturer, from test ingot taken during the pouring of each melt. Drillings for analysis shall be taken not less than ¼ inch beneath the surface of the test ingot. A copy of this analysis shall be given the purchaser.

8. *Check Analysis.*—A check analysis may be made by the purchaser from a test coupon, representing each melt, and this analysis shall conform to the requirements of Section 6.

9. *Sampling for Chemical Analysis.*—From the coupon described in Section 12 (a), which has satisfactorily passed the physical requirements, borings shall be taken for chemical analysis.

III. PHYSICAL PROPERTIES AND TESTS

10. *Physical Properties.*—The physical properties of steel shall be as follows:

(a) Ultimate tensile strength, lbs. per sq. in., not under 60,000.

(b) Yield point (by "drop of beam"), not under 50 per cent of ultimate tensile strength.

(c) Elongation in 2 in. per cent not less than 1,400,000 divided by the ultimate tensile strength.

11. *Proof Test.*—A minimum of one frame from each heat and not less than 2 per cent of the total frames furnished shall be tested in a suitable machine to the loads shown in the table for different capacity car trucks.

Car Capacity, Lb.	Initial Load, Lb.	Proof Tests. Load, Lb.	Maximum Deflection, In.	Maximum Set, In.
80,000	20,000	110,000	0.15	0.01
100,000	25,000	135,000	0.15	0.01
140,000	35,000	175,000	0.15	0.01

After applying initial load, reduce load to 5,000 lb. and set deflection instrument at zero; apply the requisite proof load and measure deflection; reduce load to 5,000 lb. and measure the set.

Truck sides may be supported at each end, directly beneath the center line corresponding to center line of axle when side frame is in the truck and loaded at center of bolster opening midway between supports, or they may be supported in the center and loaded at the ends. The deflection and set shall be measured at the center line of spring seat.

12. *Annealing.*—Test coupons shall be annealed with the castings before they are detached. To determine the quality of annealing, the inspector will have one of the test coupons mentioned in Section 12 (b) cut half way through and broken off from the casting for examination of the fracture. If, in his opinion, the annealing has not been properly done, he may require the casting to be reannealed, using the second test coupon for examination in this case. If after annealing or reannealing any casting is so much out of gage as to require heating in order to bring it within the gage, it shall again be reannealed before it may be accepted.

13. *Sampling.*—For the purpose of determining whether the physical and chemical requirements are complied with, the inspector shall select at random one casting from each melt. From this casting the two physical and chemical test coupons shall be removed by the inspector; one of them shall be subjected to physical test, but if the coupon casting proves unsound, the other coupon shall be used in its stead for this purpose.

(a) Physical Test Coupons.—The manufacturer shall have cast on each truck side two test coupons having a cross section of 1⅛ by 1⅛ in. and 6 in. long. These coupons are to be used for physical and chemical tests, and their location upon the casting shall be specified by the purchaser.

(b) Annealing Coupons.—There shall be two additional coupons of a cross section not less than the average cross section of the casting. These coupons are to be used to determine the character of the annealing as specified in Section 11.

IV. WEIGHTS

14. *Limiting Weights.*—Truck sides shall conform to the weights given in table. In case the castings have met all requirements except that of overweight, they may be accepted at the maximum allowable weight here specified:

Car Capacity, Lb.	Weights, Lb.		
	Minimum.	Normal.	Maximum.
100,000	485	500	515
140,000	640	660	680

V. WORKMANSHIP

15. *Workmanship.*—They shall conform to the dimensions shown on the drawings and shall be free from rust, scale, blowholes and shrinkage cracks.

VI. MARKING

16. *Marking.*—Each casting shall have the following markings cast upon it in raised letters and figures.

(a) Initials of Railroad Company.

(b) Month and year when cast, thus, 6-12.

(c) Manufacturers' serial number and trade mark (or other designation).

(d) M. C. B. S.

VII. REJECTION

17. *Rejection.*—In case the test pieces do not meet the specifications, all castings from the entire melt shall be rejected. If the side frame selected to represent a melt does not meet the proof test, then all the frames from that melt shall be subjected to the proof test, and all such frames failing to meet the test shall be rejected.

18. *Removal of S.*—From each casting rejected by inspector under these specifications, he shall cause to be chipped the "S" of the letters M. C. B. S. which are specified in Section 15 (d).

Truck Sides, Cast Steel, Welding. See Welding Cast Steel Trucks.

Trunnion. The pivot upon which any body, as a gun, revolves. The term is usually applied to bearings for objects of irregular shape, and having slow or irregular motion, as distinguished from the journals of wheels, etc.

Truss. A frame to which rigidity is given by uniting the parts so that its figure shall be in effect cut up into triangles, making it incapable of distortion by turning of the bars about their joints. The simplest form of truss is that in which a truss rod and king post are put underneath a beam to strengthen it, or two beams are framed together in the form of a letter A, and tied together at their lower ends by a rod or another beam. These are called king post trusses. Another form is that in which two posts are used, which are called queen post trusses. This is not a perfect truss, since it is capable of altering its shape by simply bending without rupturing its parts, when unequally loaded. In order to prevent this counterbalances should be added. This is the usual way of trussing the underframe of cars. The sills resist bending and act as straining beams, thus preventing great distortion. The usual forms of trusses used for the side framing of cars are the Pratt and the Howe types. In the former all the braces are subject to tension, and in the latter the braces are compression members. The Pratt truss is rarely used alone today for side trussing, but is often used in combination with the Howe truss. The Howe truss is rarely used in its simple form, being usually provided with vertical posts alongside of the vertical tension members. The side of a car is not a perfect truss as ordinarily built, for the middle panel, which contains the door, lacks the essential element of braces or counterbraces. Long cars are reinforced with heavy trusses of the bridge or roof type, and further strengthened by body truss rods.

Truss Block. A distance piece between a truss rod and the compression member of a trussed beam, which forms a bearing for both.

Truss Plank (Passenger Car Framing). A wide piece of timber, set on edge and bolted to, or sometimes gained into the posts on the inside of the car immediately above the sills.

Truss Plank Cap. A strip of wood attached to the top of a truss plank between the seat frames.

Truss Rod. 33, Fig. 260. A rod used in connection with a king or queen post truss, or trussed beam, to resist deflection. It is attached to the ends of the beam, and is supported in the middle by a king post, truss block, or two queen posts between the beam and the rod. See Body Truss Rod.

Truss Rod Anchor. An iron forging or casting bolted to the sills, to which the end of the side truss rod is fastened. It is commonly made integral with the body bolster when a double body bolster is used.

Truss Rod Bearing. A bearing used to furnish support to a truss rod at an angle or bend.

The bearing, over the bolster, of a long body truss rod running from end sill to end sill is called a body truss rod saddle, probably in part from its form. See Queen Post.

Truss Rod Iron. A bar of iron, having an eye, to which a body truss rod is attached, bolted to the under side of a sill below a body bolster. It is a form of attaching body truss rods almost out of use for freight cars, but in use on wooden passenger cars. A Truss Rod Anchor.

Truss Rod Saddle. See Body Truss Rod Saddle and Truss Rod Bearings.

Truss Rod Strut. See Queen Post.

Truss Rod Washer. A large flat or beveled washer, used under a nut on the end of a truss rod. Sometimes called a skew back.

Tufting Button. A button used in upholstery to hold the cord which passes through the upper covering of the upholstered surface, dividing it into squares or diamonds.

Tumbler. A drinking glass. Fig. 2922.

(Locksmithing.) A latch engaging within a notch in a lock, bolt, or otherwise, opposing its motion until it is lifted or arranged by the key so as to remove the obstacle.

Tumbler Holder. Figs. 1719, 1720, 1728, 2922. A bracket or stand for holding glass tumblers or drinking cups. They are either single or double.

Tumbler Holder and Drip. Fig. 1728. A water cooler drip, the top of which is made large enough to hold a glass.

Tup. See Hammer.

Turbo-Generator (Electric Car Lighting). A steam turbine of small size direct-connected to a generator for furnishing electric current to light trains by the head end system. The turbo-generator may be mounted in the baggage car or on top of the locomotive boiler and receives steam from the locomotive.

Turn Over Seat. See Reversible Car Seat.

Turnbuckle. A device inserted in the middle of a long rod for changing its length. They are made the following sizes, and larger in proportion.

Size D.	A.	B.	C.	L.
1 inch	6 in.	1½ in.	9 in.	25 in.
1⅛ inch	6 in.	1 11/16 in.	9⅜ in.	25 in.
1¼ inch	6 in.	1⅞ in.	9¾ in.	26 in.
1⅜ inch	6 in.	2 1/16 in.	10⅛ in.	27 in.
1½ inch	6 in.	2¼ in.	10½ in.	27 in.
1⅝ inch	6 in.	2 7/16 in.	10⅞ in.	28 in.
1¾ inch	6 in.	2⅝ in.	11¼ in.	28 in.

D. Size = Outside Diameter of Screw.

A. Length in Clear between head = 6 in. first length for all sizes.

B. Length of Tapped Heads = 1½ D.

C. Total Length of Buckle without Bolt Ends.

L. Total Length of Buckle and Stub Ends when open.

Turpentine, Specifications for (M. C. B. Recommended Practice).

In 1916 the following Specifications for Turpentine were adopted:

1. *Scope.*—These specifications apply to both the turpentine that is distilled from pine oleoresins, and commonly known as "gum turpentine" or "spirits turpentine," and to the turpentine commonly known as "wood turpentine" that is obtained from resinous wood, whether by extraction with volatile solvents, steam or by destructive distillation, to be used in making paint for M. C. B. equipment cars.

2. *Appearance.*—The turpentine shall be clear and free from suspended matter and water.

3. *Color.*—The color shall be "Standard" or better.

4. *Specify Gravity.*—The specific gravity shall not be less than 0.862 nor more than 0.872 at 15.5° C.

5. *Refractive Index.*—The refractive index at 15.5° C. shall not be less than 1.468 nor more than 1.478.

6. *Initial Boiling Point.*—The initial boiling point shall not be less than 150 nor more than 160° C.

7. *Distillation.*—Ninety per cent of the turpentine shall distill below 170° C.

8. *Polymerization.* — The polymerization residue shall not exceed 2 per cent, and its refractive index at 15.5° C. shall not be less than 1.500.

9. *Odor.*—Shall not have an offensive or empyreumatic odor.

METHODS OF ANALYSIS

10. *Color.*—Fill a 200-mm., perfectly flat bottom colorimetric tube graduated in millimeters to a depth of from 40 to 50 mm. with the turpentine to be examined. Place the tube in a colorimeter and place on or under it a No. 2 yellow Lovibond glass. Over or under a second graduated tube in the colorimeter, place a No. 1 yellow Lovibond glass and run in the same turpentine until the color matches as nearly as possible the color in the first tube. Read the difference in depth of the turpentine in the two tubes. If this difference is 50 mm. or more, the turpentine is "Standard."

11. *Specific Gravity.*—Determine specific gravity at any convenient temperature with a plummet, the displacement of which has been accurately determined for that temperature, or by an equally accurate method, using the factor 0.00082 for each degree centigrade that the temperature of determination differs from 15.5° C.

12. *Refractive Index.*—Determine refractive index at any convenient temperature with an accurate instrument, and calculate the results to 15.5° C., using the factor 0.00045 for each degree that the temperature of determination differs from 15.5° C.

13. *Distillation.*—Use an ordinary Engler flask and condenser, and heat the flask by placing it in a glycerine or oil bath of the general type described in Bulletin No. 135, Bureau of Chemistry. Fit the flask with a thermometer reading from 145 to 200° C. in such a way that the mercury bulb shall be opposite the side tube of the flask and the 175° mark below the cork. Place 100 cc. of the turpentine to be examined in the flask, connect with the condenser, insert stopper bearing thermometer, and heat until distillation of the turpentine begins. Conduct the distillation so that the distillate passes over at the rate of two drops per second. Note the initial distilling temperature and the percentage distilling below 170° C.

14. *Polymerization.*—Place 20 cc. of exactly 38/N (100.92 per cent) sulphuric acid in a graduated, narrow-neck Babcock flask, stoppered, and place in ice water and cool. Add slowly 5 cc. of the turpentine to be tested. Gradually mix the contents, cooling from time to time and not allowing the temperature to rise above about 60° C. When the mixture no longer warms up on shaking, agitate thoroughly and place the bottle in a water bath and heat from 60 to 65° C. for about ten minutes, keeping the contents of the flask thoroughly mixed by vigorous shaking five or six times during the period. Do not stopper the flask after the turpentine has been added, as it may explode. Cool to room temperature, fill the flask with concentrated sulphuric acid until the unpolymerized oil rises into the graduated neck. Centrifuge at about 1200 r.p.m. from four to five minutes, or allow to stand for twelve hours. Read unpolymerized residue, notice its consistency and color, and determine its refractive index.

Turtle Back Roof. Fig. 283. A roof for a passenger equipment car which is arched, and without a clere story or upper deck.

Twin Car Seat. A seat stand with a division arm, two cushions, two seat backs with two striker arms each, so that they may be turned to bring the occupants face to face. See Reclining Chair.

Twin Hopper Gondola Car. A gondola car with two hoppers. See Gondola and Hopper Bottom Gondola.

Twin Spring Draft Gear. Figs. 759, 781, 782. A draft gear in which the springs are arranged alongside of one another.

Twin Washer. A Double Washer.

Two-Way Dump Car. Figs. 134, 136-142, etc. A car from which the entire load may be dumped to either side of the track. See also Side Dump Car.

Tyre. See Tire.

U

U-Bolt. A double bolt made of a bar of iron bent to the shape of the letter U, with a screw thread on each end.

U-Bolt Casting. A casting so shaped that a U-bolt can fit around it and connect it to a timber or sill to form a bearing or carrier for a pin or bolt.

Uncoupling Apparatus. See Uncoupling Lever.

Uncoupling Arrangements for M. C. B. Couplers. Recommended Practice. Sheet M. C. B.—19-B. Figs. 2962. In 1897 designs showing the details of uncoupling arrangements to concealed end sill cars and outside end sill cars were adopted as Recommended Practice.

In 1905 the shoulder of the bracket for the uncoupling rod was made bevel.

In 1908 these details were revised and changes made to overcome former defects.

The special feature of this uncoupling attachment is the slotted center bracket. By placing the rod back on top of end sill or head block a longer arm is obtained, which gives sufficient lift with ample slack in the chain, and by using a sloping slotted bracket the rod projects 1½ inches in front of coupler lock, which is about the best position for an efficient lift. The slotted bracket allows the rod to slide back 3½ inches and avoids interference when slack of train is bunched.

The handle shown should preferably project below end of car or be bent as shown by dotted lines on Sheet M. C. B.—C, in order to protect the operator's hand.

Three links 3¾ inches, 5¾ inches and 7¾ inches long, respectively, are shown. By using one of these three links, therefore, a chain 6½, 8½ or 10½ inches long is obtained, which should fit all cars and M. C. B. links, "S" hooks and other temporary repair devices couplers. These links should avoid the use of split now very common. The arrangement as a whole is applicable to all types of cars, and if properly applied will largely obviate present troubles. Only a few limiting dimensions are shown on the drawing, as the others must be adapted to each particular class of car; but the dimensions for center arm, chain slack and position of lift pin eye should be carefully adhered to.

In 1911 the uncoupling arrangements for M. C. B. coupler were made to conform to the requirements of the U. S. Safety Appliance Act, as shown on Sheet M. C. B. 19-B. Details of uncoupling rod chain are shown on Sheet M. C. B. 23-A.

In 1915 a recommendation was adopted that the uncoupling arrangement for passenger equipment cars should be located on the left-hand side of car facing the end of the car, the same as for freight equipment.

The report in the 1908 M. C. B. Proceedings, page 130, related largely to a study of the uncoupling attachments.

A topical discussion on uncoupling chains on passenger cars will be found in the 1906 M. C. B. Proceedings, page 345.

A brief topical discussion on released rigging for couplers will be found in the M. C. B. Proceedings, 1901, page 337.

Uncoupling Chain. See Uncoupling Arrangements.

Uncoupling Lever or **Uncoupling Rod.** 13, Fig. 35; 12, Fig. 80. Figs. 650, etc. Figs. 798-807; Pages 1201, 1227. An iron rod with a bent handle forming a lever, usually attached to the end sill, by which the lock of the automatic coupler is opened and the cars uncoupled without going between them. The lever proper is the part attached to the rod and operating the unlocking mechanism, but in the case of freight cars the lever and rod are generally made in one piece. In passenger equipment cars the lever is located on the platform or in the vestibule. The short lever (Fig. 628) which is directly connected to a passenger coupler is also sometimes called uncoupling lever.

Uncoupling Lever Bracket. Fig. 969. A bracket supporting the uncoupling lever on the end of the car.

Uncoupling Rigging. See Uncoupling Lever.

Uncoupling Rod. See Uncoupling Lever.

Uncoupling Rod Foot. Fig. 633. The bottom Uncoupling Guide Rod.

Uncoupling Rod Guide. Fig. 632. A guide or support port for the Uncoupling Shaft used on passenger equipment cars having wide vestibules. Preferably uncoupling shaft guide.

Uncoupling Shaft (Passenger Equipment Cars). A vertical rod extending up through the platform floor having a square end at the top to take the uncoupling lever and a crank arm at the bottom to which is attached an uncoupling rod. A partial turn of the uncoupling lever pulls out the uncoupling rod and releases the coupler lock, allowing the knuckle to open and the cars to part.

Uncoupling Shaft Bracket. Fig. 969. See Uncoupling Lever Bracket.

Underframe. Figs. 467-489, 2854-2885; Pages 1131, 1153, 1206, 1254. A framework, which receives the buffing and pulling stresses and carries the weight of the floor and body of the vehicle. In both freight and passenger cars in America the underframe and body are rigidly connected and mutually stiffen and strengthen one another, but in British carriages the body is framed as an independent structure, and merely rests on the underframe, rubber pads (india rubber body cushions) being interposed to deaden shocks. The only connection is through a body holding-down bolt. Underframe includes all the framing below the floor, and includes the platforms, draft timbers, etc. See general drawings of the various types of cars.

Underhung Door. A sliding door which is supported and slides on a rail below the door.

Union (Pipe Fittings) Figs. 2029-2042. A means of uniting the ends of two pipes with a nut. The nut is attached to one pipe by a sleeve with a collar, and is screwed on a sleeve attached to the other pipe. See Pipe Fittings and Pipe Unions.

Union Elbow. Figs. 2036, 2041. A union having one section in the form of an elbow.

Unit-Switch Control (Motor Cars.) Figs. 2599, 2601. A control apparatus for single cars and cars operated in multiple unit service. Parts are standardized to permit of ready renewal. Main power circuit connections are made by pneumatically operated switches assembled in a switch group underneath the car. See Fig. 2601 for section through a unit switch group. For arrangement of the working parts of the air cylinder of a unit switch, see Fig. 2597. See Fig. 2599 for wiring diagram of unit switch control.

United States Gallon. A U. S. gallon contains 231 cubic inches and a U. S. gallon of water weighs 8 1-3 lbs. See Imperial Gallon.

United States Government Specifications for Postal Cars. See Postal Cars, U. S. Government Specifications.

Universal Joint. A device for connecting the ends of two shafts so as to allow them to have perfect freedom of motion in every direction within certain defined limits.

Universal Valve. Fig. 1378; Page 1307. A valve mechanism used with both electric road and steam road passenger brake equipments, which corresponds in a general way to the triple valve in common use, in that it operates to charge the reservoirs and to control the admission of air to and exhaust from the brake cylinder. This valve, however, possesses many distinct and novel features which are made necessary by the rigid requirements of modern traffic conditions. The universal valve is of the built-up type, a simple form of triple valve being the base. This makes it possible to install and operate an equipment, if desired, in stages by adding to the simplest arrangement of apparatus such portions as are demanded by an advance in service requirements, up to the complete form of the device, which is electro-pneumatically operated. The complete form of the device consists of an equalizing portion, which controls the pneumatic service and release of the brake and the charging and recharging of the reservoirs of the equipment; a quick action portion with high pressure cap, which controls the transmission of serial quick action and the obtaining of high emergency pressure in the brake cylinders when an emergency application of the brakes is made; an electric portion which comprises the magnets, switch, etc., controlling the electric service application, electric release and electric emergency applications of the brake; and a pipe bracket to which the various portions of the valve device are bolted and to which all pipe connections are permanently made. The equipment employing this valve is known as the Universal Equipment.

Unloading Machines. A report of an M. C. B. committee on damage to freight car equipment by unloading machines will be found in the 1912 Proceedings, page 264; also in the 1913 Proceedings, page 563; and 1914 Proceedings, page 355.

Unotherm. Fig. 2178. A device for automatic control of steam or vapor heating apparatus.

Upholstery. In passenger car construction, the term includes the cushions, curtains, carpets, beds, etc., and generally the materials from which they are made.

Upper Belt Rail (Passenger Car Exteriors). A horizontal bar attached to the posts on the outside and above the windows. See Belt Rail.

Upper Berth. 2, Figs. 1626, 1627; Fig. 1625. The top berth in a sleeping car section. It folds up by day against the roof, being secured by a berth latch, and the head board, mattresses and bedding are stored in the pocket between it and the roof. See Berth.

Upper Berth End. The end piece of a sleeping car upper berth.

Upper Berth Front Panel. The central panel of an upper berth.

Upper Berth Ladder. 14, Figs. 1626, 1627. For use in entering and leaving an upper berth in a sleeping car.

Upper Berth Lower Rail. The bottom or rear bar of the frame of a wooden upper berth. See Berth Front.

Upper Berth Pocket. A pocket against the sides of the car which closes up flush therewith when the upper berth is folded up, but drops open when the berth is made up, to afford a receptacle for clothing and baggage. It has been replaced by a hammock. Similar pockets for the lower berth are made by turning up the head rest of the seat.

Upper Berth Rest. See Berth Bracket.

Upper Berth Rest Pivot. A pin attached to a plate fastened to an upper berth. The pin engages in a hole in a Berth Bracket.

Upper Berth Spring. Fig. 1628.

Upper Berth Safety Strap. Fig. 337; 15, Figs. 1626, 1627, 1638.

Upper Berth Top Rail. The upper or front bar of the frame of a wooden upper berth. See Berth Front.

Upper Brake Shaft Bearing. A metal eye by which the upper end of a brake shaft is held in place.

Upper Buffer Spring. Figs. 568, 570; Page 1160. A spring at the top of a vestibule diaphragm to hold the vestibule face plates in contact.

Upper Deck (Passenger Equipment Cars). Also called clere-story. The raised central portion of the roof. See Deck.

Upper Deck Carline. A carline supporting the upper deck or clere-story, usually called simply deck carline. A through carline, extending under both lower and upper decks, is also sometimes called an upper deck carline or profile carline.

Upper Deck Eaves Molding. A molding, usually called simply deck eaves molding, on the outside edge of the roof.

Upper Door Sash. The part of a double window sash in a car door which covers the upper part of the opening. This upper section is usually made movable, so that it can be lowered for ventilation.

Upper Floor (Stock Car). More commonly called double deck. A deck or floor in a stock car half way between the main floor of the car and the roof, to double the carrying capacity of the car for pigs, sheep, calves, etc.

(Automobile Car.) A similar arrangement fitted in an automobile car.

Upper Wainscot Rail. A longitudinal wooden bar or rail, fastened to the posts on the inside of a passenger car immediately under the window. See Wainscot Rail.

Urinal. A metal or porcelain receptacle used in saloons, connected to a pipe leading through the floor. They are distinguished as corner or side urinals. A concealing urinal, shutting up flush with the wood work when not in use, is sometimes used.

Urinal Cover. A wooden or sheet metal lid for inclosing a urinal.

Urinal Drip or Drip Pan. A pan under a urinal on the floor.

Urinal Handle. A handle in a saloon, placed above the urinal for support.

Urinal Ventilator. A pipe attached to a cap on a urinal communicating with the top of a car, where some form of wind scoop is often added.

V

V-shaped Screw Thread. A thread with a sharp edge at the top and sharp groove at the root. The Sellers' (U. S.) standard thread is flat at the top and at the root, and the Whitworth is rounded.

Vacuum Brake. A system of continuous brakes which is operated by exhausting the air from some appliance under each car, by which the pressure of the external air is transmitted to the brake levers and shoes. So called in distinction from air brakes,

which are technically understood to refer only to brakes operating with compressed air, although in a literal sense the vacuum brake is also an air brake. An ejector on the engine is ordinarily used for exhausting the air, connected with the rest of the train by pipes and flexible hose between the cars. A continuous pipe is connected through the train between cars by rubber hose, wound with wire to prevent collapsing, and suitable couplings. Under each car is a large cylinder with a piston and rod connected to the brake levers actuating the brake shoes. These cylinders are connected to the train pipe through a simple form of ball valve. An ejector on the locomotive maintains a vacuum of from 20 to 24 inches in the train pipe and in the cylinders under each car. In the release position the piston rests by its own weight in the bottom of the cylinder. To apply the brakes air is admitted to the train pipe and through the ball valve under each car to the space below the piston. The vacuum above the piston permits the atmosphere pressure below the piston to raise it and apply the brakes. A vacuum is always maintained above the piston and is available for applying the brakes at any time. In case the train parts the admittance of air to the broken train pipes applies the brakes in both sections of the train. A valve in the caboose may also be used to admit air to the train pipe and apply the brakes in case of emergency. To release the brakes, the vacuum is restored in the train pipe and under the pistons by working the ejector. See AIR BRAKE.

Vacuum Cleaner. Fig. 2028. A device for removing dust from carpets, etc. It usually consists of a motor-driven pump, which creates a vacuum, by means of which the dust is drawn up through a hose and deposited in a receptacle.

Valve. A lid, cover, or plug for opening and closing an aperture or passage.

Valve Body. The shell case or frame of a valve. See TRIPLE VALVE BODY.

Valve Key (Pintsch Gas Lighting Apparatus). A key for opening all the high pressure valves, the lamp key being used for the low pressure valves connected with the burners.

Valve Rod. 13, Fig. 173. A rod for opening and closing a valve. Frequently an extension of the valve stem. See VALVE STEM.

Valve Seat. The surface on which a valve rests.

Valve Stem. A rod attached to a valve, and by which the latter is moved, is called a valve stem or spindle.

Van. See CABOOSE.

Vapor Regulating Valve (Car Heating). Figs. 2076, etc.; Pages 1184, 1298, 1299, etc. A valve by which the amount of steam admitted to the heater pipe is controlled. For a more detailed description of operation of the one used with the Pressure and Vapor Car Heating System see Vapor Reservoir, which acts in conjunction with it. It is possible with this system to both the valve and the reservoir, in which case it is called a vapor regulating valve, as above.

Vapor Reservoir. Used in the Pressure and Vapor Heating System, Figs. 2155, 2265, etc., in conjunction with the Vapor Regulating Valve. It is placed below the blowoff, or drip valve, forming an extension to it, and consists of a spiral coil of copper piping surrounding a pipe which forms an extension to the blow-off valve. This pipe has several slots cut through to allow the hot water escaping from the system to trickle over the spiral copper pipe. This spiral pipe is filled with a liquid that boils at a low temperature and an extension of the pipe is connected to a diaphragm in the frame of the automatic Vapor Regulating Valve. One or more joints are used to connect the coil and the diaphragm. The extension of the diaphragm closes the steam valve by means of the stem as soon as the liquid in the coil reaches a temperature at which it boils, and under which conditions the vapor generated has sufficient force to close the valves against the spring. When the liquid in the coil cools, which follows the cutting off of the steam supplied to the radiating coils, the vapor condenses and the spring forces the valve open, allowing a fresh supply of steam to enter the heating pipes and supply additional heat to the car.

Vapor System (Passenger Train Lighting). Figs. 2293, etc.; Page 1259. A system of gas lighting designed for use in localities where Pintsch gas charging plants are not available. The gas is produced by mixing air with the vapor of gasolene. The air is taken from the air brake system and passing through a carburetor charged with gasolene becomes a gas suitable for illuminating purposes. The gas is burned in a mantle lamp and produces a soft white light.

Referring to Fig. 2293, air is taken from the auxiliary reservoir of the brake system through check valve 1020 and into the air storage tank through valve 53-B. It then passes up into the car to shut-off valve 2173, which is placed in some convenient location. From valve 2173 the air is carried to thermostatic regulator 2252, and into the carburetor, where it mixes with the gasolene vapor. The gas thus formed passes through regulator 254 to main cock 25-C inside the car and thence through roof piping to the lamps. Check valve 1020 prevents the stored air from returning to the brake system when the brakes are inoperative. With this arrangement, when the car is cut off from the air supply a sufficient quantity of air is held in the tank to keep the lights burning. The carburetor and air storage tank are combined, the carburetor being placed within the tank so that it will be well protected from puncture in case of a wreck. The tank is made of welded steel and is 24¼ in. in diameter by 8 ft. 11¼ in. long. The carburetor consists of a piece of 12 in. wrought iron pipe and is securely fastened to the air tank in such a manner that there is no connection between the air storage compartment and the carburetor. The tank is shown in section in Fig. 2294. That there may be no liquid gasolene present in the gas, the carburetor is packed with an absorbent material, consisting of cotton wicking made up in cartridges about 6 in. long and of a diameter to fit tightly in the carburetor. The cartridges are made by rolling up strips of the cotton wicking with wire cloth. The cartridges are placed in the carburetor with baffle plates between them. Each baffle plate has an opening at the outer edge for the passage of the gas and the arrangement is such that the holes in adjoining plates are on opposite sides of the carburetor, thus causing the air to pass through every part of the carburetor and become thoroughly saturated with gasolene vapor.

Vapor Trap. See STEAM TRAP.

Varnish. A liquid for covering paint or woodwork with a hard, impervious and glossy surface.

Vaulted Deck Window. A deck window shaped like an arch.

Velocipede Car. Fig. 2645. Generally a three-wheeled car, in which the rider sits astride and propels the car with his feet (or feet and hands together), after the manner of a velocipede. They comprise a variety of light cars for inspectors, telegraph line repairers, lamp lighters, etc.

Veneer. A thin leaf of a superior wood for overlaying an inferior wood. By trade usage it is a veneer if it covers other materials than inferior wood.

Vent. A small aperture; a hole or passage for air or other fluid to escape.

Vent Valve (Air Brake). Fig. 1480; Page 1308.

Ventilated Box Car. Fig. 230, 907. Similar to an ordinary box car, but arranged for ventilation and suitable for the transportation of produce or other food-stuffs not needing refrigeration. See CAR.

Ventilating Jack (for Saloons). Figs. 2184, etc. Also called wind scoop. A flaring horizontal tube, constituting a simple form of the ventilating devices which use the current produced by the motion of the cars to cause an exhaust current of air.

Ventilation, Passenger Car. A topical discussion on passenger car ventilation will be found in the 1907 M. C. B. Proceedings, page 272.

A report of a committee on the ventilating and heating of coaches and sleeping cars will be found in the 1908 M. C. B. Proceedings, page 338.

Ventilator (Saloon). Fig. 1969; Pages 1181, 1185. The fixed oval sashes fitted in the saloons of many of the passenger cars are often arranged with a circular ventilator near the center.

Figs. 2184-2211. A device for admitting or exhausting air to or from a railway car. Ventilators, according to their position, are designed as deck ventilators (end or side), frieze ventilators, etc. They are often designated as automatic or self-acting. Day coaches usually depend upon the deck windows for ventilation, the sash at every other window being hung on different sides, so that the open sash may be hinged on the front end. For a report of tests with various ventilators see Proceedings M. C. B. Association, 1894, page 234. See DECK VENTILATOR.

(For Fruit Car.) Figs. 918-920, Pages 1314, 1315. A system of slats at each end of the car, so arranged as to enable the ventilators to be readily opened or closed from the outside.

(Refrigerator Car.) Figs. 228, 890, etc.; Pages 1314, 1315. A current of air must be admitted to refrigerator cars, which passes through the refrigerator and comes in contact with the lading. As it becomes warm it rises upward and passes out. The ventilator controls the admission of air and its circulation.

See HOPPER VENTILATOR.

Ventilator Blower. Fig. 2184a. A blower used in connection with dining car ventilators.

Ventilator Deflector. A metal plate or board placed in such a position at a ventilator opening that it will cause a current of air to flow into or out of the car when the latter is in motion.

Ventilator Door. Figs. 2194, etc. A door for closing the aperture of a ventilator.

Ventilator Hood. A shield over the outside of a ventilator to prevent the entrance of sparks, cinders, rain or snow. It is sometimes intended to direct the current of air either into or out of the car.

Ventilator Netting. A wire screen or netting fastened over the outer deck window sash to prevent the entrance of sparks and cinders.

A netting over the ventilator windows of a fruit car.

Ventilator Opener. See DECK SASH OPENER.

Ventilator Pivot. A pin on which a ventilator door or sash is swung or hinged. It is the same as a deck sash pivot.

Ventilator Plug. Fig. 890. A hatch; a door for closing the opening in a refrigerator car ice bunker.

Ventilator Register. Fig. 2197; Pages 1314, 1315. A metal plate or frame attached to a ventilator opening, provided with slats arranged so as to turn, or openings which can be controlled, and thus either open or close the ventilator.

Ventilator Sash. Usually a deck sash.

Ventilator Staff. A pull hook or Deck Sash Opener.

Ventilator Valve. A door for opening or closing the aperture of a ventilator, usually made to turn on pivots at or near its center.

Vertical Steam Trap and Blow-Off. Figs. 2078, etc. A Thermostatic Steam Trap, and a blow-off valve combined. It may be operated from inside of the car.

Vestibule. Figs. 528-649. Formerly that part of the car nearest the door, cut off from the main saloon by an interior door. It was occupied by the saloon, washing and heating arrangements, etc. Its purpose was to give protection to the interior of the car against drafts and noise.

Usually a platform enclosure, consisting of a face or buffer plate, constituting an arched doorway, connected with a spring extended rod, a foot plate combined with the buffer stems and face plate, a bellows-like connection called a diaphragm between the face plate and car frame and side doors opening to the steps.

Vestibule Body Corner Post. The inner post of a vestibule, set against the end of the car body and directly over the platform sills.

Vestibule Buffer Plate. 79, Fig. 552. An extra long and wide buffer plate, sometimes recessed or chamfered at the ends, where it is connected with the face plate of the vestibule, whose face is flush with the buffer plate.

Vestibule Corner Post. 31, Fig. 348. The outer corner post of the vestibule.

Vestibule Curtain. Figs. 573-588; Page 1160. A curtain which is stretched across the inside surface made by the vestibule diaphragms and face plates when two cars are coupled, to protect passengers from injury.

Vestibule Curtain Fixtures. Figs. 571-588; Pages 1160, 1165.

Vestibule Curtain Handle. Figs. 579-584; Page 1160. A handle or catch used to secure a vestibule passageway curtain to its hook. A release handle is one which automatically unfastens in case of excessive strain.

Vestibule Curtain Hook. Figs. 573, 574. See VESTIBULE CURTAIN.

Vestibule Curtain Shield. Figs. 571, 572, 577, 585, 586; Pages 1160, 1165. A shield to protect a vestibule curtain when rolled up.

Vestibule Diaphragm. Figs. 532-570; Pages 1160, 1164. See DIAPHRAGM.

Vestibule Diaphragm Post. 32, Fig. 348. The vestibule post to which the diaphragm is connected.

Vestibule Dome Lamp. A VESTIBULE LAMP.

Vestibule Door. Figs. 882, 883, etc. A door by which the vestibule of a car is entered from the side. In the older or narrow type of vestibule they are double or divided, the two doors being hinged together and swung from the vestibule corner post.

Vestibule Door Hinge. Strap hinges, which fasten the double doors of a narrow vestibule together.

Vestibule Door Latch. Page 1200. A device for holding a door in place, either open or shut, as may be desired.

Vestibule Door Rod. A bar or rod across the doors of a narrow vestibule to prevent their being pushed in.

Vestibule End Carline. A platform hood end carline. See CARLINE.

Vestibule End Post. See VESTIBULE CORNER POST.

Vestibule End Window. The window in the end of the vestibule enclosure.

Vestibule Face Plate. Fig. 556. An inverted U-shaped forging and forming with the diaphragm a passageway from the platform of one car to that of the next. The weight of it is carried on the buffer plate and it is kept thrust out against the opposing face plate either by springs or by its own weight.

Vestibule Gate. Figs. 619-624. A gate used to close the vestibule passageway at the rear of the last car in a train.

Vestibule Guard Rail. Figs. 637, 643, 644. A hand rail or hand hold, pivoted at one end and fitting in a socket at the other, and located on the end of the car so that it may be swung across the vestibule door and hold it in an open position.

Vestibule Hood. The platform hood of a vestibuled car.

Vestibule Lamp. Figs. 2245, etc. A lamp used for lighting a car vestibule.

Vestibuled Car (Passenger Equipment). Figs. 293-351, 354-366, 372-400. A car equipped with covered enclosed platforms. See VESTIBULE.

Volt. The unit of electric pressure or electro-motive force.

Voltmeter. An instrument for measuring the voltage of electric currents.

W

Wainscot Panel (Passenger Car Interior). A panel under the windows between the two wainscot rails.

Wainscot Rail (Passenger Car Interior). A longitudinal wooden strip fastened to the posts and extending from one end of the car to the other. The lower wainscot rail comes immediately above the truss plank; the upper wainscot rail is immediately under the window. The wainscot end rails are the wainscot rails at the end of the car.

Walkover Seat. Figs. 1676, etc. A term used to designate a type of car seats in which the back does not turn over when the seat is reversed. Also called GLIDEOVER and PUSHOVER.

Wall Lamp. A lamp to fit in a recess in the wall of a car or corridor.

Wall Seat End. The seat end next to the wall or side of a car, so called in distinction from the aisle seat end.

Wardrobe (Postal Car). Fig. 2921. See also POSTAL CARS, U. S. GOVERNMENT SPECIFICATIONS.

Wards (of a Lock). The interior circular ridges which fit into corresponding recesses in the bit of a key (the latter also termed wards), the surrounding solid parts of the bit being called the web.

Wash Bowl or Wash Basin. See BASIN.

Wash Bowl Pipe. A waste pipe.

Wash Room. A compartment provided with toilet facilities. See LAVATORY.

Wash Room Pump. More properly BASIN PUMP.

Wash Stand. Figs. 1761, etc.; Pages 1118, 1162. A cast stand carrying a basin. They are distinguished as corner or side wash stands.

Wash Stand Slab. A stone or metal slab which forms the top for a wash stand.

Washer. Fig. 972. A plate of metal or other material, usually annular, which is placed under a nut or bolt head to give it a better bearing. Two or more washers are sometimes combined and called washer plates, strap washers, double or twin washers, triple washers, etc.; they are sometimes made beveled or triangular for a rod or bolt which is oblique with reference to the bearing surface. A socket washer or flush washer is one provided with a recess for the bolt head, so as to leave it flush with the surface of the adjoining parts. Cut washers or wrought washers are those stamped out of rolled iron plates. Cast washers are made from cast iron. Both are largely used. Washers in car work generally take their name from that of the bolt or rod to which they are attached.

Washer Plate. A STRAP WASHER.

Waste. Page 1174. Material used for wiping oil from machinery, and also for journal packing. Made largely of spoiled bobbins of wool or cotton mills and discarded fabrics, which are shredded for their threads. See JOURNAL PACKING.

A topical discussion on "What Constitutes Efficient Waste Packing" will be found in the M. C. B. Proceedings, 1901, Page 336.

A topical discussion, including the results of a series of tests on cotton and woolen waste, and proposed specifications for wool, cotton and white cotton waste, will be found in the 1903 M. C. B. Proceedings, Page 335.

Waste Cock. (Baker Heaters.) A cock attached to the expansion drum or circulating drum of the Baker heater for drawing off or changing the water in the heater pipes.

A cock for drawing off water from a tank or basin.

Water Alcove. Fig. 1768. A recess in the side of a partition of a passenger car to receive the faucet of a water cooler or water pipe and a drinking cup. The term is generally used to designate the metal casing or lining with which the recess is covered. The water tank for supplying water alcoves is usually placed on the other side of the partition, in the saloon, and commonly when so placed extends to the roof.

Wastometer. Fig. 1782. A device for flushing water closets.

Water Circulation Heating System. See HOT WATER CIRCULATION HEATING SYSTEM.

Water Closet. Figs. 1780-1794; Pages 1162, 1166. A commode with water supply to rinse the basin and carry off the contents.

Water Cooler. Figs. 1756, etc.; Page 1185. A tank or vessel for carrying drinking water, which is usually cooled with ice. The sides are generally made double, and the space between filled with some non-conducting substance. They frequently extend to the roof. See WATER ALCOVE, WATER TANK.

Water Drip. Fig. 1760; Page 1185. a pan or receptacle to receive the waste water from a water cooler. A drip pipe, or waste pipe, connects with it.

A slight projection or raised seam in the roof of a passenger or baggage car over the side doors, or at the end of the car in the platform roof to divert the water so it will not fall upon persons entering the car or passing from one car to the next.

Water Gage. See GLASS WATER GAGE.

Water Seal. See TRAP.

Water Supply. The system of water supply used in Pullman sleeping cars is under air pressure, thus doing away with the old method of using pumps for raising water for washing purposes. The system consists of forcing water into the wash bowls by air pressure taken from the air brake system. The water is usually heated by using live steam from the locomotive for this purpose.

Water Tank. Page 1185. A vessel or reservoir for holding water. Those used on cars for drinking water are usually made of sheet iron, and often extend to the roof. They are then usually drawn from by a water alcove, Fig. 1768, the tank being usually in the corner of the saloon, concealed from the interior of the car.

For size and arrangement of water tank in postal cars, see U. S. Government Specification for POSTAL CARS and Fig. 2917.

Watt. The unit of electric power. The product of one ampere multiplied by one volt. It is equal to 1-746 horsepower.

Wattmeter. An instrument for measuring electric power.

Waved Moldings. Moldings which by a special machine are made of a corrugated section longitudinally.

Way Car. A CABOOSE.

Weather Strips Figs. 1859, etc.; Page 1165. A strip for application around the crevices of windows or doors, for excluding the dust and wind, and for preventing water from entering around the windows.

Web. A term applied to the center portion of a beam, as an I-beam, which ties the flanges together. See BODY BOLSTER FILLER.

(Of a Key.) The solid portion of a bit of a key, the recesses cut away being termed wards. See BIT.

Web Filler. See BODY BOLSTER FILLER.

Webbing. A strong fabric, made of hemp or other material which is not likely to stretch, used in upholstering car seats.

Wedge. The metal piece used to keep a journal bearing in its place in the journal box. See JOURNAL BOX WEDGE.

Wedge, Journal Box. See JOURNAL BOXES AND DETAILS.

Weed Killer. Fig. 428. See SPRAYING CAR.

Weight of Car, Light; Stenciling of. See FOUNDATION BRAKE GEAR.

Welding Cast Steel Trucks. A report on welding cast steel truck side frames and bolsters will be found in the M. C. B. Proceedings, 1916, page 497.

Well Car. Figs. 153, 155-159. A flat car with an opening in the center to allow the load to extend below the floor level when it could not otherwise come within the overhead clearance limits. See CAR.

Wheel. A circular frame or solid piece of material which revolves on an axis. See BRAKE RATCHET WHEEL, HAND BRAKE WHEEL, etc.

Figs. 1199-1226; Pages 1123, 1125, 1126, 1192, 1194, 1197, 1283. A circular frame or disc, as above defined, serving to support a moving vehicle, as Car Wheel, hand car wheel, etc. Car wheels are generally either cast iron (chilled), forged, cast steel, or steel tired.

The rules for INTERCHANGE OF TRAFFIC give the defects for which wheels may be replaced.

Wheel Bar (Passenger Truck). A wheel piece.

Wheel, Cast Iron. (M. C. B. Recommended Practice.) Sheets M. C. B.—N, O and P. Figs. 3052-3055.

In 1904 designs of wheels for cars of 60,000 pounds, 80,000 pounds and 100,000 pounds capacity were adopted as Recommended Practice. Revised 1907. Modified 1909. Modified in 1911. Titles of Sheets M. C. B.—N, O and P changed in 1913 to show gross weight capacity. In 1914 the title of Sheet N was corrected to read "95,000 pounds."

In 1917 wheels for 80,000-lb. capacity cars redesigned and increased in weight to 700 lb. See Sheet M. C. B.—O.

In 1917 a design of wheels for 140,000 lb. capacity cars was adopted. See Sheet M. C. B.—P[1].

Wheel Center (Steel Tired Wheels). The portion of a wheel inside of the tire and between it and the hub or boss. The wheel center is sometimes in one piece and sometimes made up of two parts, the hub or boss and the central filling piece. Face plates, front and back, are also used. The term is seldom applied to chilled or cast wheels.

Wheel-Check Gage (M. C. B. Standard). Fig. 2948.

In 1896 a standard reference gage for mounting and inspecting wheels was adopted by letter ballot to take the place of the check gage for mounting wheels, formerly shown on Sheet M. C. B. 12, and the gage for distance between wheels formerly shown on Sheet M. C. B. 7. At same date a standard check gage was adopted. See Proceedings 1896. In 1907 these were modified. Modified 1909.

In 1911 the mounting and inspection wheel gages were eliminated and a wheel check gage adopted as their substitute.

Wheel-Circumference Measure for Cast-Iron, for Steel and Steel-Tired, and Cast Steel Wheels. M. C. B. (Standard). Sheet M. C. B. 16-A. Fig. 2950.

By letter ballot in 1893 a Wheel Circumference Measure was adopted as a standard of the Association. Prior to that date it had been recommended for use in all car building shops. See Proceedings 1892, page 172.

In 1900 a new form of Wheel Circumference Measure was adopted as standard, as shown on Sheet 16. See Proceedings 1900, page 114.

In 1910 the brackets used on the wheel circumference measure were replaced with a form to suit the wheel tread and flange contour adopted in 1909. Redesigned in 1911. Redesigned in 1913.

In 1917 the wheel circumference measure for steel and steel-tired wheels advanced to Standard, taking the place of gage shown on Sheet M. C. B. 16-A, one gage to be used for both cast-iron and steel wheels.

In 1918 the length of the band was increased 5 in. in order to take care of the 38 in. diameter steel and steel-tired wheels.

The markings for steel and steel-tired wheels were shown separately, each occupying one-half of the band.

Wheel Defects Gage. (M. C. B. Standard.) Sheet M. C. B. 16. Fig. 2946.

In 1903 the wheel defect gage shown in the Rules of Interchange was adopted as standard. See Sheet M. C. B. 16. Modified 1904, 1905, 1907, 1909.

In 1914 gage had a notch added for measuring flat spots of 1 inch and 2 inches in length.

In 1916 gage changed to permit gaging of worn collars on axles and name changed to Wheel Defect, Worn Coupler Limit and Worn Journal Collar Gage.

In 1917 the condemning limits for worn thin and worn vertical flanges of cast-steel wheels adopted, the same as those for wrought-steel wheels.

In 1918 gage was changed to show a radius of 5-16 in. at the lower right-hand corner and radius of ⅜ in. at the lower left-hand corner for the purpose of checking the fillets of journals.

Wheel, Diameter of Steel and Steel-Tired (M. C. B. Recommended Practice). In 1911 a recommended practice of 33 inches was adopted as the diameter for all new steel and steel-tired wheels for freight cars.

Wheel Fit. See Wheel Seat.

Wheel Flange. The projecting edge or rim on the periphery of a car wheel for keeping it on the rail.

Wheel Flanges, Distance Between the Backs of. (M. C. B. Standard.)

In 1883 the standard distance between the backs of flanges of car wheels was made 4 feet 5⅜ inches. See Proceedings 1883, pages 55, 118-120.

In 1885 it was decided by letter ballot that in fitting wheels on axles a variation of ⅛ inch each way from the standard distance between flanges would be allowed. See Proceedings 1885, pages 111-119. Drawing revised in 1896.

In 1907 this standard distance was made 4 feet 5⅛ inches, owing to increase in width of wheel flange. Modified 1909.

In 1909 the minimum distance between the backs of flanges at base line of tread was fixed at 4 feet 5 3-32 inches.

Wheel Flange Thickness Gages for New Wheels. (M. C. B. Standard.) Sheet M. C. B. 16. Fig. 2948.

Maximum and minimum wheel flange thickness gages for new wheels were adopted as standard in 1894. Such gages should be used on all new wheels after September 1, 1894, to insure ability to mount them properly to check gage.

In 1907 a modified form of wheel flange thickness gages, applicable to the larger wheel tread than a standard, was adopted as standard. They are shown on Sheet M. C. B. 16. Redesigned in 1909 to suit new tread and flange contour.

In 1911 the minimum flange thickness dimension shown on minimum flange thickness gage as 1 5-32 inches was changed to 1 11-64 inches.

In 1912 the maximum and minimum flange thickness gages were modified so that they can be used for either cast-iron, solid steel or steel-tired wheels; also to limit the maximum and minimum height as well as the throat radius for steel wheels.

In 1914 gage was corrected to have radius with which the gaging point at the throat is struck, from ⅝ to 1 15-16 inch. Likewise the ⅝-inch radius, as shown for minimum flange-thickness gage, changed to 1 13-16 inch.

Wheels, Limit Gages for Inspecting Second-Hand, for Remounting. (M. C. B. Standard.) Sheet M. C. B. 16-A. Fig. 2949.

In 1907 limit gages for use at shops when inspecting secondhand wheels for remounting were adopted as Recommended Practice. Modified in 1909. Advanced to Standard in 1910. In 1911 the method of using gages was shown on above sheet.

In 1911 the note under limit gage on Sheet M. C. B. 16-A was changed to cover cast-iron wheels with standard tread and flange adopted prior to 1909 and a new gage added to cover standard tread and flange adopted in 1909.

Wheels, Mating. A topical discussion on the circumferential variation allowable in mating wheels, will be found in the M. C. B. Proceedings, page 129.

Wheel, Minimum Thickness for Steel Tire of. See Tires, Minimum Thickness for Steel.

Wheels, Mounting. (M. C. B. Recommended Practice.)

In 1897 the Recommended Practice for mounting wheels was modified by letter ballot by the omission of that part providing, among other things, that wheels with flanges worn to a thickness of 1⅛ in. or less should not be remounted, and the substitution therefor of the following:

First.—That wheels with flanges worn to a thickness of 11/16 in. or less shall not be remounted.

In 1916 the following maximum and minimum pressures for mounting wrought-steel and cast-iron wheels on axles of the different sizes were adopted:

Mounting Pressures, in Tons.

Axle.	Wheel Seat Diameter.	Cast Iron Wheels. Minimum.	Cast Iron Wheels. Maximum.	Steel Wheels. Minimum.	Steel Wheels. Maximum.
A	5⅛ in.	30	45	45	60
B	5¾ in.	35	50	50	70
C	6⅓ in.	40	60	60	80
D	7 in.	45	65	65	85
E	7⅝ in.	50	70	70	95

Second.—That the thickness of flanges of wheels fitted on the same axle should be equal and should never vary more than 1/16 in.

Third.—That in mounting wheels, new or second-hand, the standard wheel mounting and check gage be used in the following manner:

After one wheel is pressed into position, place the stop "A" or "B" of the check gage against the inside of the flange of the wheel with the thinner flange with the corresponding tread stop "C" or "D" against the tread of the wheel. Press the other wheel on the axle until the opposite tread stop comes in contact with the tread with the corresponding gage point "E" or "F" in contact with the outside of the thicker flange.

In 1917 the following was adopted:

The wheel seats on all axles must be turned to a uniform diameter throughout the entire length of each wheel seat, and must be smooth and free from ridges, so as to provide an even bearing for the wheel fit throughout. Mounting of wheels on axles having the wheel fit tapered is not permissible.

A committee report on the practices of mounting

wheels on axles and the pressure to be used will be found in the 1910 M. C. B. Proceedings, page 470.

Wheel Piece 10, Fig. 1003. The upper side member of a pedestal truck, to which the pedestals are attached.

Wheel Piece Plate. 11, 12, Fig. 1003. A plate used to strengthen a wooden wheel piece.

Wheel Plate (Cast Iron Wheels). That part of a plate car wheel which connects the rim and the hub. It occupies the place and fulfills the same purpose as the spokes do in an open or spoke wheel. See WHEEL, PLATE WHEEL, FACE PLATE.

Wheel Press Recording Gage. Figs. 2021, 2022. A device which indicates and records the progress of pressing wheels on car and locomotive axles.

Wheel Ribs (Cast Iron Wheels). More commonly, brackets. Projections cast usually on the inner side of plate car wheels to strengthen them.

Wheel Seat or Wheel Fit (of an Axle). The part which is inserted in the hub of a wheel. It is made truly cylindrical and very slightly larger than the axle seat of the wheel. The wheel is pressed on it by hydraulic pressure. See WHEELS.

Wheel, Specifications for 33-Inch Cast-Iron, for Cars of Maximum Gross Weights, Not to Exceed 95,000 Pounds, 132,000 Pounds and 161,000 Pounds. (M. C. B. Recommended Practice.) Sheets M. C. B. —N, O and P.

Adopted 1893. Revised 1899 and 1904. Modified 1911 in reference to cast date. In 1912 measuring line for nominal diameter was designated as A. B. and the diameters of cores added to drawings. Revised as to form in 1913. In 1914 the thermal-test clause (b) was corrected. In 1914 Section 14, "Marking Wheel," was corrected. In 1915 Section IV, paragraph 7, was modified. Modified to include 850-lb. wheel in 1917.

I. MATERIAL AND CHILL

1. *Material.*—The wheels shall show clean, gray iron in the plates, except at chaplets, where mottling to not more than ½ in. from same will be permitted.

2. *Chill.*—(a) The depth of pure white iron shall not exceed 1 in. nor be less than ½ in. in the middle of the tread.

(b) It shall not exceed 1 in. in the middle of the tread nor be less than ⅜ in. in throat for wheels having a maximum weight of 625 lb.

(c) It shall not exceed 1 in. in the middle of the tread nor be less than 7-16 in. in the throat for wheels having a maximum weight of 700 lb.

(d) It shall not exceed 1 in. in the tread nor be less than ½ in. in the throat for wheels having a maximum weight of 725 lb. and 850 lb.

(e) The depth of white iron shall not vary more than ¼ in. around the tread on the rail line in the same wheel.

II. PHYSICAL PROPERTIES AND TESTS

3. *Sampling.*—When ready for inspection, the wheels shall be arranged in groups, all wheels of the same date being grouped together, and for each 100 wheels which pass inspection and are ready for shipment, two representative wheels shall be taken at random, one of which will be subjected to the drop test.

4. *Drop Test.*—The wheels shall conform to the following drop-test requirements:

(a) The test wheel shall be so placed on the three supports, with flange turned downward, that the tup will strike centrally on the hub. When tested in accordance with the following conditions, the wheel shall stand the following specific number of blows:

TABLE 1.

Weight of Wheel, Pounds.	Weight of Tup, Pounds.	Height of Drop, Feet.	Number of Blows.
625	200	9	10
700	200	10	12
725	200	12	12
850	200	15	12

5. *Thermal Test.*—Should the test wheel stand the given number of blows without breaking into two or more pieces, the inspector will then subject the other wheel to the following test:

(a) Preparation.—The wheel shall be laid with the flange downward in the sand and a channel way 1½ in. wide and 4 in. deep must be molded with green sand around the wheel. The clean tread of the wheel must form one side of the channel way and the clean flange must form as much of the bottom as its width will cover.

(b) Test.—The above described channel must be filled with molten cast iron, which shall be hot enough, when poured, so that the ring which is formed, when the metal is cold, shall be solid or free from wrinkles or layers. The time when pouring ceases must be noted, and two minutes later an examination of the wheel must be made. If the wheel is found broken in pieces or if any cracks in the plate extend through or into the rim, all wheels of the same tape size as the wheel broken will be rejected.

6. *Drop-test Machine.*—The three supports shall not be more than 5 in. wide. The anvil shall be supported on rubble masonry at least two feet deep and shall weight not less than 1,700 lb. The striking face of the tup shall be 8 in. in diameter and be flat.

III. RETEST

7. *Number of Tests.*—In making the drop test, should the test wheel break into two or more pieces with less than the required number of blows, then the second wheel shall be taken from the same lot and similarly tested. If the second wheel stands the test it shall be optional with the inspector whether he shall test the third wheel or not. If he does not do so, or if he does and the third wheel stands the test, the 100 wheels will be accepted as filling the requirements of the drop test.

IV. DIMENSIONS, TAPING AND GAGING

8. *Dimensions.*—The normal diameter of the wheel produced by the chill must be the M. C. B. standard 33 in., measured at a point 2⅝ in. from the outside of the tread of the wheel. Wheels furnished under this specification shall not vary more than 5/16 in. above or below the normal size measured on the circumference and the same wheel shall not vary more than 1/16 in. in diameter.

The thickness of the flange shall be regulated by the maximum and minimum flange thickness gages adopted by the Master Car Builders' Association.

9. *Taping.*—All wheels shall be taped with M. C. B. standard design of wheel circumference tape, having numbers 1, 2, 3, 4 and 5 stamped ⅛ in. apart, the figure 3 to represent the normal diameter 103.67 in. circumference. The figure 1, the smallest, and the figure 5 the largest.

V. WEIGHTS

(10) All wheels furnished under these specifications shall conform to the respective sections shown

by the M. C. B. drawings for different weights of wheels, and weights shall be as follows:

Maximum Gross Weight of Car Pounds.	Maximum Weight of Wheel Not Exceeding Pounds.	Minimum Weight of Wheel Not Less Than Pounds.
95,000	625	615
132,000	700	690
161,000	725	715
210,000	850	835

(b) Cores.—In case of wheels ordered with cores smaller in diameter than the standard, the additional weight should be considered as an addition to the normal weight and paid for by the purchaser.

(c) Note.—Weights given in the above table are based on M. C. B. standard drawings covering wheel design, adopted in 1909.

11. *Under Weight.*—Wheels that are under minimum weight will be set aside and not further considered.

12. *Over Weight.*—Wheels that are over the maximum weights will be at the expense of the manufacturer.

VI. WORKMANSHIP AND FINISH

13. *Workmanship.*—Chills shall have an inside profile that, in the finished wheel, will produce the exact form of the flange and tread contour shown by the M. C. B. drawings adopted in 1909.

14. *Finish.*—The body of the wheel must be smooth and free from slag, shrinkage or blow holes. The tread shall be free from deep and irregular wrinkles, slag, chill cracks and sweat or beads in the throat, and swelled rims.

VII. MARKING

15. *Marking.*—All wheels shall be numbered consecutively in accordance with the instructions from the railroad company purchasing them, and shall have the initials of such railroad company, also the wheel number, the weight of the wheel and month, day and year when made, plainly formed on the inside plate of casting. No two wheels shall have the same number. All wheels shall also have the name and place of manufacture plainly formed on the outside plate in casting. Wheels conforming to the requirements and furnished under this specification shall have plainly formed on the outside plate, M. C. B., 1909, for wheels of nominal weight of 625 and 725 lb., and M. C. B., 1917, for wheels having a nominal weight of 700 and 850 lb.

VIII. REJECTION LIMITS

16. *Rejection.*—(a) If in any lot of wheels submitted for test the test wheel fails to meet the requirements of the drop, chill or thermal test, then all of the wheels in tape number and weight corresponding to the test wheel will be rejected.

(b) High Chill.—In case the rejection is for high chill, weak breaking strength or failure in the thermal test, the test will be continued in the next higher number of tape size.

(c) Low Chill.—If the rejection is for low chill, the test will be continued in the next lower number tape size.

Wheels, Plane Gage for Wrought Steel (M. C. B. Standard). Sheet M. C. B. 16-A. (Fig. 2949.)

In 1912 a plane gage was adopted for the purpose of measuring how much wheels are out of plane.

Advanced to Standard in 1917.

Wheels, Rotundity Gage for Wrought Steel (M. C. B. Standard). Sheet M. C. B. 16-A. (Fig. 2949.)

In 1912 a rotundity gage was adopted for the purpose of measuring the maximum distance that wheels are out of round.

Advanced to Standard in 1917.

Wheel, Solid Steel. A topical discussion on solid steel wheels for passenger cars will be found in the 1907 M. C. B. Proceedings, page 277.

Wheel, Solid Steel, Plane Gage for (M. C. B. Recommended Practice). Fig. 2949. In 1912 a plane gage was adopted for the purpose of measuring how much wheels are out of plane.

Wheel, Solid Steel, Rotundity Gage for (M. C. B. Recommended Practice). Fig. 2949. In 1912 a rotundity gage was adopted for the purpose of measuring the maximum distance that wheels are out of round.

Wheel, Solid Steel, Sizes and Dimensions for (M. C. B. Recommended Practice). Figs. 3062, 3063. In 1912 sizes and dimensions for solid steel wheels for freight and passengers cars were adopted as recommended practice. Revised in 1913.

Wheel, Steel, Branding of (M. C. B. Recommended (Practice). Sheet M. C. B.—C². (Fig. 3037.)

In 1912 a method of branding wrought steel wheels was adopted.

Wheels, Steel and Steel-Tired, Diameter of (M. C. B. Standard).

In 1914 33-inch, 36-inch and 38-inch diameters were adopted as Standard.

Wheels, Steel and Steel-Tired (M. C. B. Recommended Practice). Sheets M. C. B. 25, 25-A and 25-B. (Figs. 2992-2994.)

In 1911 a recommended practice of 33 inches was adopted as the diameter for all new steel and steel-tired wheels for freight cars.

In 1911 a recommended practice was also adopted that for high-capacity cars built in the future and likely to be equipped with steel wheels that provisions be made in the construction of car and trucks to permit the use of wheels varying in diameter from 33 inches to 30 inches.

In 1912 specifications covering dimensions and tolerances for solid wrought-steel wheels for freight and passenger car service were adopted as recommended practice. Revised 1913 and Sheets M. C. B.—R, S and T changed to conform. In 1914 paragraph 4, "Branding," was corrected, adding the purchaser's name and serial number. Advanced to Standard in 1917.

In 1914 wheel centers of 28 inches, 31 inches and 33 inches were adopted by letter ballot.

Wheel, Steel-Tired, Tire Fastening for (M. C. B. Recommended Practice). Sheet M. C. B.—C. (Fig. 3035.)

In 1912 the form of fastening for steel-tired wheels shown on above sheet was adopted.

Wheel, Steel, Gage for Measuring Thickness of Rim (M. C. B. Standard). Sheet M. C. B.—C². (Fig. 3036.)

In 1912 a gage was adopted for the purpose of measuring the thickness of the rim above the limit of wear groove. With this gage it is possible to measure direct the amount of metal necessary to remove in order to restore the tread to M. C. B. contour; also to measure direct the amount of service metal remaining above the condemning limit after the tread is restored to M. C. B. contour.

The report of the M. C. B. committee in the 1901

Proceedings, page 182, relates to an investigation on the question of locating the inner face of cast iron wheels to the gage point and the thickness of metal between the bore and ring core; also recommending minimum weights for wheels for use under 60,000, 80,000 and 100,000 lb. passenger cars.

The report of the committee in the 1902 Proceedings, page 265, is largely a progress report and recommends that the roads keep careful records of the breakage of cast iron wheels.

A progress report on the design, weight and material of cast iron wheels for cars of 60,000, 80,000 and 100,000-pound capacity, will be found in the 1903 M. C. B. Proceedings, page 163.

A topical discussion on the performance of the 1904 cast iron wheel will be found in the 1905 M. C. B. Proceedings, page 295.

The report of the committee in the 1905 Proceedings, page 269, is concerned largely with the question of a guarantee from wheel makers.

In 1906 the committee recommended certain changes in the thickness of the flange and the taper of the tread which were adopted by letter ballot.

The committee report for 1907 related largely to revisions of the drawings and rules to make them conform with the new standards.

The report in the 1908 Proceedings, page 235, is concerned with detailed recommendations.

Other reports will be found in the M. C. B. Proceedings, 1910, page 378; 1911 Proceedings, page 204; 1912 Proceedings, page 134; 1913 Proceedings, page 284; 1914 Proceedings, page 102; 1915 Proceedings, page 96; the report in the 1916 Proceedings, page 183, contains an elaborate study of flange and tread failures.

Wheel Timber. A term sometimes applied to a wooden Wheel Piece.

Wheel Tread and Flange for Steel and Steel-Tired Wheels. (M. C. B. Recommended Practice.) Sheet M. C. B. 16-A. Fig. 2949.

In 1909 the former illustration then shown on Sheet M. C. B.—A was discarded, and the four illustrations shown on Sheet M. C. B.—C substituted, to govern service operations for both steel and steel-tired wheels under both passenger and freight cars.

Also, that the location of limit of wear of groove be ¼ inch below the tread face on steel and steel-tired wheels where same have worn to condemning limit, as shown in illustrations on Sheet M. C. B.—C; the shape of the groove to be as shown on these illustrations and the measurements to be taken from the horizontal or inside edge of same.

In 1909 the tread and flange contour for steel and steel-tired wheels was revised as shown on Sheet M. C. B.—C. It is exactly similar to the new tread and flange contour for cast-iron wheels from the point of the flange to the outside of the tread only, and the development of the flange from the point to the back face of the wheel or tire has been made of such form that the same mounting and inspecting gage used for cast-iron wheels can be used for the new section of steel and steel-tired wheels.

In 1912 the thickness of flange for steel and steel-tired wheels was increased 3/32 inch, making the contour to the base line the same as for cast-iron wheels. Advanced to Standard in 1917.

Wheel Tread and Flanges, Form of. Sheet M. C. B. 16. Fig. 2948.

A form of wheel tread and flange was adopted as a standard of the Association, by letter ballot, in 1886. For action of the Association see Proceedings 1882, pages 178 and 179; Proceedings 1886, page 68.

In 1906 a design of wheel tread and flange was adopted as Recommended Practice, having an increase of ⅛ inch on the flange, and a taper in the tread of one in twenty. In 1907 this was advanced to standard, and is shown on Sheet M. C. B. 16. Modified 1909.

In 1910 a maximum allowable height of flange for cast-iron wheels of 1½ inches was adopted as standard.

Wheel and Track, Terms and Gaging Points for. Sheet M. C. B. 16. Fig. 2948.

Standard terms and gaging points for wheels and track were adopted in 1894 as follows:

1.—*Track Rails* are the two main rails forming the track.

2.—*Gage of Track* is the shortest distance between the heads of track rails.

3.—*Base Line,* for wheel gages, is a line parallel to the axis of the wheels drawn through the point of intersection of tread with a line perpendicular to the axis, and passing through the center of the throat curve.

4.—*Inside Gage of Flanges* is the distance between backs of flanges of a pair of mounted wheels measured on the base line.

5.—*Gage of Wheels* is the distance between the outside face of flanges of a pair of mounted wheels measured on a line parallel to the base line, but ⅝ inch farther from the axis of the wheels.

6.—*Thickness of Flange* is the distance measured parallel to the base line between two lines perpendicular thereto, one drawn through the point of measurement of "inside gage of flanges," and the other drawn through the point of measurement of "gage of wheels."

7.—*Width of Tread* is the distance measured parallel to the base line from a line perpendicular thereto, drawn through the point of measurement of "gage of wheels" to the outer edge of tread.

8.—*Check Gage Distance* is the distance measured parallel to the base line between two lines perpendicular thereto, one drawn through the point of measurement of "inside gage of flanges" on either wheel, and the other drawn through point of measurement of "gage of wheels" on mate wheel.

9.—*Over All Gage* is the distance parallel to base line from outer edge of one wheel to the outer edge of mate wheel.

The above mentioned wheel gage distances are either directly or by inference as follows, having been modified in 1909:

	Feet.	Inches.
Inside Gage of Flanges	4	5 7/32
Gage of Wheels	4	7 11/16
Thickness of Flange	..	1 15/64
Width of Tread	..	4 11/32
Check Gage Distance	4	6 29/64
Over All Gage	5	4 3/8

Wheel Truing Brake Shoe. A brake shoe with abrasive inserts to grind the wheel tread and flange true to center while in service. See Brake Shoe.

Wheels, Worn and Chipped Flanges and Treads of. See Interchange of Traffic, Rules, etc.

Wheels, Wrought Steel, for Freight and Passenger Service; Specifications Governing Dimensions and Tolerances for (M. C. B. Standard).

I. MANUFACTURE

1. *Process.*—The steel shall be made by the open-hearth process.

2. *Discard.*—A sufficient discard shall be made from the top of each ingot from which the blanks are made to insure freedom from injurious piping and undue segregation.

II. CHEMICAL PROPERTIES AND TESTS

3. *Chemical Composition.*—The steel shall conform to the following requirements as to chemical composition:

	ACID.	BASIC.
Carbon	0.60 —0.80	0.65 —0.85 per cent
Manganese	0.55 —0.80	0.55 —0.80 per cent
Silicon	0.15 —0.35	0.10 —0.30 per cent
Phosphorus	not over 0.05	not over 0.05 per cent
Sulphur	not over 0.05	not over 0.05 per cent

4. *Ladle Analysis.*—To determine whether the material conforms to the requirements specified in Section II, an analysis shall be made by the manufacturer from a test ingot taken during the pouring of each melt. A copy of this analysis shall be given to the purchaser or his representative.

5. *Check Analysis.*—A check analysis may be made by the purchaser from any one or more wheels representing each melt, and this analysis shall conform to the requirements specified in Section II. A sample may be taken from any one point in the plate; or two samples may be taken, in which case they shall be on radii at right angles to each other. Samples shall not be taken in such a way as to impair the usefulness of the wheel. Drillings for analysis shall be taken by boring entirely through the sample parallel to the axis of the wheel; they shall be clean from scale, oil and other foreign substances. All drillings from any one wheel shall be thoroughly mixed together.

III. TOLERANCES

6. *Tolerances.*—(a) Wheels should be furnished rough-bored and with faced hubs, and have a contour of tread and flange as rolled or machined according to recommended practice Sheet M. C. B. 16-A. They should conform to dimensions specified within the following tolerances:

(b) *Height of Flange.*—The height of flanges should not be more than ⅛ inch over and must not be under that specified or 1 inch.

(c) *Thickness of Flange.*—Thickness of flange shall not vary more than 1/16 inch over or under that specified.

(d) *Throat Radius.*—The radius of the throat shall not vary more than 1/16 inch over or under that specified.

(e) *Thickness of Rim.*—The thickness of rim to be measured between the limit of wear groove and the top of the tread at the point where it joins the fillet at throat of flange. The average thickness of service metal of all wheels in any shipment must not be less than 1¾ inches, measured from the limit of wear groove to top of tread. The thickness of rim should in no case be less than 3/16 inch under that specified.

(f) *Width of Rim.*—The width of rim shall not be more than ⅛ inch less nor more than ⅛ inch over that specified.

(g) *Thickness of Plate.*—The thickness of the plate of the wheel shall not be less than ¾ inch at the point where the plate joins the fillet at the rim and not less than 1 inch at the point where the plate joins the fillet at the hub. Intermediate minimum thickness to be proportional.

(h) *Limit of Wear Groove.*—The limit of wear groove to be located as shown in Sheets M. C. B. 16-A.

(i) *Diameter of Bore.*—The diameter of rough bore shall not vary more than 1/16 inch above or below that specified. When not specified, the rough bore shall be ¼ inch less in diameter than the finished bore, subject to the above limitations.

(j) *Hub Diameter.*—The hub diameter may be either 10 inches or 11 inches in diameter, as specified, with a maximum variation of ⅛ inch below. The thickness of the wall of the finished bored hub shall not vary more than ⅜ inch at any two points on the same wheel.

(k) *Hub Length.*—The length of hub shall not vary more than ⅛ inch over or under that specified.

(l) *Depression of Hub.*—The depression of the hub must be made so that the distance from the outside face of the hub to the line "AB" shall not exceed 1 11/16 inch for wheels used on 5½-inch axles and under, and 1 7/16 inch for wheels used on 6 by 11 inch axles.

(m) *Black Spots in Hub.*—Black spots will be allowed within 2 inches of the face of the hub, but must not be of such depth that they will not bore out and give clear metal at finished size of bore.

(n) *Eccentricity of Bore.*—The eccentricity between the tread at its center line and the rough bore shall not exceed 3/64 inch.

(o) *Block Marks on Tread.*—The maximum height of block marks must not be greater than 1/64 inch.

(p) *Rotundity.*—All wheels shall be gaged with a ring gage, and the opening between the gage and tread at any one point shall not exceed 1/16 inch.

(q) *Plane.*—Wheel shall be gaged with a ring gage placed concentric and perpendicular to the axis of the wheel. All points on the back of the rim equi-distant from the center shall be within a variation of 1/16 inch from the plane of the same gage when so placed.

(r) *Tape Sizes.*—Wheels shall not vary more than five tapes under nor nine tapes over the size called for.

(s) *Mating.*—The tape sizes shall be marked in plain figures on each wheel. Wheels must be mated to tape sizes and shipped in pairs.

(t) *Gage.*—Gages and tape used shall be M. C. B. Standard or Recommended Practice as follows:

Wheel circumference measure, M. C. B. Sheet 16-A.
Maximum flange thickness gage, M. C. B. Sheet 16.
Minimum flange thickness gage, M. C. B. Sheet 16.
Rotundity gage, M. C. B. Sheet 16-A.
Plane gage, M. C. B. Sheet 16-A.
Gage for measuring service metal, M. C. B. Sheet C-1.

IV. BRANDING

7. *Branding.*—The name or brand of the manufacturer, date and serial number shall be legibly stamped on each wheel, also purchaser's name and serial number, if specified. The tape size shall be legibly marked on each wheel, Sheet M. C. B. C-2.

V. FINISH

8. *Finish.*—(a) The wheel shall be free from injurious defects, and shall have a workmanlike finish.

(b) Wheels shall not be offered for inspection if covered with paint, rust, or any other substance, to such an extent as to hide defects.

VI. INSPECTION

9. *Inspection.*—(a) Inspector representing the purchaser shall have free entry at all times while work on the contract of the purchaser is being performed, to all parts of the manufacturer's works, which concern the manufacture of the material ordered.

(b) The manufacturer shall afford the inspector, free of cost, all reasonable facilities and necessary gages to satisfy him that the wheels are being furnished in accordance with these specifications. Tests and inspection at the place of manufacture shall be made prior to shipment, and free of cost to the purchaser.

(c) The purchaser may make the tests to govern the acceptance or rejection of material in his own laboratory or elsewhere as may be decided by the purchaser. Such tests, however, shall be made at the expense of the purchaser.

(d) All tests and inspection shall be so conducted as not to interfere unnecessarily with the operation of the works.

(e) Wheels which show injurious defects while being finished by the purchaser shall be rejected, and manufacturer promptly notified.

(f) Samples of rejected material must be preserved at the laboratory of the purchaser for one month from date of test report. In case of dissatisfaction with the results of the test, manufacturer may make claim for a rehearing in that time.

M. C. B. Standard

Sheet 25, 25-A and 25-B. (Figs. 2992-2994)

In 1912 sizes and dimensions for wrought steel wheels for freight and passenger cars were adopted as recommended practice. See Sheets R, S and T. Revised 1913.

Dimensions indicating distance from rim of wheel to gaging point on flange on section of wheel, Sheet T, corrected to 4 11/32 inches.

Advanced to Standard in 1917.

Whistle (Signal Apparatus). An air whistle used with the train signal apparatus.

Whistle Reservoir. A small tank or reservoir to store air for operating a pneumatic signal whistle on electric motor cars.

Whistle Valve. Fig. 1451. A valve for admitting air to the alarm whistle on electric cars.

White Lead for Lettering, Specifications for (M. C. B. Recommended Practice).

In 1916 the following Specifications were adopted for White Lead for Lettering:

1. *Scope.*—These specifications cover two kinds of white lead paste to be used as a base in stencil paint for freight equipment cars.

I. CHEMICAL PROPERTIES AND TESTS.

2. *Chemical Composition.*—(a) Paste. The paste shall conform to the following:

Pigment ....90-93 per cent by weight
Oil .... 7-10 per cent by weight
Moisture, mechanical, combined with pigment or oil.not over 0.25 per cent by weight.

(b) *Pigment.*—The composition of the pigment shall conform to either of the following:

(1) Basic carbonate of lead:

Lead carbonate......68-75 per cent by weight.
Lead hydrate........25-32 per cent by weight.
Lead sulphate..not over 0.5 per cent by weight.
Acetates ....not any.

(2) Equal parts of basic carbonate and basic sulphate white lead:

Lead carbonate...34. -37.5 per cent by weight
Lead sulphate....37. -42.5 per cent by weight.
Lead hydrate.....12.5-16 per cent by weight.
Lead oxide ...... 5. -10 per cent by weight.
Zinc oxide ...... 2. - 4 per cent by weight.
Water soluble.not over 0.5 per cent by weight.
Lead acetate ....None.

(c) The pigment shall conform to the railroad company's standard sample as far as fineness, opacity and density are concerned, and shall not have a crystalline structure or any adulterants.

3. *Oil.*—The linseed oil shall conform to the M. C. B. Specifications for Linseed Oil.

4. *Fineness.*—(a) The pigment shall be so fine that after having been separated from the oil and freed from hygroscopic moisture and then thoroughly mixed again with pure linseed oil, which has also been freed from moisture in the proportion of one part oil to one part pigment by weight, it will stand the following:

(b) Place a small amount of the above mixture on one end of a strip of dry glass, set the strip vertical where the temperature is 70° F. and allow to remain for 30 minutes.

(c) As the mixture runs down the glass, the fineness will be acceptable if the oil and pigment do not separate in the first inch.

II. PACKING AND MARKING

5. *Packing.*—White lead paste shall be put up in moisture-proof barrels, cans or packages according to the railroad company's requirements.

6. *Marking.*—The manufacturer shall mark the white lead packages according to the railroad company's requirements.

III. INSPECTION AND REJECTIONS

7. *Inspection.*—(a) The inspector representing the purchaser shall have free entry, at all times while work on the contract of the purchaser is being performed, to all parts of the manufacturer's works which concern the manufacture of the material ordered. The manufacturer shall afford the inspector, free of cost, all reasonable facilities to satisfy him that the material is being furnished in accordance with these specifications.

(b) The purchaser may make the tests and inspection to govern the acceptance or rejection of the material in his own laboratory or elsewhere. Such tests and inspection shall be made at the expense of the purchaser.

(c) All tests and inspection shall be so conducted as not to interfere unnecessarily with the operation of the works.

8. *Rejection.*—Material represented by samples which fail to satisfy the requirements of these specifications will be rejected.

9. *Rehearing.*—Samples tested in accordance with this specification, which represent rejected material, shall be preserved for fourteen days from date of test report. In case of dissatisfaction with results of tests, the manufacturer may make claim for a rehearing within that time.

Whitworth Gages. See Cylindrical Gages.

Wide Gage. In general usage, the distance between the heads of the rails of a railroad when it is slightly greater than 4 ft. 8½ in., in distinction from Broad Gage, which means a material increase, as to 5 ft. or 6 ft.

Wide Vestibule. The modern vestibule extends the full width of the car. The first vestibule extended over the platform proper (or the width of the end door) only. When the present-used vestibules began to be used they were commonly termed wide vestibules and the older type narrow vestibule. See VESTIBULE.

Wind Guard (Pintsch Gas Lighting System). A perforated brass disc fitting in globe holder below the opal globe, and supplied with a small covered hole for admitting a match or taper when lighting the gas. Its purpose is, as indicated by its name, to protect the flame from the action of drafts from below the globe.

Wind Scoop. See VENTILATING JACK.

Winding Gear (Pile Driver). Consists of spools and a spur gear of the ordinary form controlled by a strap brake and treadle, so that on the release of the brake the shears attached to the hammer rope will descend by their own weight and engage with the hammer eye.

Winding Shaft (Drop Doors of Coal Cars, etc.). An iron bar supported by winding shaft plates or bearings, around which the drop door chain or hopper chain is wound. It carries a ratchet wheel and is usually formed with a square end for applying a wrench or handle to turn it. See DOOR OPERATING GEAR.

Winding Shaft Plate. A plate which acts as a bearing for the winding shaft. See WINDING SHAFT.

Winding Shaft Ratchet Wheel and Pawl. The ratchet wheel and pawl attached to the end of the winding shaft to prevent its turning and allowing the doors to drop.

Windows. Figs. 1858, etc. An opening for the admission of light and of air when necessary. It has a frame on the sides, in which are set movable sashes containing panes of glass. Hence the window itself, especially in compound words, is often termed simply the sash. In Great Britain carriage windows are technically termed lights. Car windows are now generally made of uniform size throughout. In sleeping and parlor cars double windows are almost always used to inclose an air space between them and prevent radiation of heat and drafts. See also SASH.

Window Balance. Fig. 1862. A device in which a spring is used instead of a weight to counterbalance the weight of the sash and glass. See SASH BALANCE.

Window Blind. A wooden screen composed of a frame called the sash, carrying slats, placed in a window to exclude sunshine. Window shades have nearly displaced blinds in first-class passenger cars, blinds being seldom used except in the saloon or lavatory.

Window Blind Bolt. Fig. 1963. A bolt used for holding a window blind in any desired position. It enters a window blind bolt bushing or plate.

Window Blind Lift. Fig. 1947. Commonly called simply blind lift or blind pull. A metal hook fastened to the blind for raising and lowering it, usually attached to the bottom rail, but in street car blinds, which are lowered below the window, to the top rail.

Window Blind Mullion. An upright bar in the center of a window blind sash.

Window Blind Pull. See WINDOW BLIND LIFT.

Window Blind Rest. A wooden strip to fill up the lower part of the groove in which an upper window blind slides, and on which it rests when down.

Window Blind Sash. The frame in which the inclined thin slats of a window blind are held.

Window Blind Slat. See WINDOW BLIND.

Window Blind Spring. A SASH SPRING.

Window Blind Stile. An upright bar in a window blind sash.

Window Blind Stop. An INSIDE WINDOW STOP.

Window Casing. A frame which incloses or surrounds a window.

Window Casing Molding or Window Cap Molding. A molding above a window casing.

Window Cove Molding. A small concave molding around the sides and top of a window on the inside of a passenger car.

Window Curtain. Figs. 1894, etc. A cloth or some kind of textile material loosely hung over a window to exclude sunshine, and which can be spread or drawn aside at pleasure. Curtains of this kind are now little used. See WINDOW SHADE.

Window Curtain Bracket. More commonly simply curtain brackets, for supporting window shade rollers. A more correct term would be shade or window shade brackets, but in common usage, curtain brackets support shade rollers.

Window Curtain Rings. Rings for supporting the curtain from the curtain rod.

Window Curtain Roller. More properly a SHADE or WINDOW SHADE ROLLER.

Window Deflector Ventilator. See DUST DEFLECTOR and VENTILATOR.

Window Dust Guard or Deflector. See DUST DEFLECTOR.

Window Fastener. A SASH LOCK.

Window Frame. Page 1199. A frame set into the side, end or roof of a car, into which the window sash fits.

Window Glass. Panes of glass used for windows.

Window Guards. Small rods to act as fenders for the end windows.

(Postal Cars). Fig. 2901. Metal rods are used on the outside and wooden rods on the inside of all postal car windows.

Window Head. A steel plate placed across the top of a window opening or a series of window openings.

Window Latch. A SASH LOCK.

Window Lift. See SASH LIFT.

Window Lintel. A horizontal strip on the outside of a passenger equipment car between the posts, and over the window openings

Window Molding. (Passenger Car Interiors.) A molding used around, or on each side of, a window, particularly to cover the joint between the panel and post. It sometimes forms a groove in which a window or window blind slides, in place of the inside window stop.

Window Molding Base. An ornament made of wood or metal attached to the lower end of a window molding.

Window Molding Joint Cover. A piece of metal or wood used to cover the joints of window moldings where two pieces join each other.

Window Panel. A panel between windows.

Window Panel Furring. Horizontal distance pieces between the window posts to which the panel is fastened.

Window Post (Passenger Equipment Cars). A side post located between windows, sometimes extending only from the belt rail to the side plate and sometimes the entire way between the side sill and side plate.

Window Protection Rod or Bar. See WINDOW GUARDS.

Window Rod Bracket. Fig. 2003.

Window Rod Bushing. A support for the ends of a curtain rod.

Window Sash. Figs. 1858, etc. The frame which holds the glass of a window.

Window Sash Balance. See SASH BALANCE.

Window Sash Holder. See SASH LOCK.

Window Sash Lock. See SASH LOCK.

Window Sash Lift. See SASH LIFT.

Window Sash Rail. A horizontal bar in a window sash.

Window Sash Spring. See SASH SPRING.

Window Shade. Figs. 1879, 1894, etc. A window curtain, which is wound on a roller above the window, in distinction from one which is drawn aside. In passenger cars window blinds have been superseded by shades. An automatic shade roller is always used, the old-fashioned pulleys and cord tighteners being practically obsolete.

Window Shade Bracket. One bracket has a circular hole and the other a rectangular one.

Window Shade Roller. Figs. 1930, 1931, etc. The cylinder on which the shade is rolled up, containing within it the springs which actuate it.

Window Shade Stop. That part of a shade holder which engages with or bears against the window casing and holds the shade.

Window Shade Thumb Latch. Usually a pair of short bars which, when pinched together with the thumb and finger, release the mechanism which locks the shade in a stationary position, permitting it to be raised and lowered.

Window Sill. 40, Fig. 260. A horizontal piece of wood or metal under a window, on which the sash rests when down.

Window Sill Cornice Board. An ornamental strip placed on the inside of a passenger car under the window sill.

Window Sill Molding. A small wooden molding under an inside window sill. In modern cars it is usually a belt molding.

Window Spring. See SASH SPRING.

Window Stile. The upright bars of a window sash.

Window Stop. The strips, or beads, attached to the window posts which hold the sash in place.

Window Ventilator. See DUST DEFLECTOR, VENTILATOR.

Wing Elevator Snow Plow. See SNOW PLOW.

Wire Gauze (for Ventilator). A fine netting made of wire, with which the outside of deck windows and ventilator openings is covered to prevent the admission of cinders.

Wood Screw. A small cylindrical bar of iron or steel with a wood screw thread cut on it and a slotted head so that it can be turned with a screw driver. A lag screw is a heavy type of wood screw. It has a square, instead of a slotted head. See SCREW.

Wood Screw Thread. A form of screw thread used for screws which are intended to screw into wooden objects. It differs from a metal thread in having the spaces between the projections wider.

Worm. A helix, like a screw thread, for winding a rope or a chain upon or for driving a spur wheel.

Worn Couplers, Gage for. See COUPLER, AUTOMATIC CAR.

Worn Flat (Car Wheels). Under the rules for the interchange of traffic this defect is defined to be irregular wear under fair usage, due to unequal hardness of the tread of the wheel, and to be carefully distinguished from slid flat, which is a defect produced by the slipping of the wheels from excessive brake pressure. See WHEELS and INTERCHANGE OF TRAFFIC.

Wreck Chain. Fig. 2701, etc A chain used for hauling and lifting purposes at wrecks.

Wreck Chain Repair Link. Fig. 2691. A device for making quick temporary repairs to a broken chain.

Wreck Train Equipment. Figs. 2679, etc. The cars and tools used in clearing wrecks. The train usually consists of a steam wreck crane, a bunk or sleeping car, a kitchen and dining car, cars for carrying spare trucks, and cars for carrying tools and blocking.

Wrecking Crane or Wreck Crane. Figs. 2687, 2688, etc.; Page 1202. A powerful crane mounted on trucks and operated usually by steam, but in some cases by electricity, for use in clearing up wrecks.

Wrecking Frog. See CAR REPLACER.

Wreck Hook. Figs. 2706, etc. A hook which can be attached to an automatic coupler and will allow a chain to be used in pulling the car.

Wrench. A contrivance for screwing and unscrewing a nut. A monkey wrench is adjustable to take nuts of various sizes. A socket wrench is one having a cubical cavity to receive a square end. A spanner is a wrench for use on round or many-sided nuts, like hose couplings, to which lugs or slots are added for engaging with the wrench.

Wrought Steel Wheels, Specifications for. See WHEELS, WROUGHT STEEL, SPECIFICATIONS FOR.

Y

Yale Lock. Fig. 1808, etc. A trade name designating any lock made by the Yale & Towne Mfg. Co. The principal types of Yale locks are: Time locks, combination locks; cylinder or pin-tumbler locks. These locks have small keys bitted on their upper edge to engage with pin tumblers contained in the cylinder. The original flat key has been superseded by the corrugated and paracentric forms. The key raises the pin tumblers to the proper height and is then able to rotate a plug in the cylinder and thus to actuate the lock.

Yoke. A pocket strap, U-shaped, which contains the spring and follower plates of a drawbar. It is the means of attaching the drawbar to the draft gear. See AUTOMATIC CAR COUPLERS (Miscellaneous M. C. B. Standards), and COUPLER YOKE.

Yoke Rivets. (M. C. B. Standard.) In 1905 the use of 1¼-inch rivets for attaching yokes to coupler butts was adopted as Recommended Practice. Advanced to Standard in 1908.

Illustrated Section

A synopsis or index of the Illustrated Section is unnecessary, because references to the illustrations are given with the definitions of the various parts and thus afford a ready means of referring to them.

Roughly, the Illustrated Section is arranged as follows: Photographs and drawings of freight and passenger cars; floor plans of passenger cars; underframe and framing details; couplers, draft gear and exterior parts of the car body; trucks, bolsters and air brakes; interior details; car heating and lighting; motor cars; wrecking equipment; Master Car Builders' Association and United States Government standards; cars of American manufacture used in government overseas service and by railroads, plantations and contractors in foreign countries.

Fig. 1—All-Steel 50-Ton Capacity Box Car. Weight 43,100 lb.; Inside Length, 36 ft.; Inside Width, 8 ft. 6 in.; Inside Height, 8 ft. 4 in. Builder, American Car & Foundry Company.

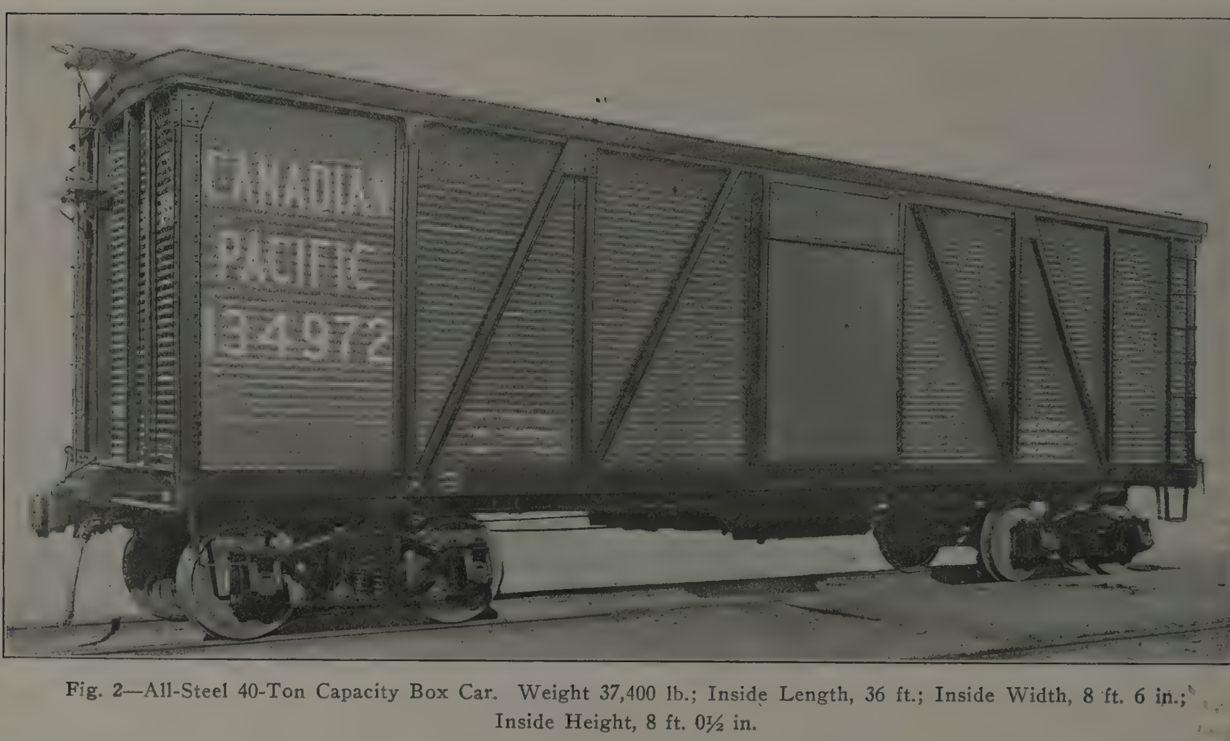


Fig. 2—All-Steel 40-Ton Capacity Box Car. Weight 37,400 lb.; Inside Length, 36 ft.; Inside Width, 8 ft. 6 in.; Inside Height, 8 ft. 0½ in.

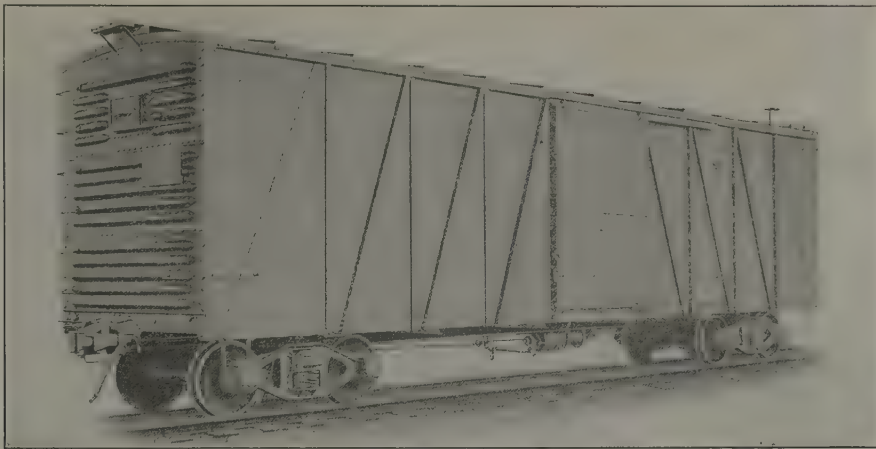


Fig. 3—All-Steel 50-Ton Capacity Box Car. Weight, 43,500 lb.; Inside Length, 40 ft. 8 in.; Inside Width, 9 ft. 2 in.; Inside Height, 9 ft. 3 in. Builder, The Bettendorf Company.

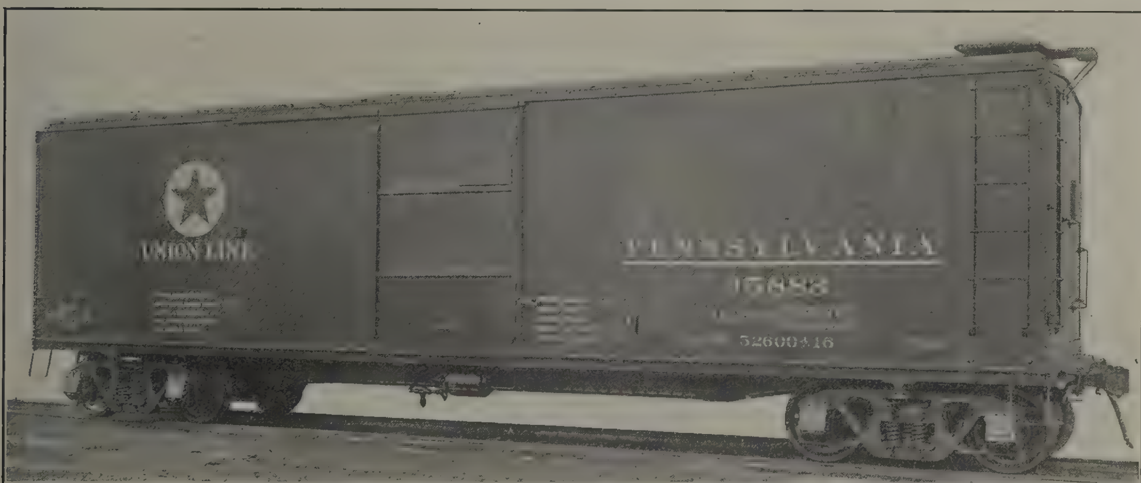


Fig. 4—All-Steel 50-Ton Capacity Box Car. Weight 52,590 lb.; Inside Length, 40 ft. 5¾ in.; Inside Width, 8 ft. 10⅞ in.; Inside Height, 9 ft. 1 in. Builder, American Car & Foundry Company.

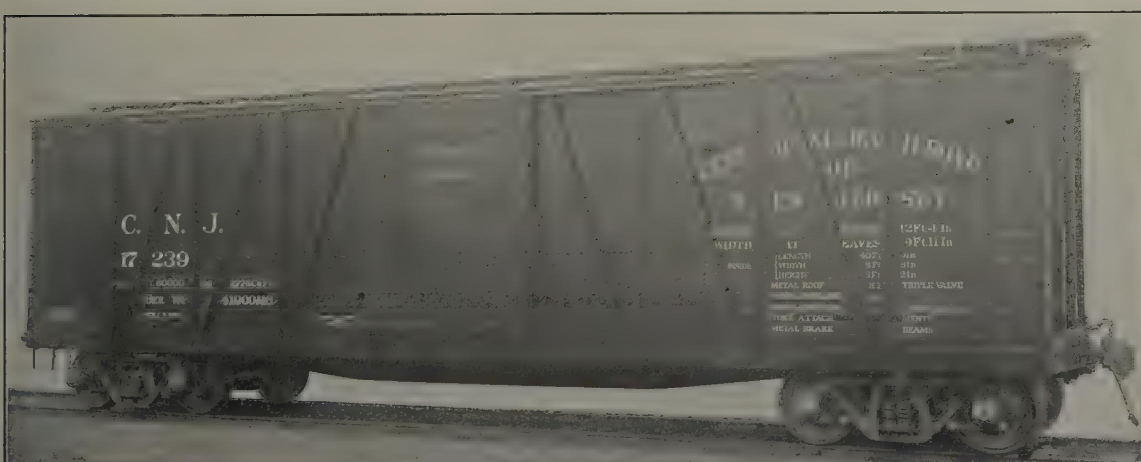


Fig. 5—Steel Frame Box Car. Capacity 40-Tons, 2,778 cu. ft. Weight, 42,400 lb. Inside Length 40 ft. 0 in.; Inside Width, 8 ft. 6 in.; Inside Height, 8 ft. 2 in. Builder, American Car & Foundry Company.

Fig. 6—All-Steel 50-Ton Capacity Box Car, Equipped with Summers Side-Bearing Truck. Weight, 45,700 lb.; Inside Length, 40 ft.; Inside Width, 8 ft. 10 in.; Inside Height, 8 ft. Builder, Summers Steel Car Company.

(General Drawings of a Similar Car are Shown in Figs. 7-9.)

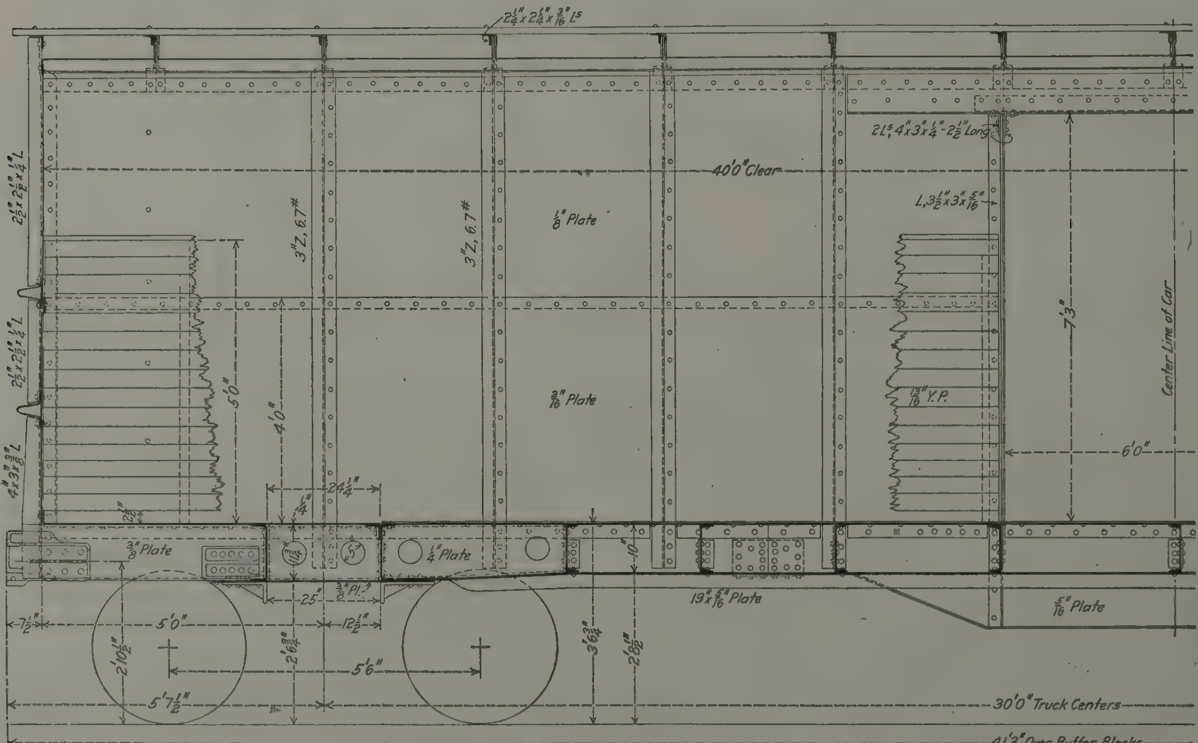


Fig. 7—Longitudinal Section of Summers All-Steel 50-Ton Capacity Box Car, Similar to the Car Shown in Fig. 6. See also Figs. 8 and 9.

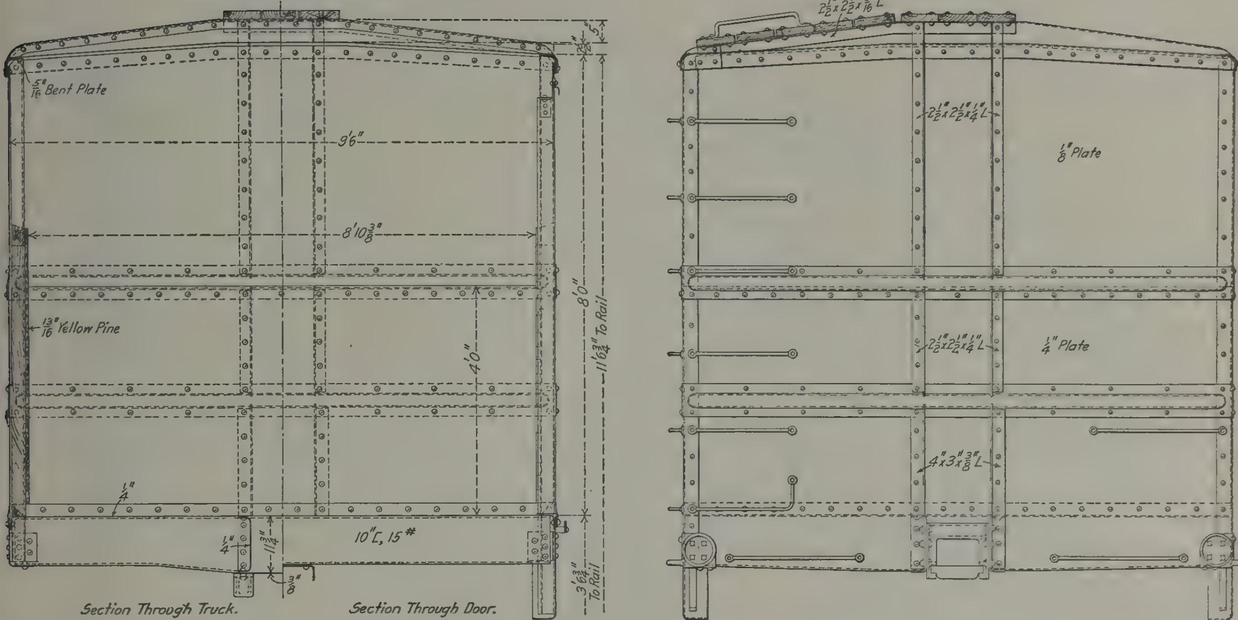


Fig. 8—Cross Sections and End Elevation of Summers All-Steel 50-Ton Capacity Box Car, Similar to the Car Shown in Fig. 6. See also Figs. 7 and 9.

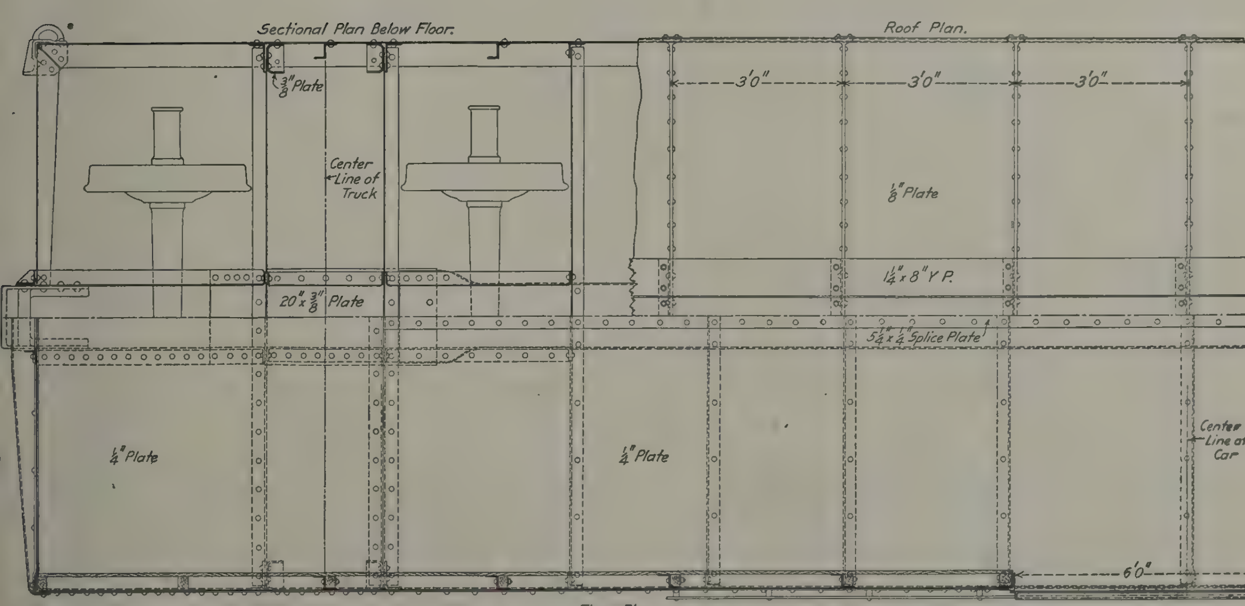


Fig. 9—Plan of Summers All-Steel 50-Ton Capacity Box Car, Similar to the Car Shown in Fig. 6. See also Figs. 7 and 8.

Fig. 10—All-Steel 40-Ton Capacity Box Car. Weight, 37,000 lb.; Inside Length, 36 ft.; Inside Width, 8 ft. 8 in.; Inside Height, 8 ft. 4 in. Builder, Canadian Car & Foundry Company.

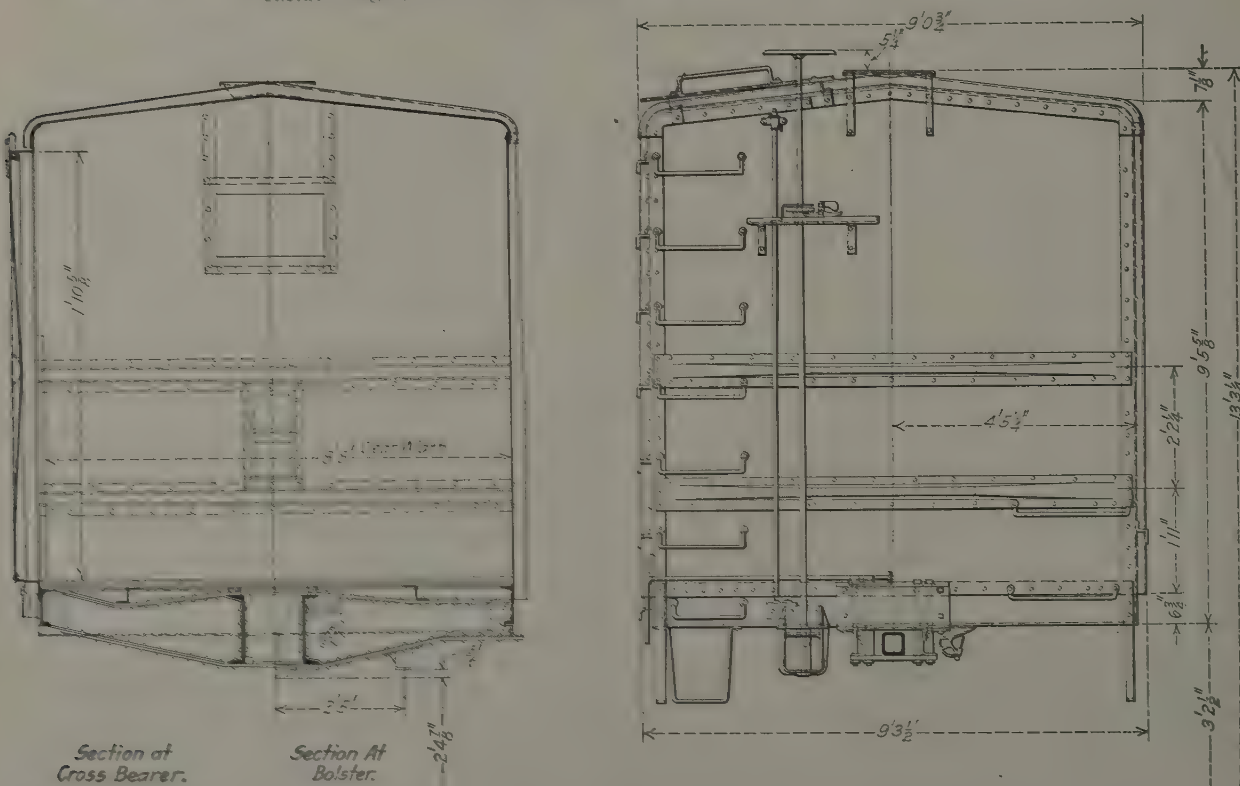


Fig. 11—End Elevation and Cross Sections of Canadian Pacific Steel Box Car Shown in Figs. 10 and 12.

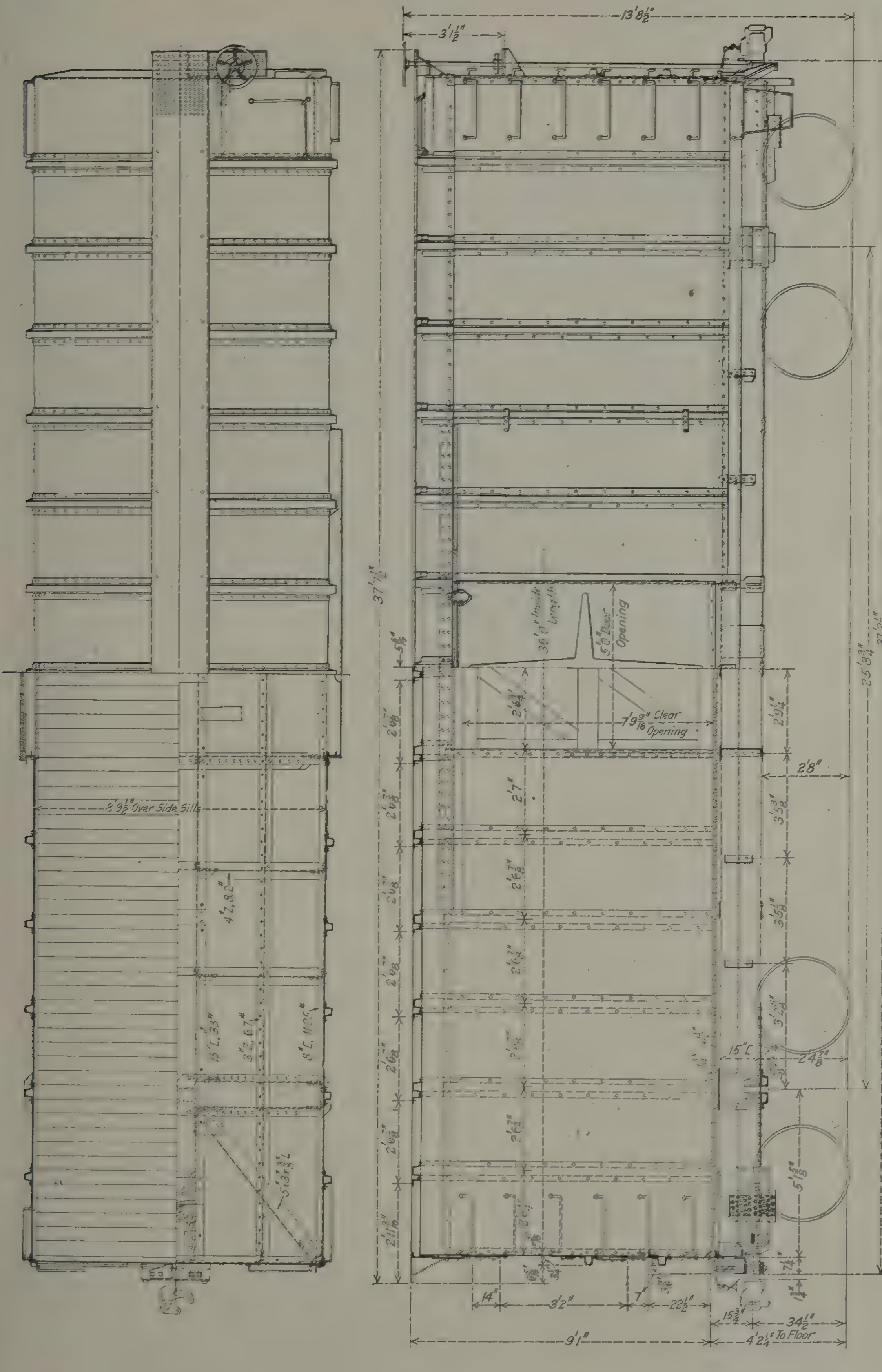


Fig. 12—Canadian Pacific Steel Box Car Shown in Figs. 10 and 11. Builder, Canadian Car & Foundry Company.

Fig. 13—Steel Frame 40-Ton Capacity Box Car. Weight, 36,600 lb.; Inside Length, 36 ft.; Inside Width, 8 ft. 6 in.; Inside Height, 8 ft. 0½ in. Cars of This Type Built Under the Patents of the Fowler Car Company are in Use by the Canadian Pacific; Chicago & North Western; Minneapolis, St. Paul & Sault Ste. Marie, and Illinois Central.

(See Figs. 14-15.)

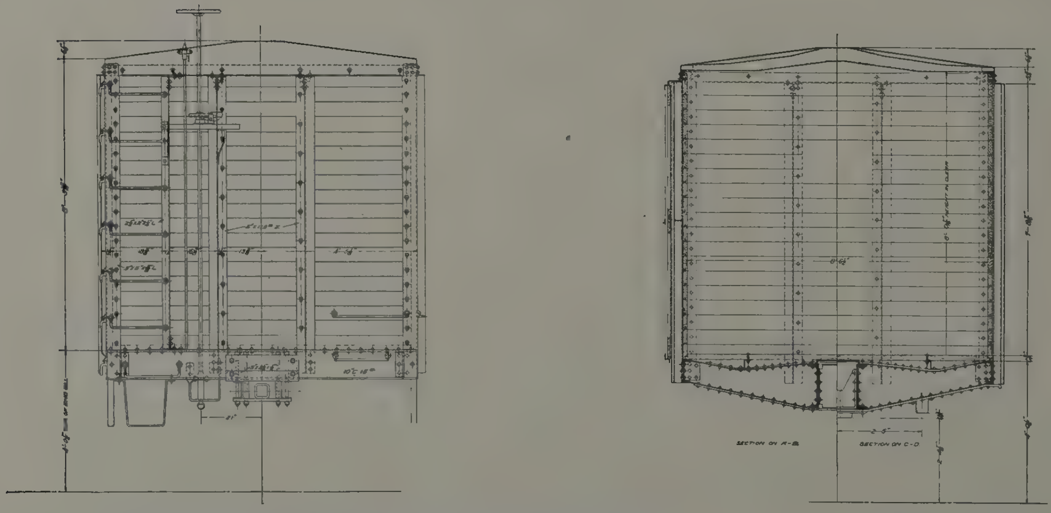


Fig. 14—End Elevation and Cross Sections of the Steel Frame Box Car Shown in Figs. 13 and 15.

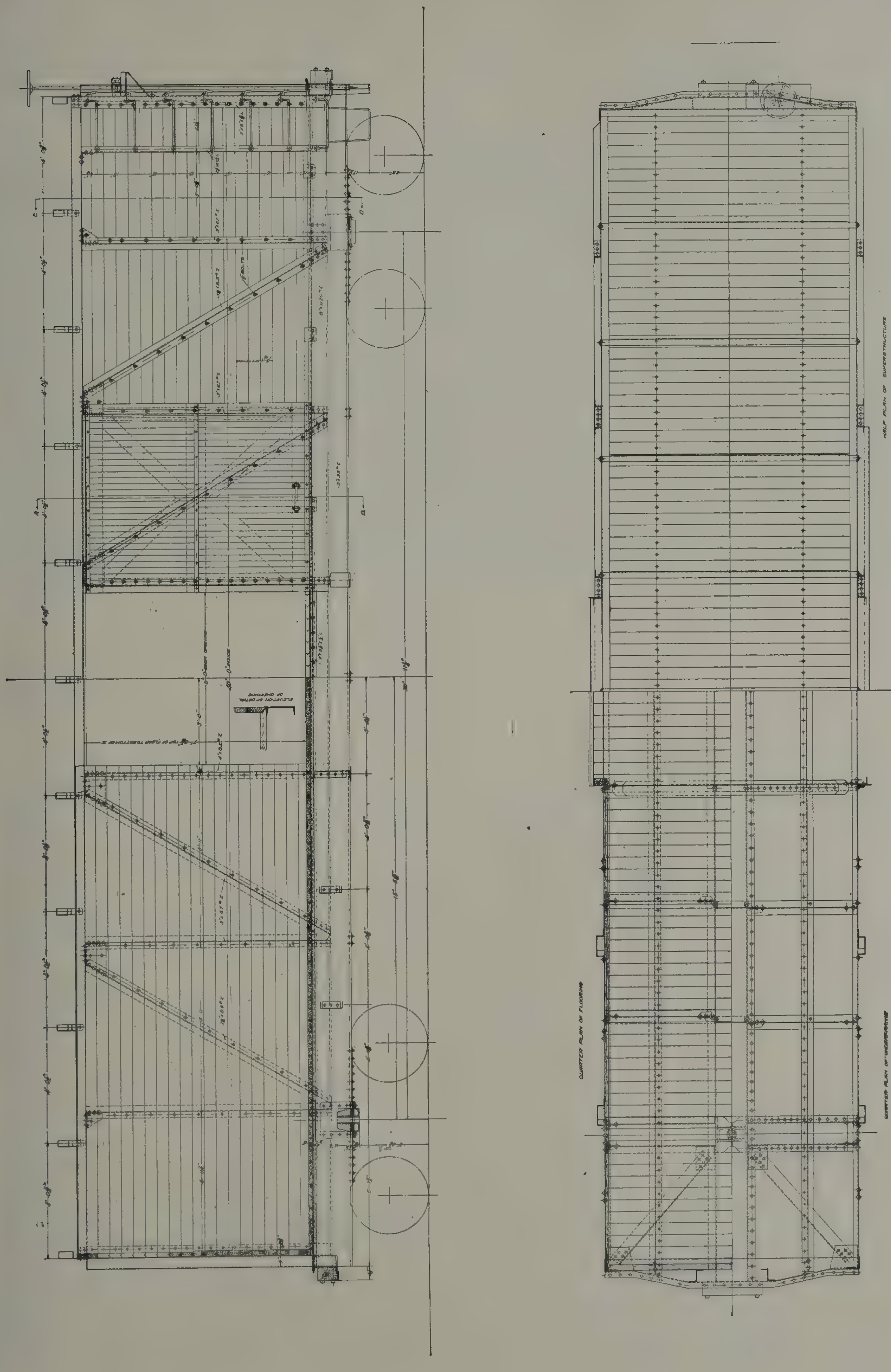


Fig. 15—Steel Frame Box Car Shown in Figs. 13 and 14, Built Under the Fowler Patents.

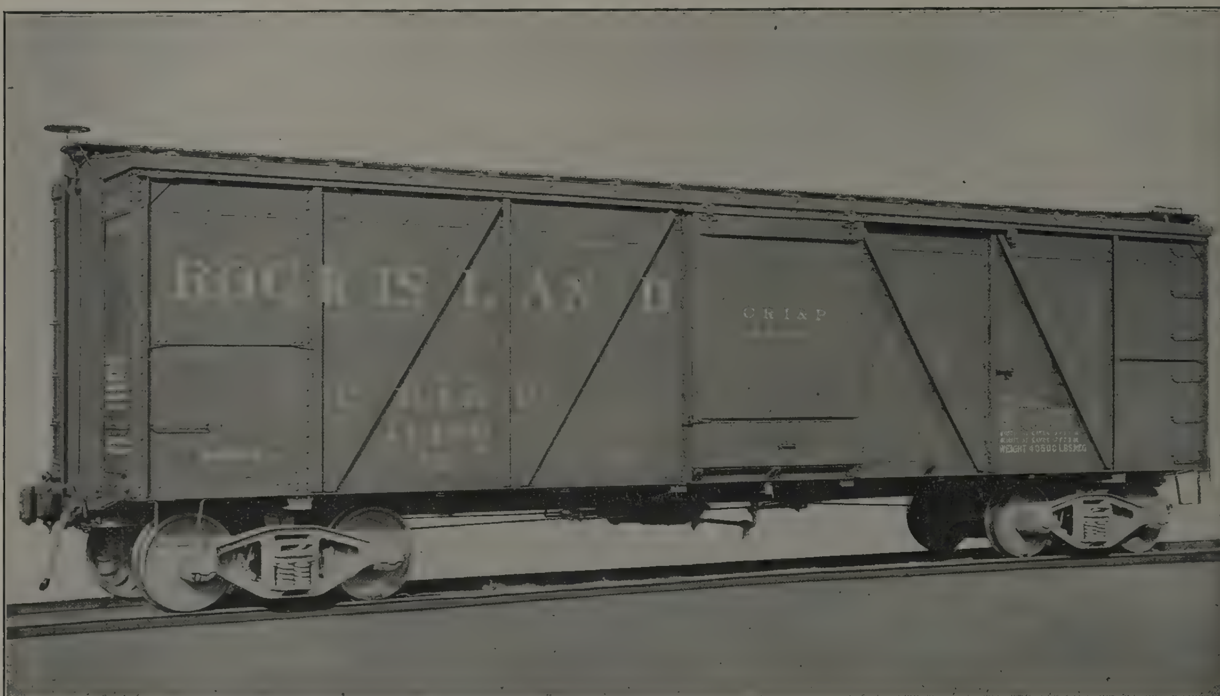


Fig. 16—Steel Frame 40-Ton Capacity Box Car. Weight, 40,500 lb.; Inside Length, 40 ft.; Inside Width, 8 ft. 6 in.; Inside Height, 8 ft. Builder, Western Steel Car & Foundry Company.

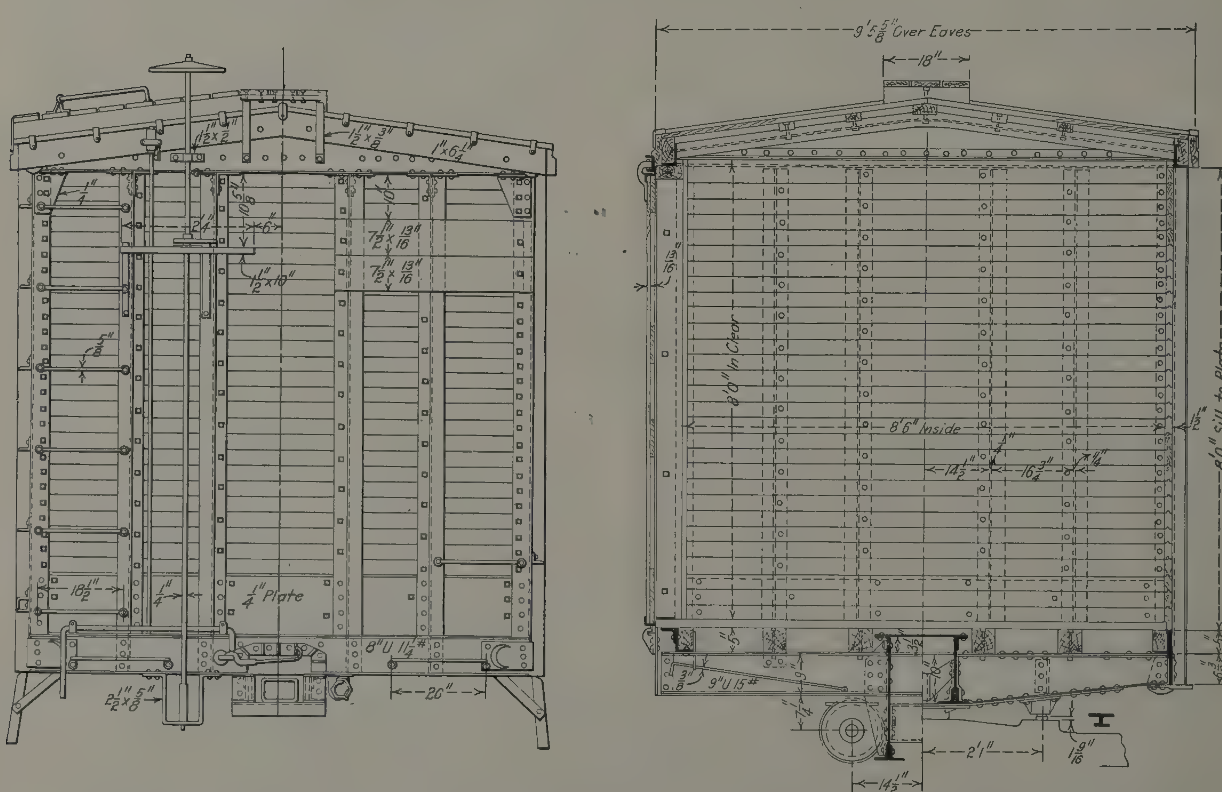


Fig. 17—End Elevation and Cross Sections of St. Louis & San Francisco Steel Frame Box Car Shown in Fig. 18.

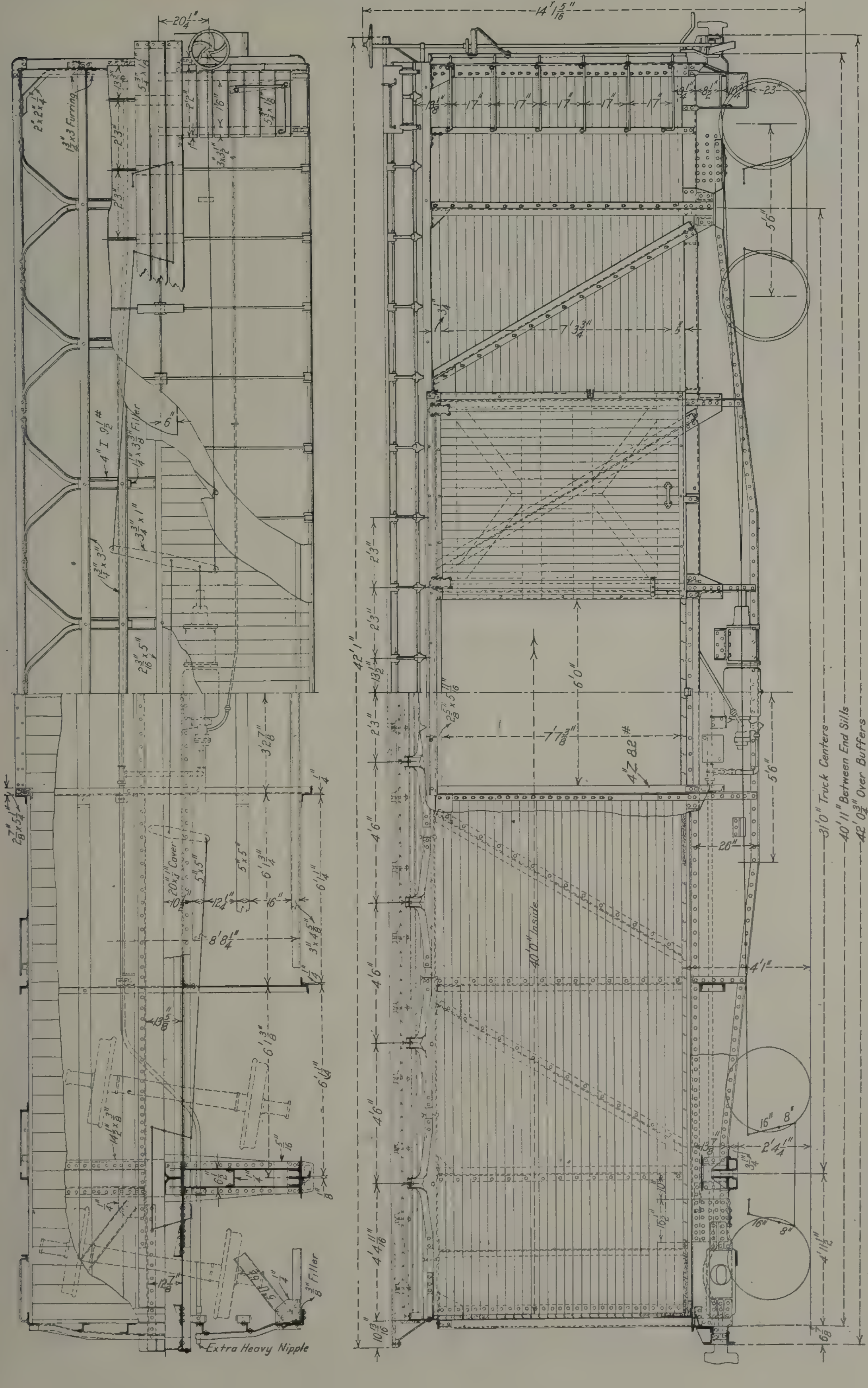


Fig. 18—St. Louis & San Francisco Steel Frame 40-Ton Capacity Box Car Shown in Fig. 17. Builder, American Car & Foundry Company.

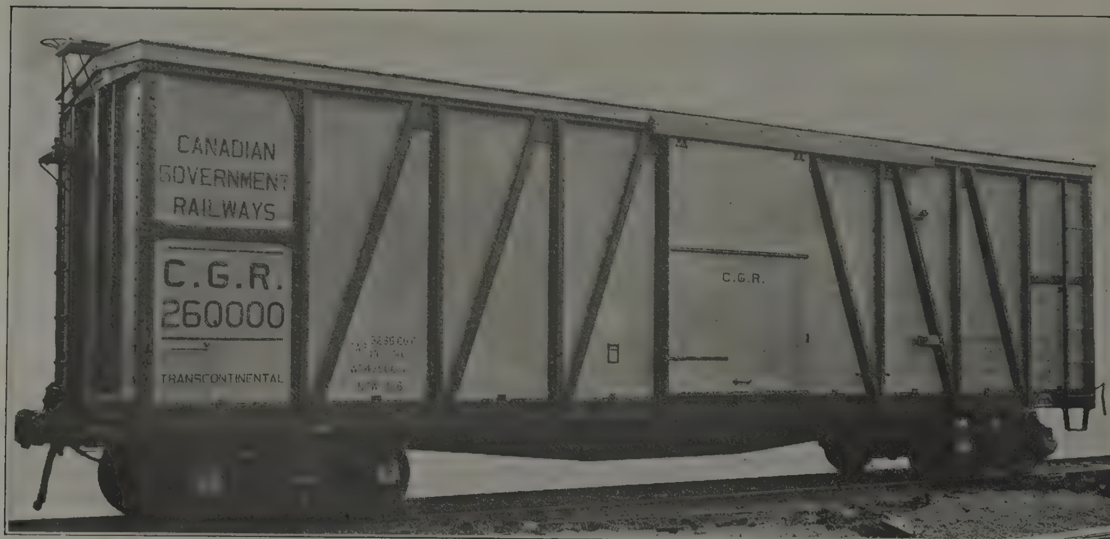


Fig. 19—Steel Frame, 50-Ton Capacity Box Car. Weight, 47,500 lb.; Inside Length, 40 ft. 6 in.; Inside Width, 9 ft. 0 in.; Inside Height, 9 ft. 0 in. Builder, Canadian Car & Foundry Company, Ltd.

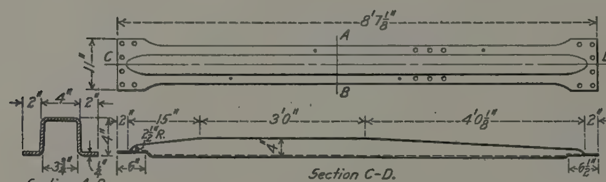


Fig. 20—Pressed Steel Side Post Used on Pennsylvania Steel Frame Box Car Shown in Figs. 21 and 22.

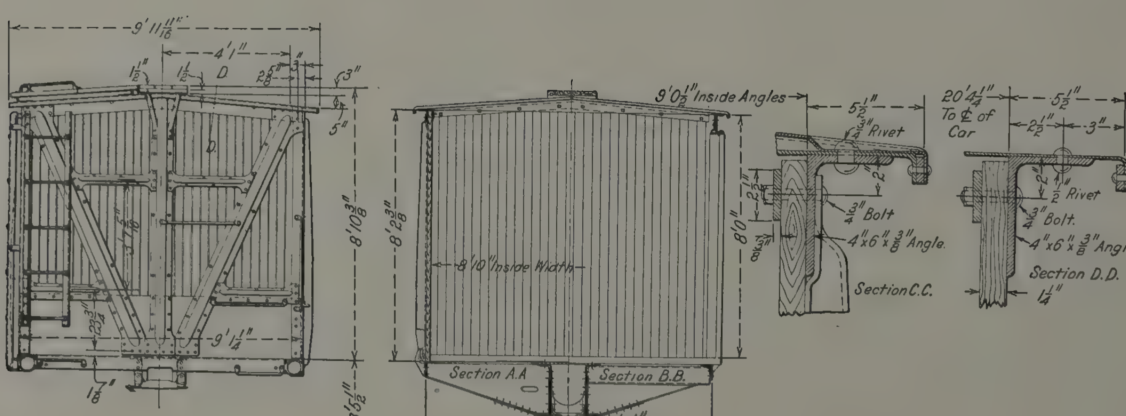


Fig. 21—End Elevation and Cross Sections of Pennsylvania Steel Frame 50-Ton Capacity Box Car. The Dotted Lines at Top of Section "CC" Show Opening in Steel Roof Extending Between Carlines for Ventilation. See Figs. 20 and 22.

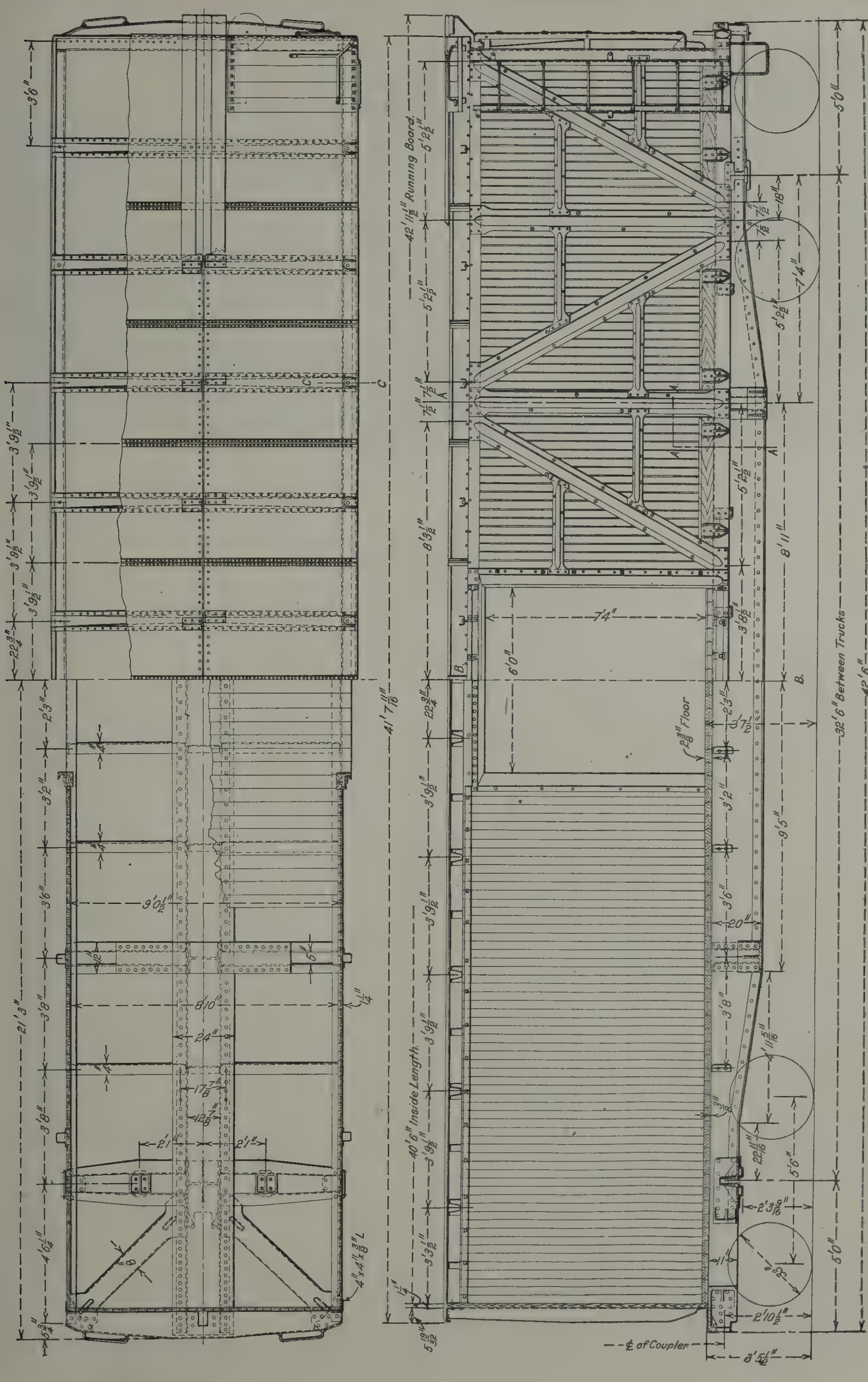


Fig. 22—Pennsylvania Steel Frame 50-Ton Capacity Box Car. See also Figs. 20 and 21.

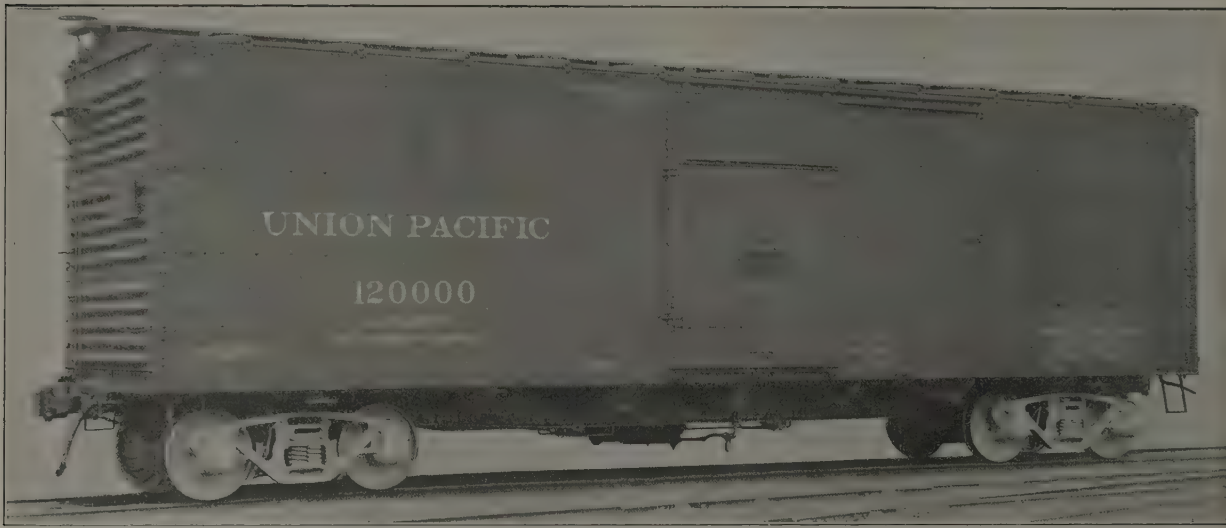


Fig. 23—Steel Underframe 50-Ton Capacity Box Car. Weight, 42,900 lb.; Inside Length, 40 ft. 7 in.; Inside Width, 9 ft. 2 in.; Inside Height, 9 ft. 4½ in. Builder, Western Steel Car & Foundry Company.

(See Figs. 24-25.)

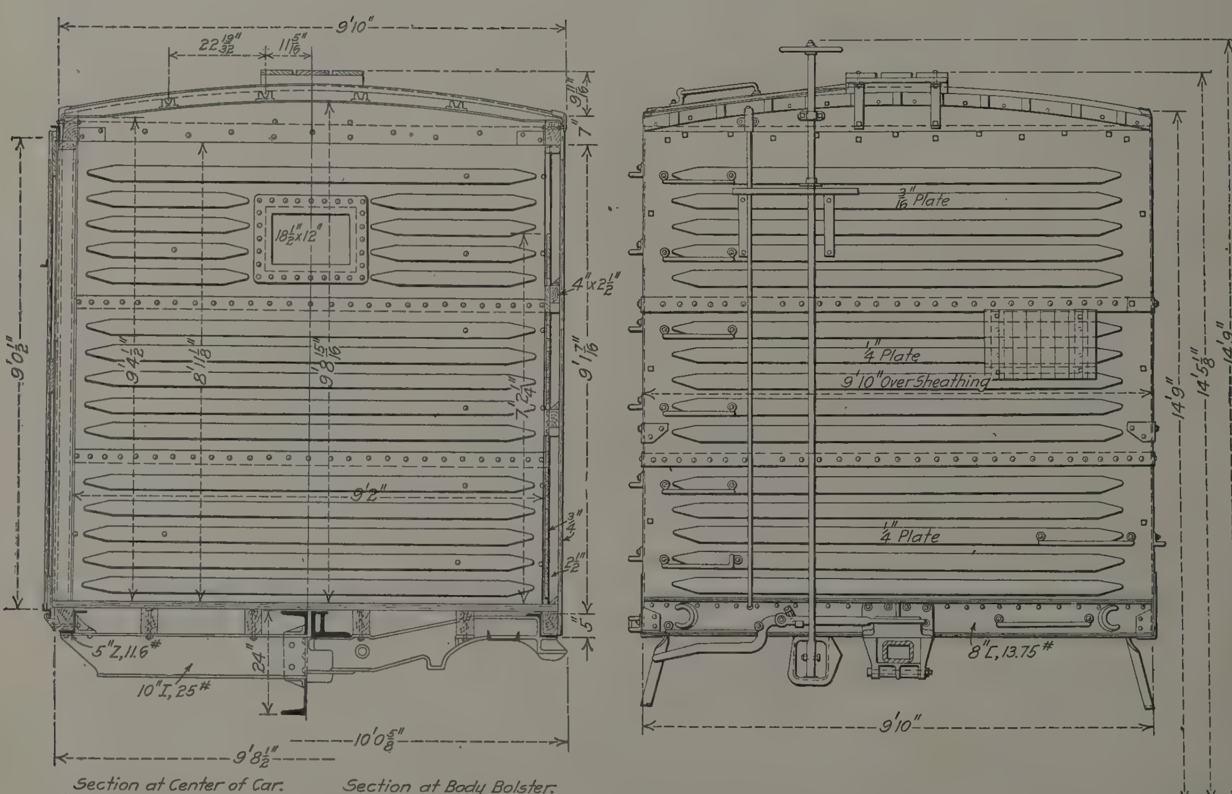


Fig. 24—End Elevation and Cross Sections of Union Pacific Steel Underframe Box Car Shown in Figs. 23 and 25.

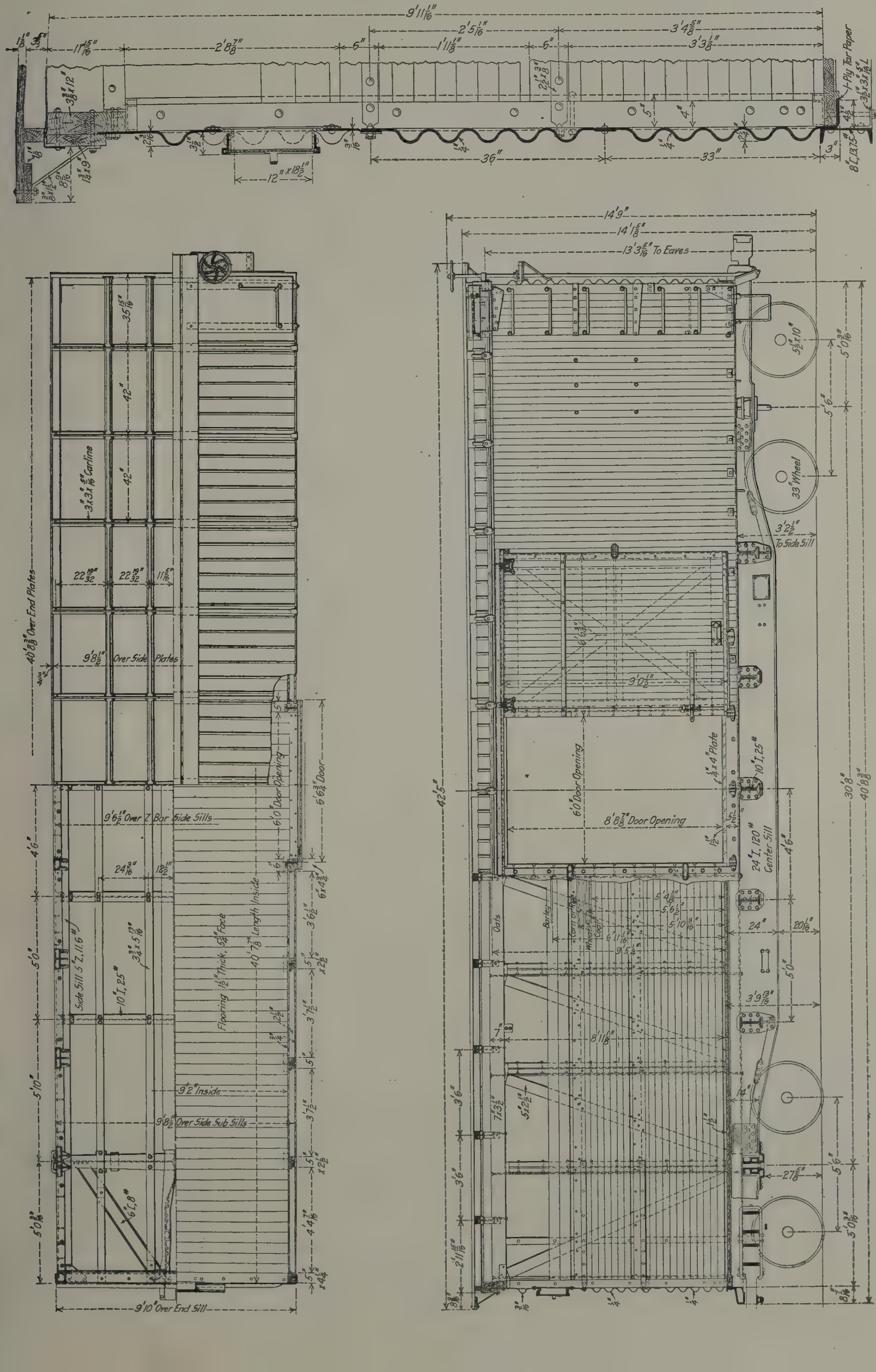


Fig. 25—Union Pacific Steel Underframe 50-Ton Capacity Box Car Shown in Figs. 23 and 24. Builder, Western Steel Car & Foundry Company.

Fig. 26—Steel Underframe 40-Ton Capacity Box Car. Weight, 39,400 lb.; Inside Length, 40 ft.; Inside Width, 8 ft. 6 in.; Inside Height, 8 ft. 8 in. Builder, Western Steel Car & Foundry Company.

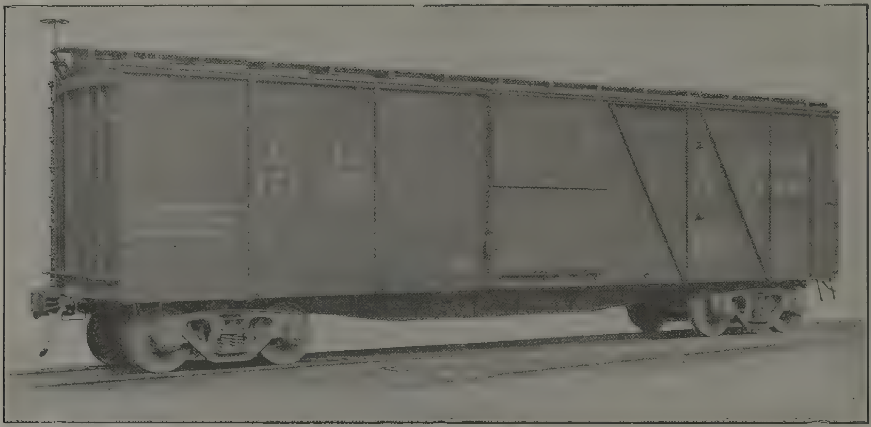


Fig. 27—Steel Frame 40-Ton Capacity Box Car. Weight, 40,000 lb.; Inside Length, 40 ft. 6 in. Inside Width, 8 ft. 6 in.; Inside Height, 8 ft. 4 in. Builder, Western Steel Car & Foundry Company.

Fig. 28—Steel Frame 40-Ton Capacity Box Car. Weight, 40,700 lb.; Inside Length, 40 ft.; Inside Width, 8 ft. 6 in.; Inside Height, 8 ft. Builder, American Car & Foundry Company.

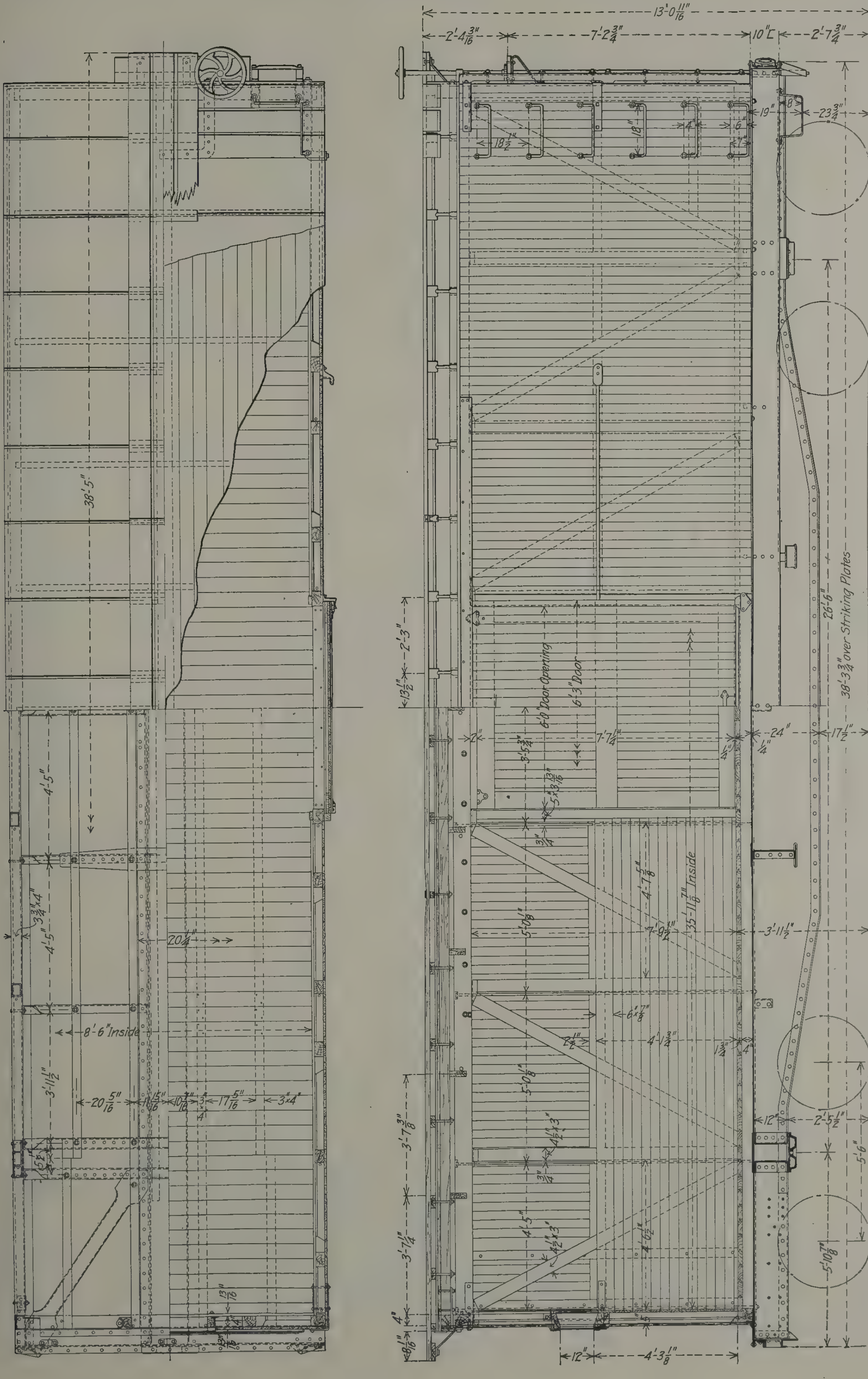


Fig. 29—Steel Underframe 40-Ton Capacity Box Car. Builder, Standard Steel Car Company.

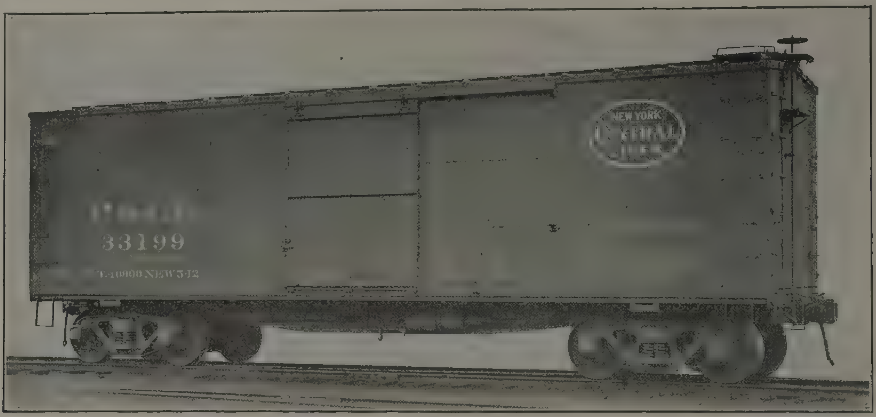


Fig. 30—Steel Underframe 40-Ton Capacity Box Car. Weight, 40,900 lb.; Inside Length, 36 ft.; Inside Width, 8 ft. 6 in.; Inside Height, 8 ft. 4 in. Builder, Pressed Steel Car Company.

(*See Figs.* 31 *and* 33.)

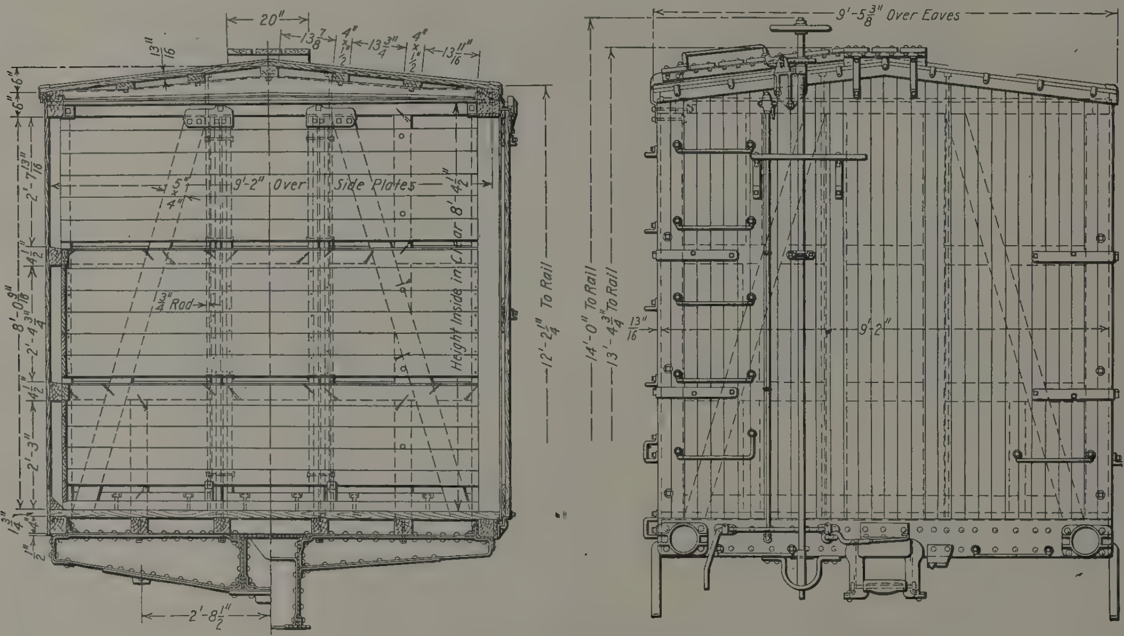


Fig. 31—End Elevation and Cross Sections of Pittsburgh & Lake Erie Steel Underframe Box Car

(*Shown in Figs.* 30 *and* 33.)

Fig. 32—Steel Frame 40-Ton Capacity Box Car. Weight, 40,700 lb.; Inside Length, 40 ft.; Inside Width, 8 ft. 6 in.; Inside Height, 8 ft. Builder, American Car & Foundry Company.

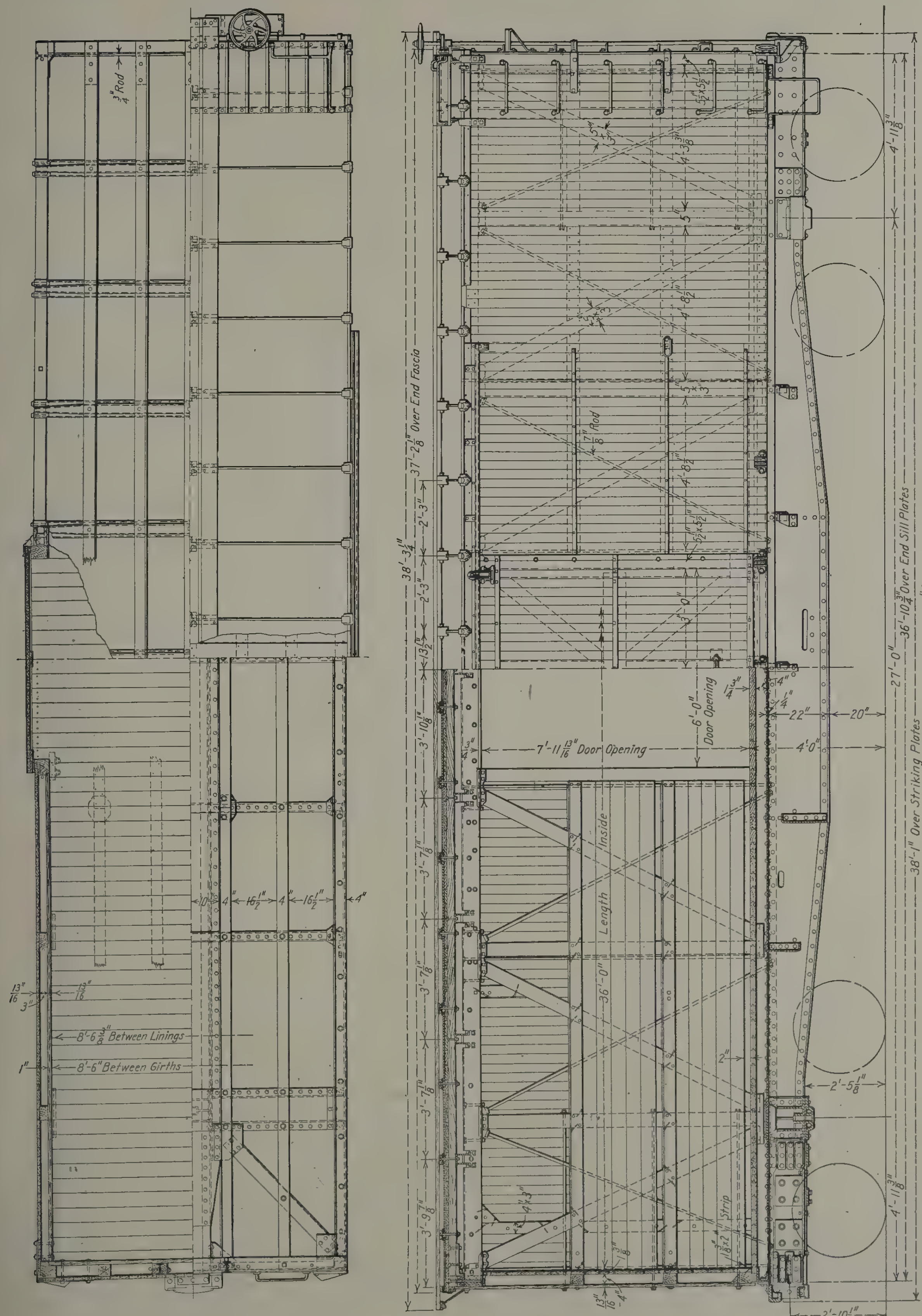


Fig. 33—Pittsburgh & Lake Erie Steel Underframe 40-Ton Capacity Box Car Shown in Figs. 30-31. Builder, Pressed Steel Car Company.

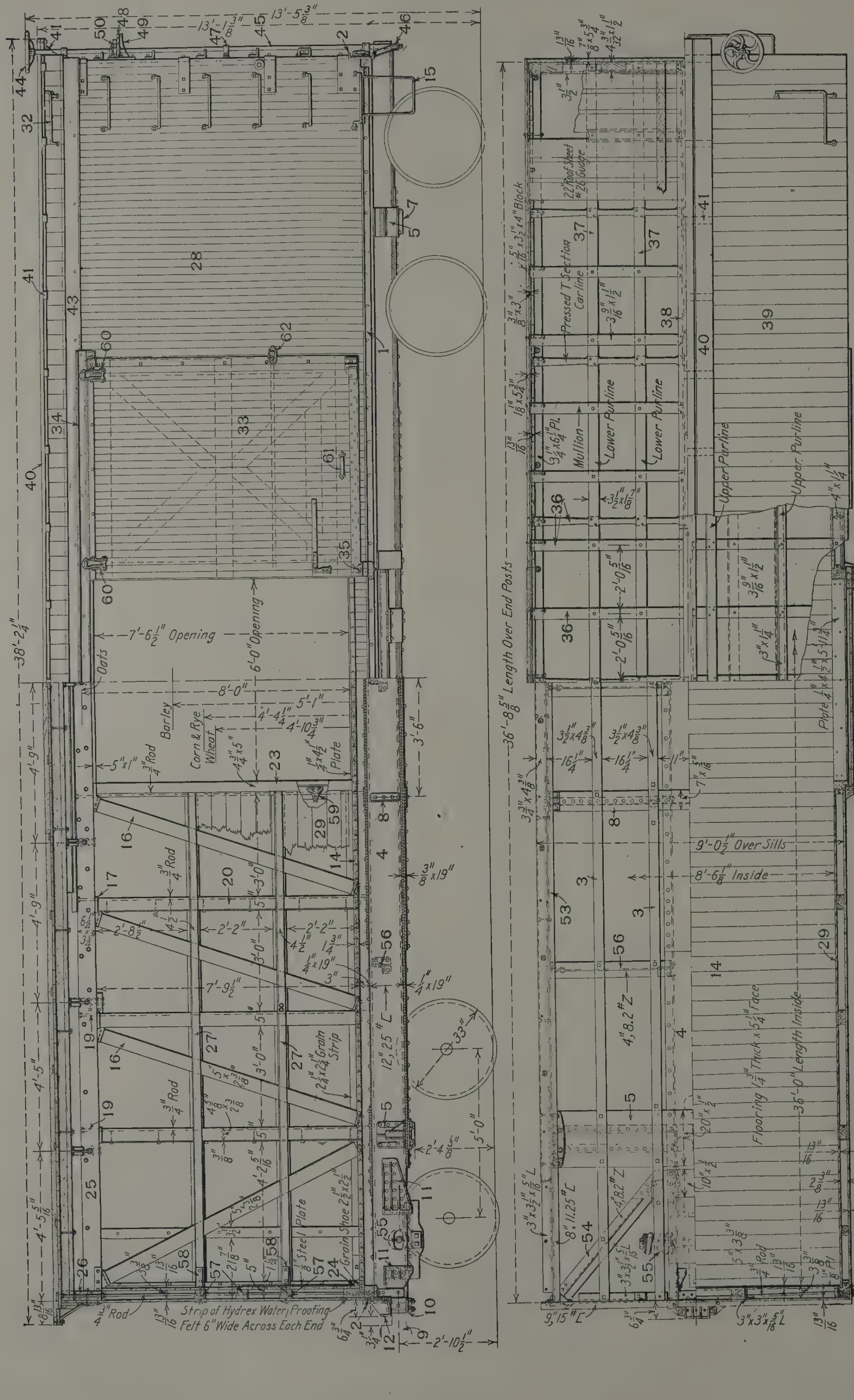


Fig. 34—Delaware, Lackawanna & Western Steel Underframe 30-Ton Capacity Box Car. Builder, The Barney & Smith Car Company. See also Fig. 35.

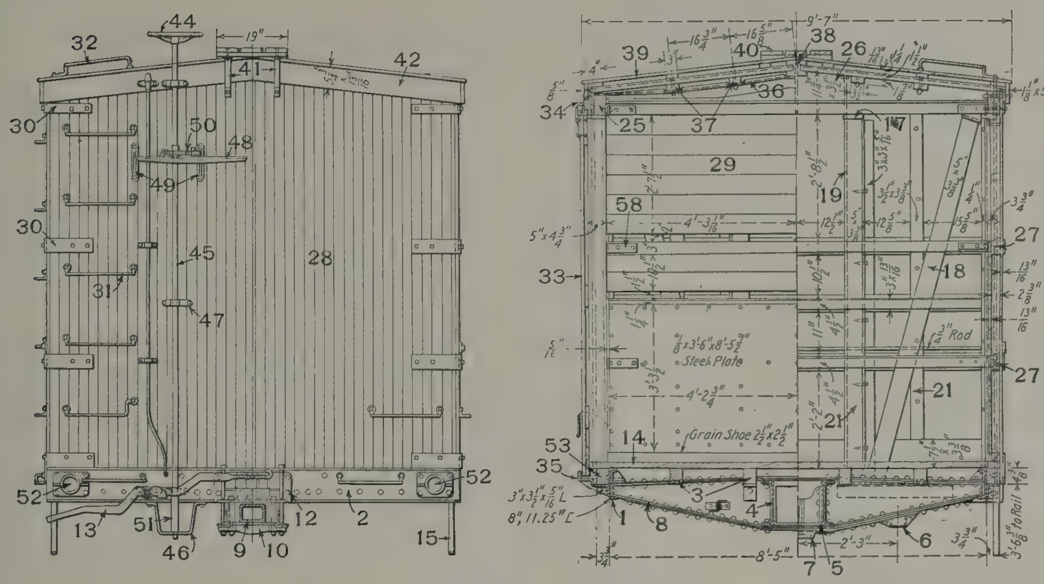


Fig. 35—End Elevation and Cross Sections of Delaware, Lackawanna & Western Steel Underframe Box Car Shown in Fig. 34.

Box Car Parts. See Figs. 34-35.

1 *Side Sill*
2 *End Sill*
3 *Floor Stringers*
4 *Center Sill*
5 *Body Bolster*
6 *Body Side Bearing*
7 *Body Center Plate*
8 *Crosstie*
9 *Drawbar*
10 *Carry Iron*
11 *Draft Casting*
12 *Striking Plate*
13 *Uncoupling Rigging*
14 *Floor*
15 *Sill Step*
16 *Side Brace*
17 *Post Pocket*
18 *End Brace*
19 *Sill and Plate Tie Rod*
20 *Side Post*
21 *End Post*
22 *Corner Post*
23 *Door Post*
24 *Grain Shoe*
25 *Side Plate*
26 *End Plate*
27 *Belt Rail*
28 *Sheathing or Siding*
29 *Lining*
30 *Corner Plate*
31 *Ladder Round*
32 *Hand Hold*
33 *Side Door*
34 *Side Door Top Track or Guide*
35 *Side Door Bottom Guide*
36 *Carline*
37 *Purline*
38 *Ridge Pole*
39 *Roof*
40 *Running Board*
41 *Running Board Bracket*
42 *End Fascia*
43 *Side Fascia*
44 *Hand Brake Wheel*
45 *Hand Brake Shaft*
46 *Hand Brake Shaft Step*
47 *Hand Brake Shaft Guide*
48 *Hand Brake Step*
49 *Hand Brake Step Bracket*
50 *Hand Brake Ratchet*
51 *Hand Brake Chain Drum*
52 *Push Pole Pocket*
53 *Side Nailing Strip or Floor Stringer Bracket*
54 *Diagonal Brace*
55 *Draft Gear*
56 *Cross Tie Floor Beam or Stringer Support*
57 *End Belt Rail*
58 *Inside Corner Plate*
59 *Side Door Stop and Lock*
60 *Side Door Hanger*
61 *Door Handle*
62 *Door Back Stop*

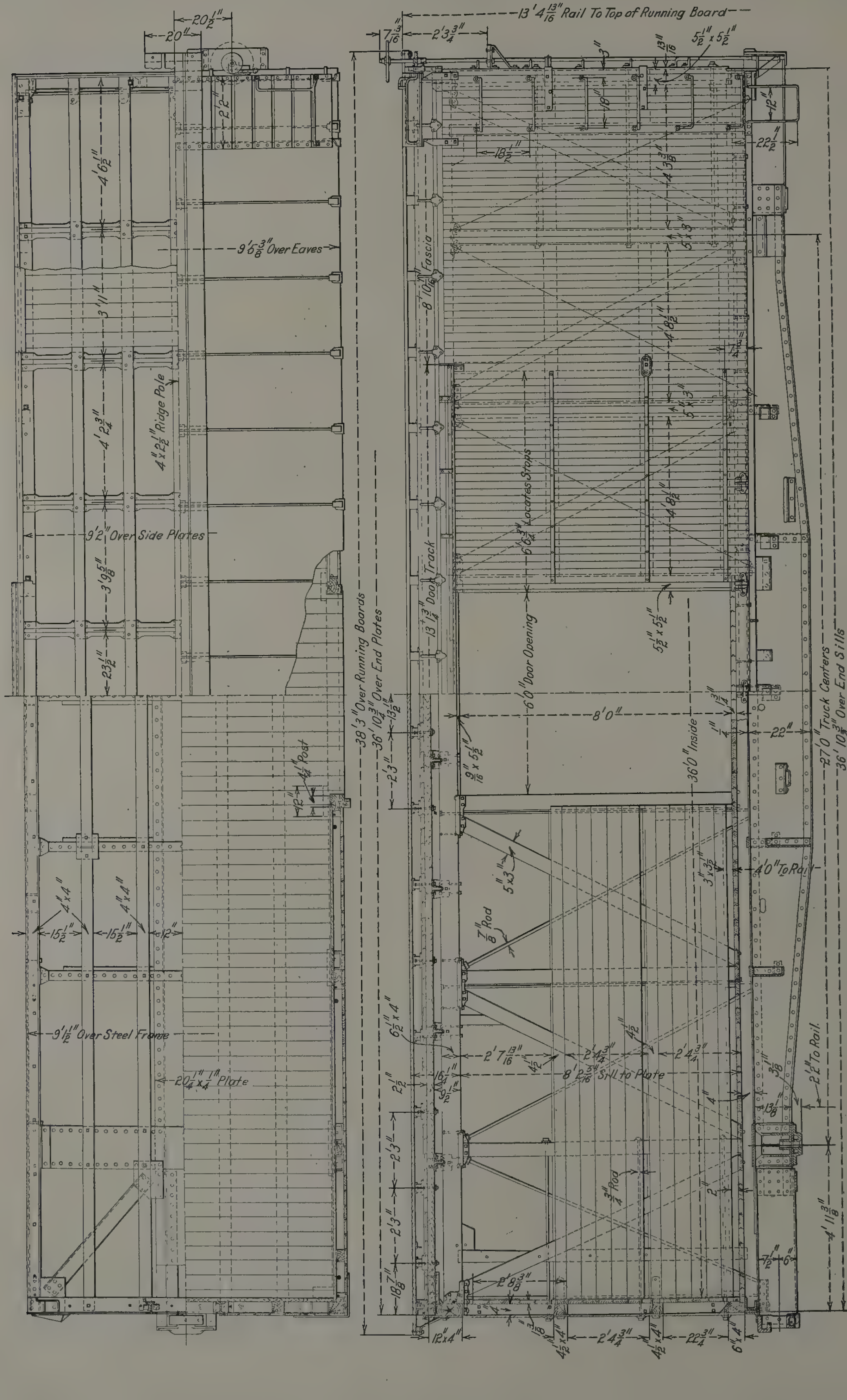


Fig. 36—New York Central Steel Underframe 40-Ton Capacity Box Car. See also Fig. 37.

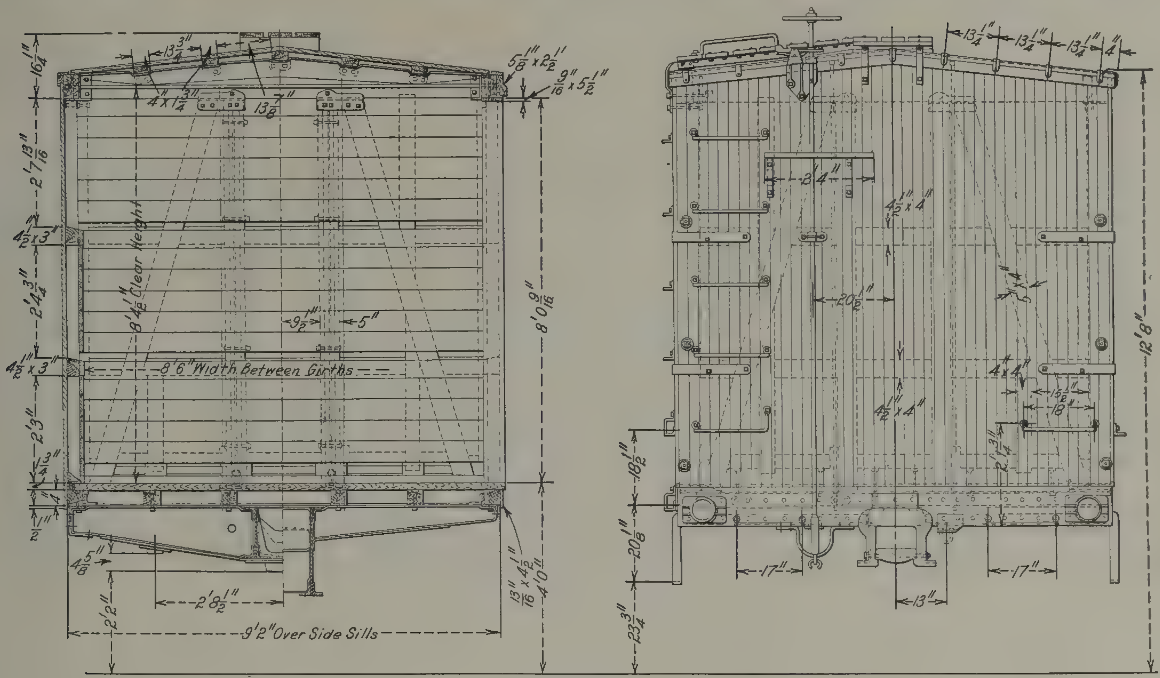


Fig. 37—End Elevation and Cross Sections of New York Central Steel Underframe Box Car Shown in Fig. 36.

Fig. 38—Wooden 40-Ton Capacity Box Car with Steel Center Sills. Weight, 36.600 lb.; Inside Length, 40 ft.; Inside Width, 8 ft. 7 in.; Inside Height, 7 ft. 9½ in. Builder, Haskell & Barker Car Company.

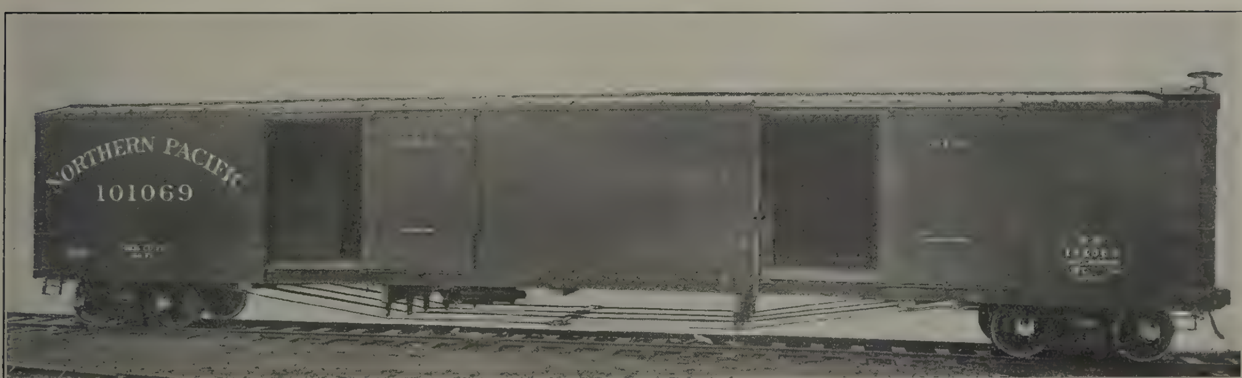


Fig. 39—Long Wooden 40-Ton, 4,036 cu. ft., Capacity Box Car for Collecting L. C. L. Freight from Team Tracks. Inside Length, 59 ft. 4⅞ in.; Light Weight, 43,500 lb. Builder, Northern Pacific Railway.

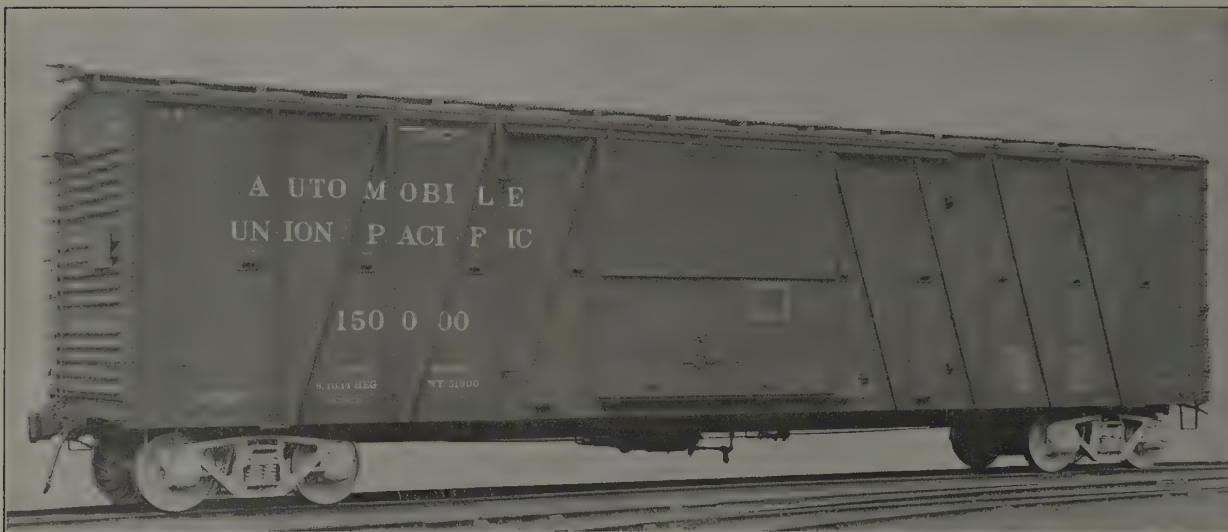


Fig. 40—All-Steel 50-Ton Capacity Box Car for Automobile Traffic. Weight, 51,900 lb.; Inside Length, 50 ft.; Inside Width, 9 ft. 2 in.; Inside Height, 10 ft. 1 in. Builder, Western Steel Car & Foundry Company.

(*See Figs.* 41-42)

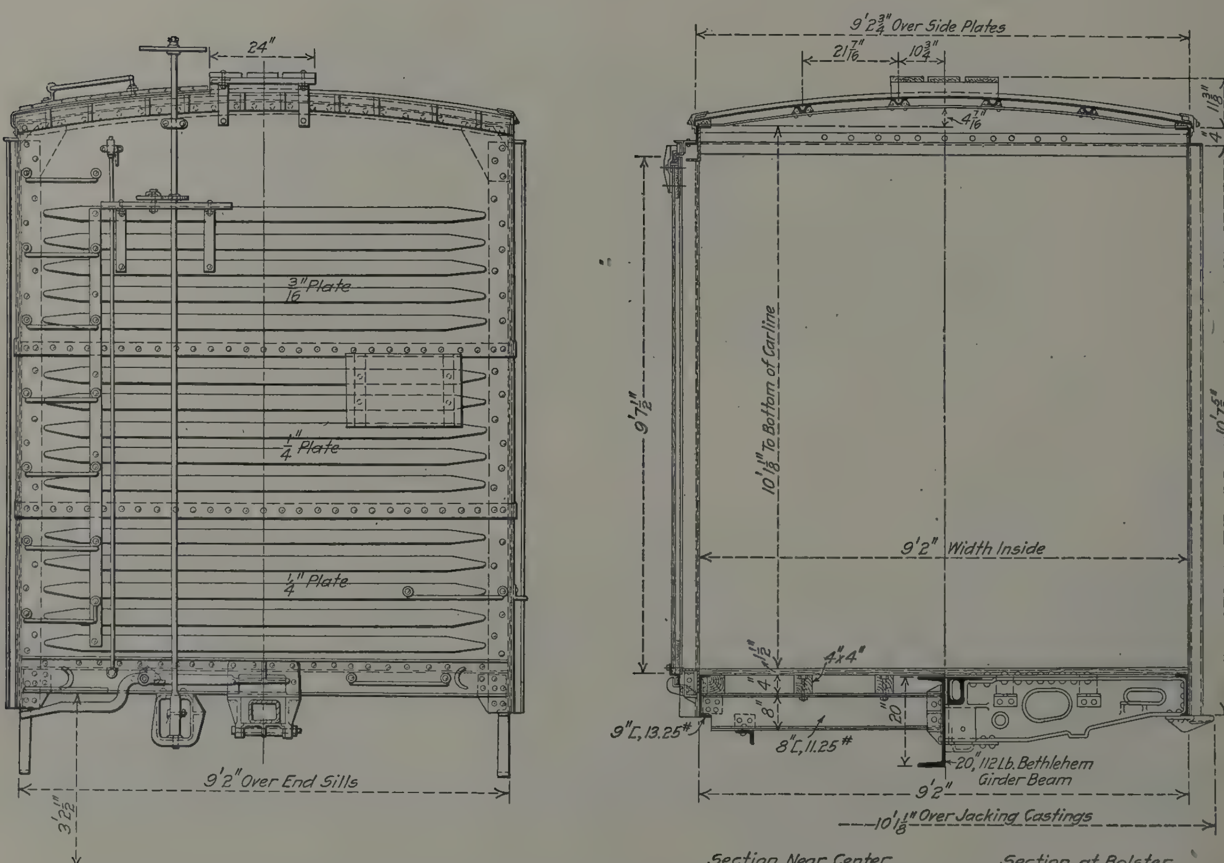


Fig. 41—End Elevation and Cross Sections of Union Pacific Steel Automobile Car Shown in Figs. 40 and 42.

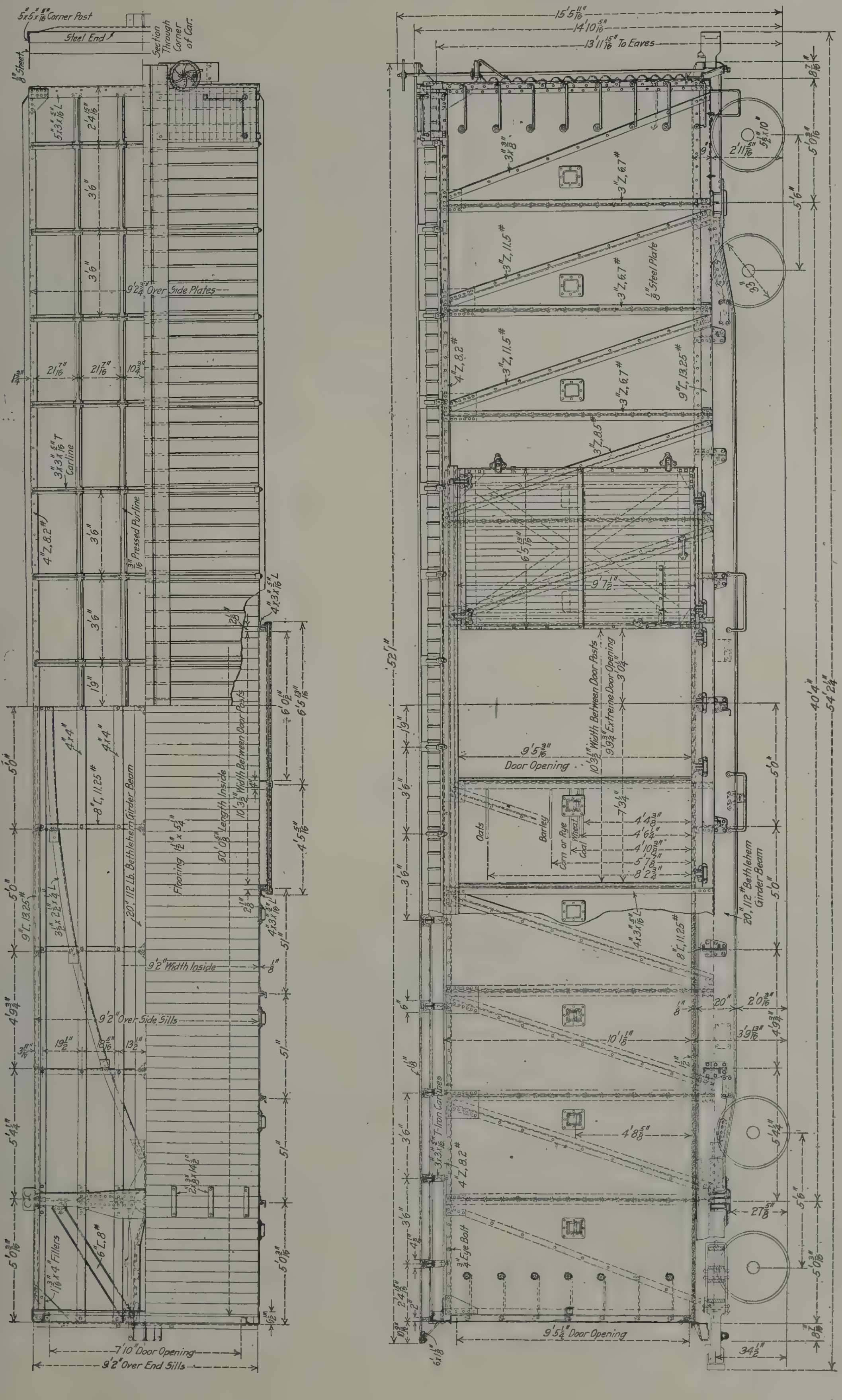


Fig. 42—Union Pacific Steel Automobile Car Shown in Figs. 40 and 41. Builder, Western Steel Car & Foundry Company.

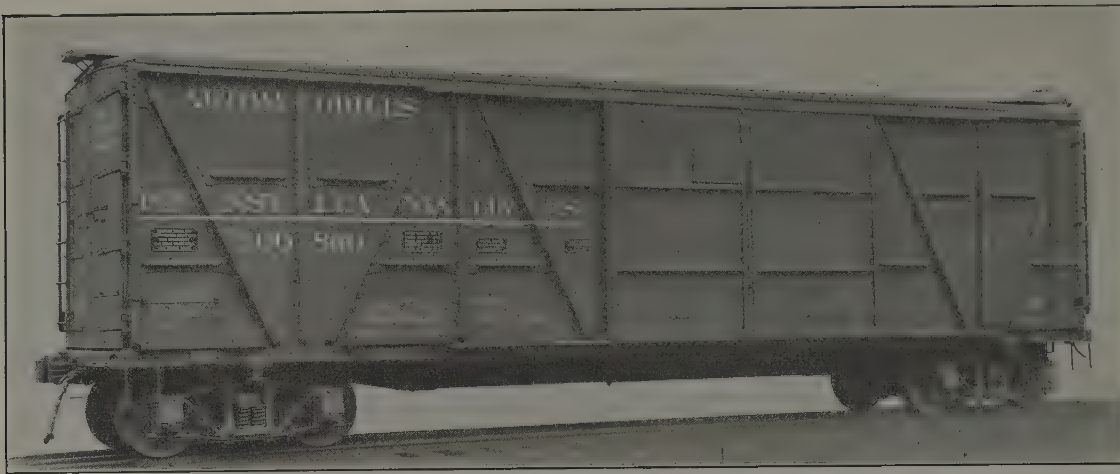


Fig. 43—Pressed Steel Frame 50-Ton Capacity Automobile Car. Weight, 49,100 lb. Inside Length, 40 ft. 5 in.; Inside Width, 8 ft. 10 in.; Inside Height, 9 ft. 1 in. Pennsylvania Railroad.

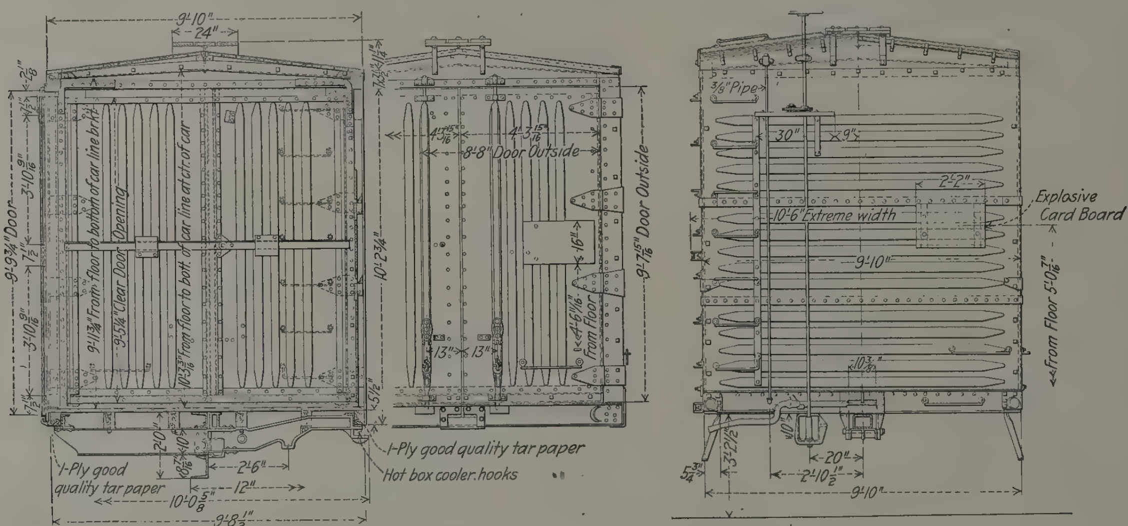


Fig. 44—End Elevations. Automobile Car Shown in Figs. 45 and 46.

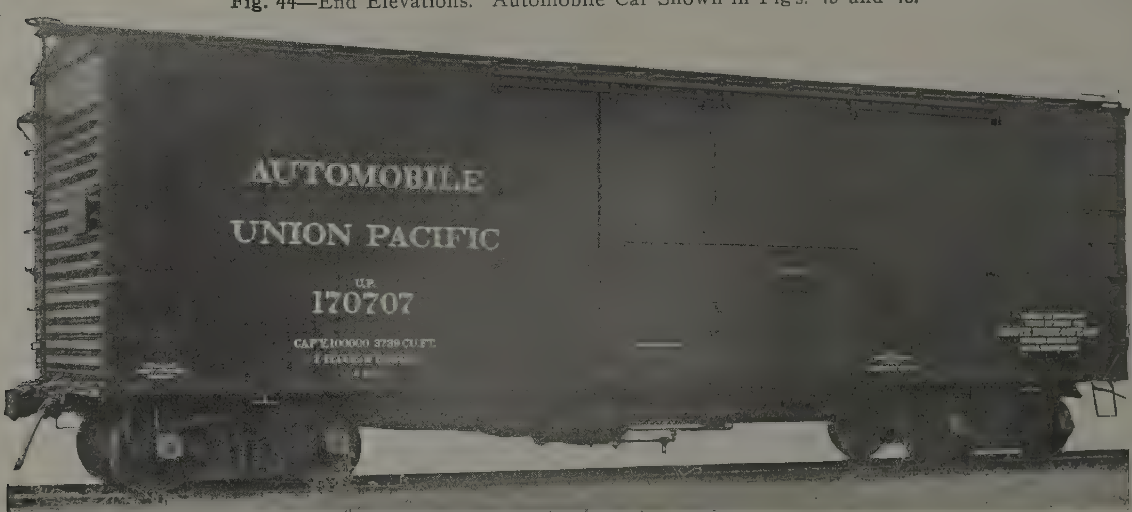


Fig. 45—Steel Frame 50-Ton Capacity Automobile Car. Weight 46,400 lb. Inside Length, 40 ft. 4 in. Builder, Ralston Steel Car Company.

(See Figs. 44 and 46.)

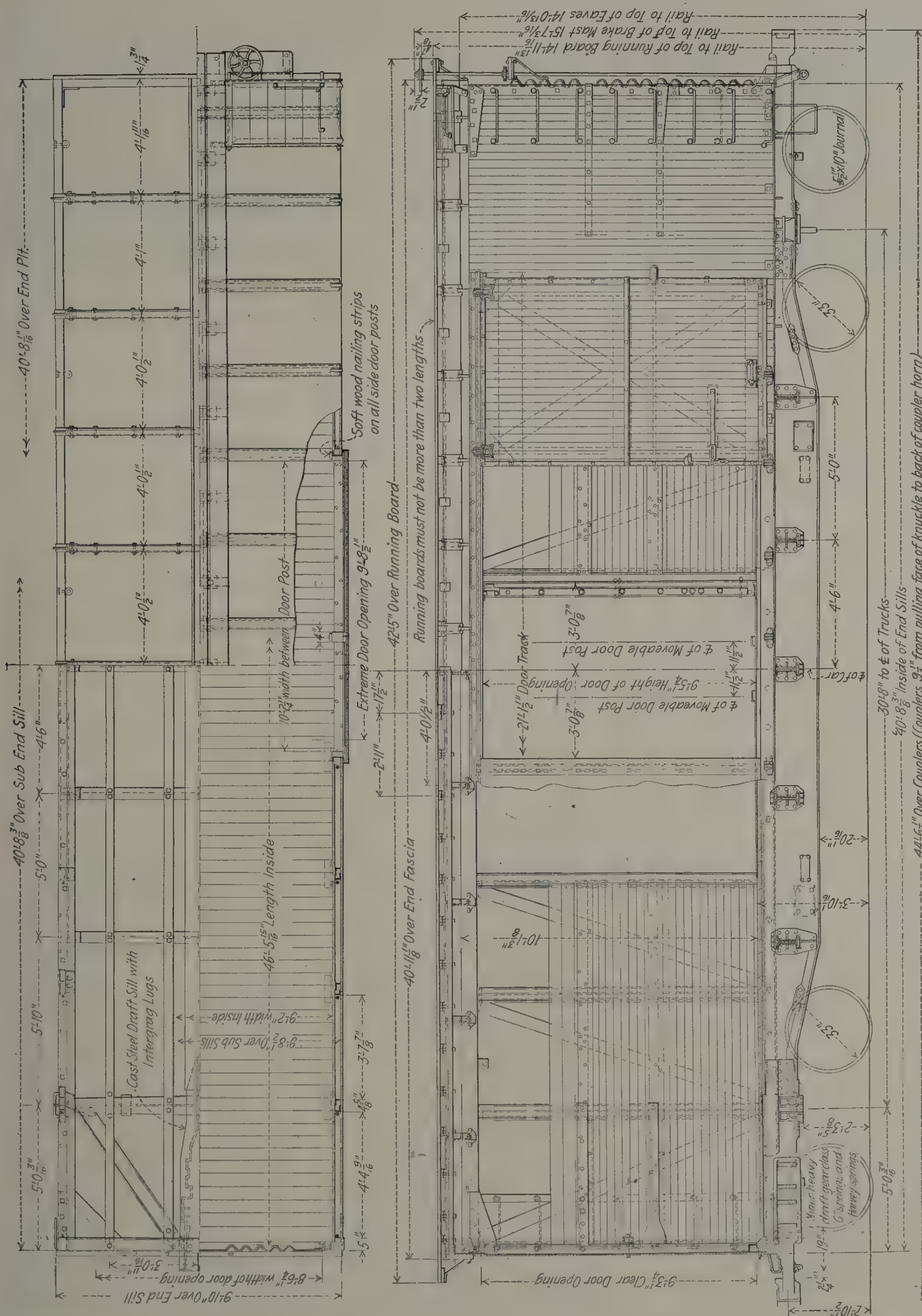


Fig. 46—Steel Frame 50-Ton Capacity Automobile Car. Builder, Ralston Steel Car Company.

(See Figs. 44 and 45.)

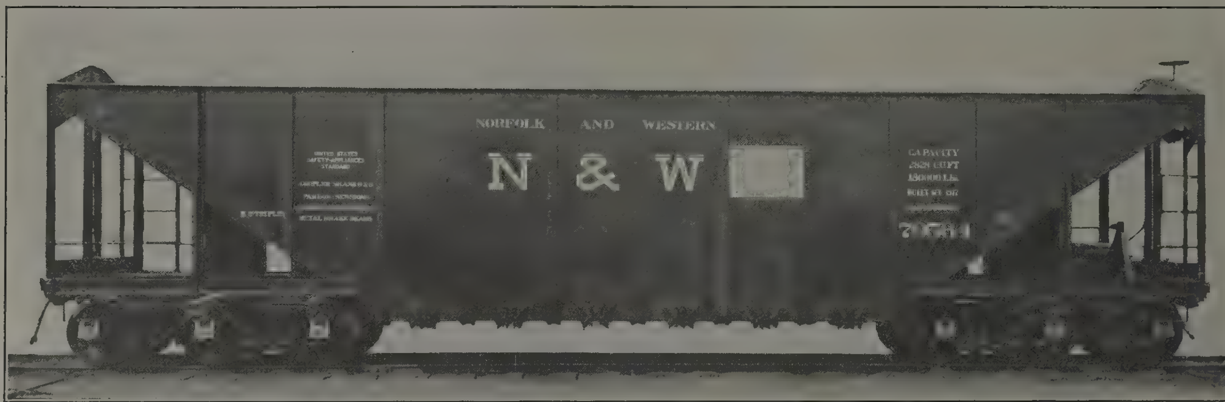


Fig. 47—All-Steel 100-Ton Capacity Hopper Car. Weight, 60,000 lb.; Inside Width, 9 ft. 6 in. Norfolk & Western Railway. (See Figs. 48-50.)

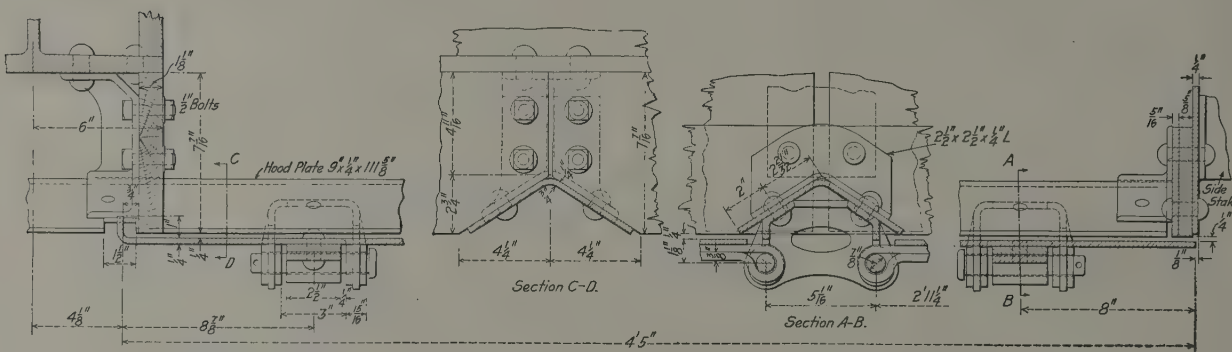


Fig. 48—Details of Door Construction, 100-Ton Hopper Car Shown in Figs. 47, 49 and 50.

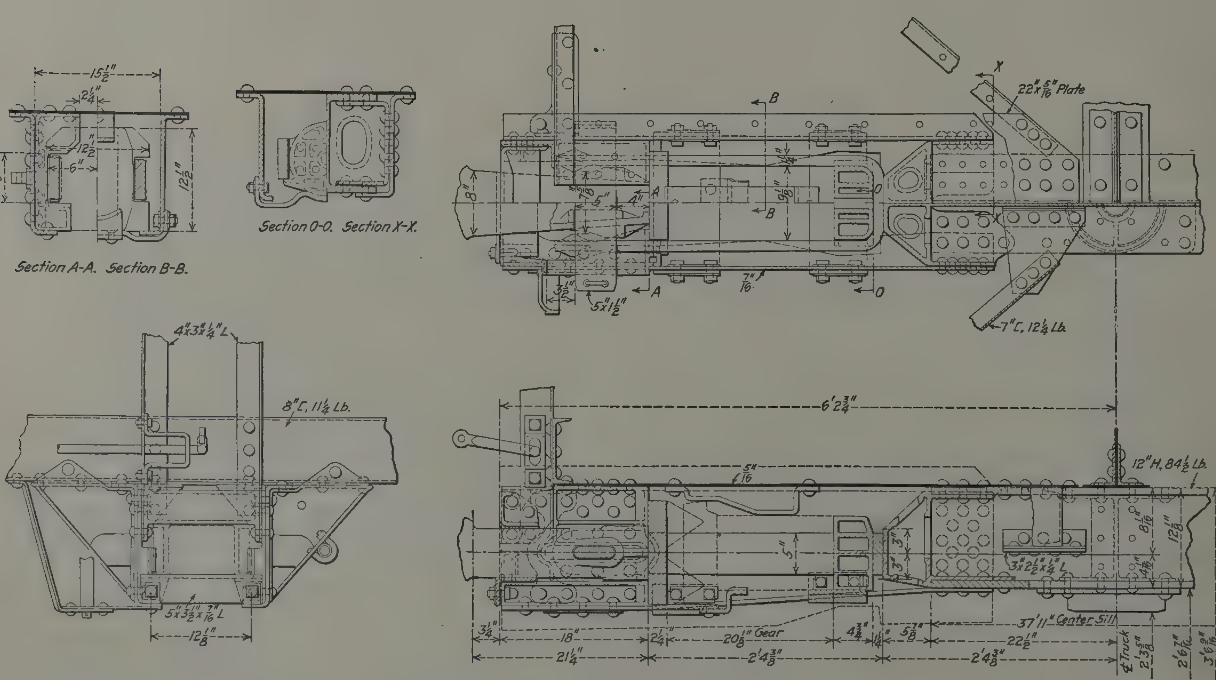


Fig. 49—Details of Draft Gear and Draft Sill Construction, 100-Ton Hopper Car Shown in Figs. 47, 48 and 50.

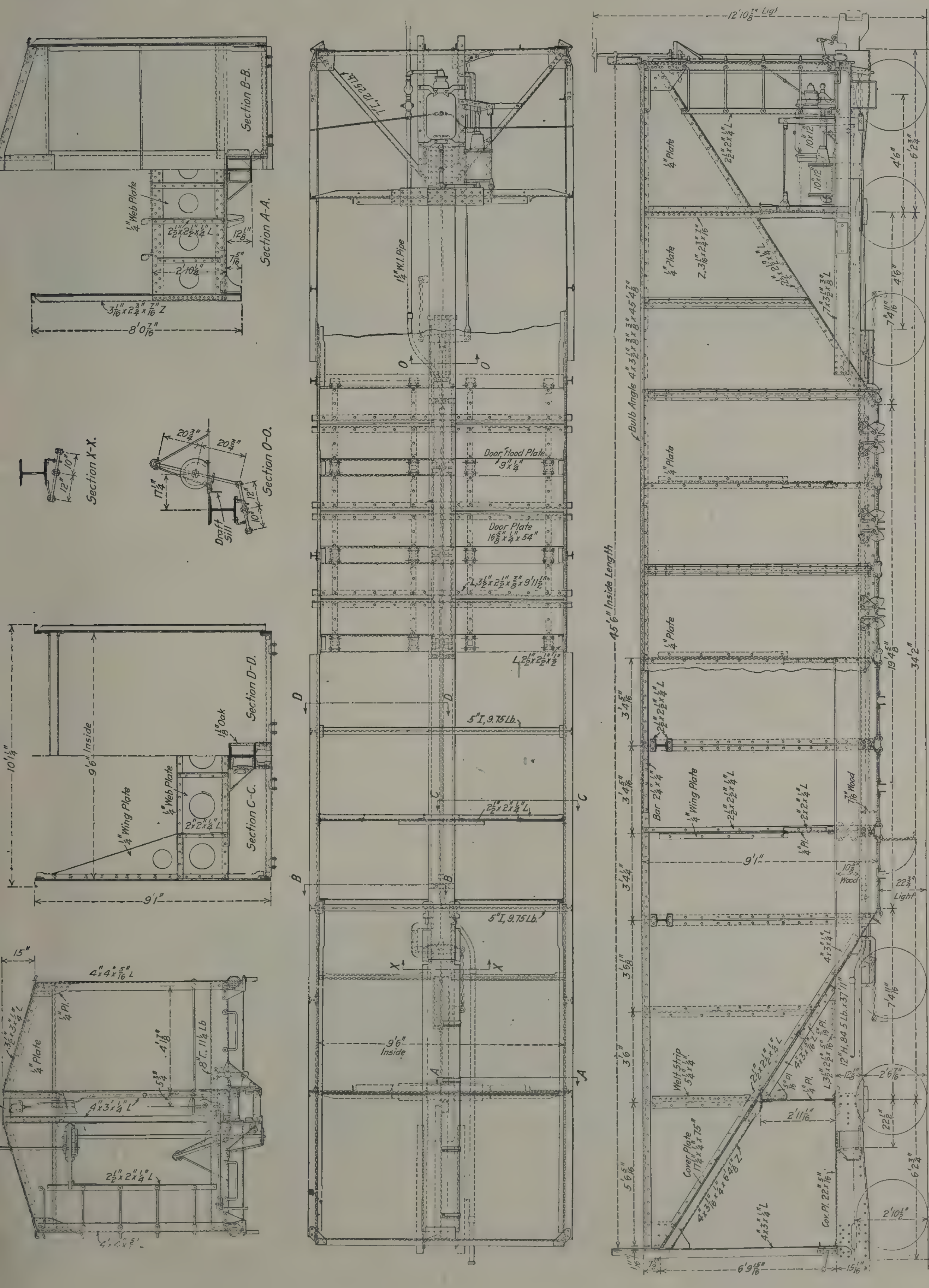


Fig. 50—Plan, Elevation and Cross Sections, 100-Ton Hopper Car Shown in Figs. 47-49.

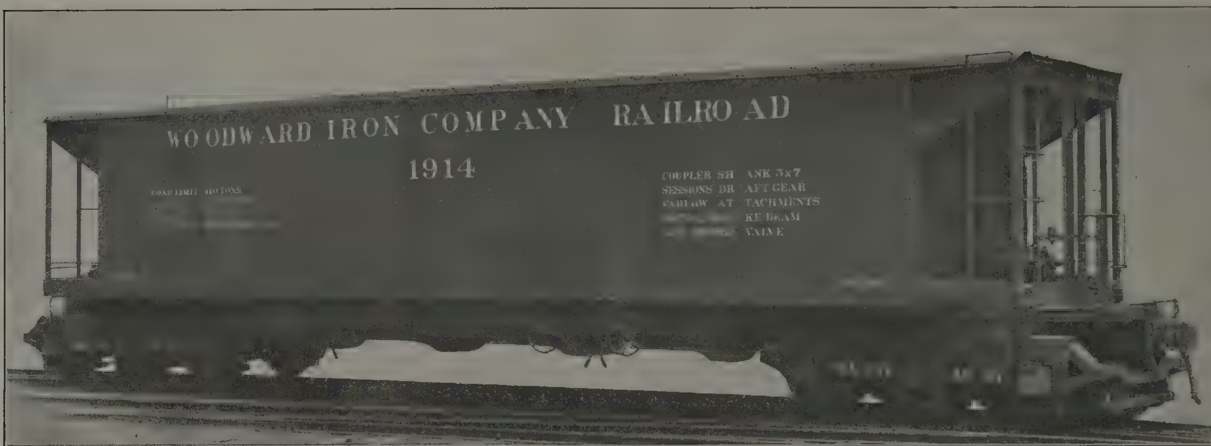


Fig. 51—All-Steel 100-Ton Capacity Hopper Car. Weight, 75,300 lb.; Inside Length, 46 ft. 4 in.; Inside Width, 10 ft. 1¾ in. Builder, Pressed Steel Car Company. (See Figs. 52-54.)

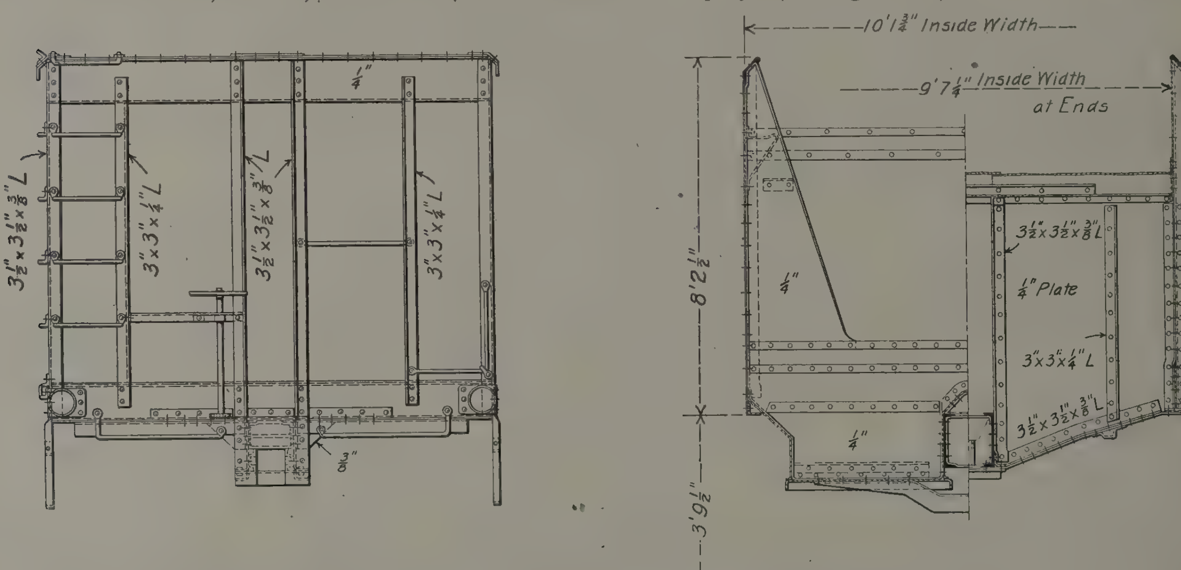


Fig. 52—End Elevation and Cross Sections, 100-Ton Hopper Car Shown in Figs. 51 and 54.

Fig. 53—All-Steel 100-Ton Capacity Side Dump Hopper Car. Weight, 50,800 lb.; Inside Length, 33 ft.; Inside Width, 10 ft. Capacity Level Full, Cubic Feet, 2,000. Builder, Summers Steel Car Company.

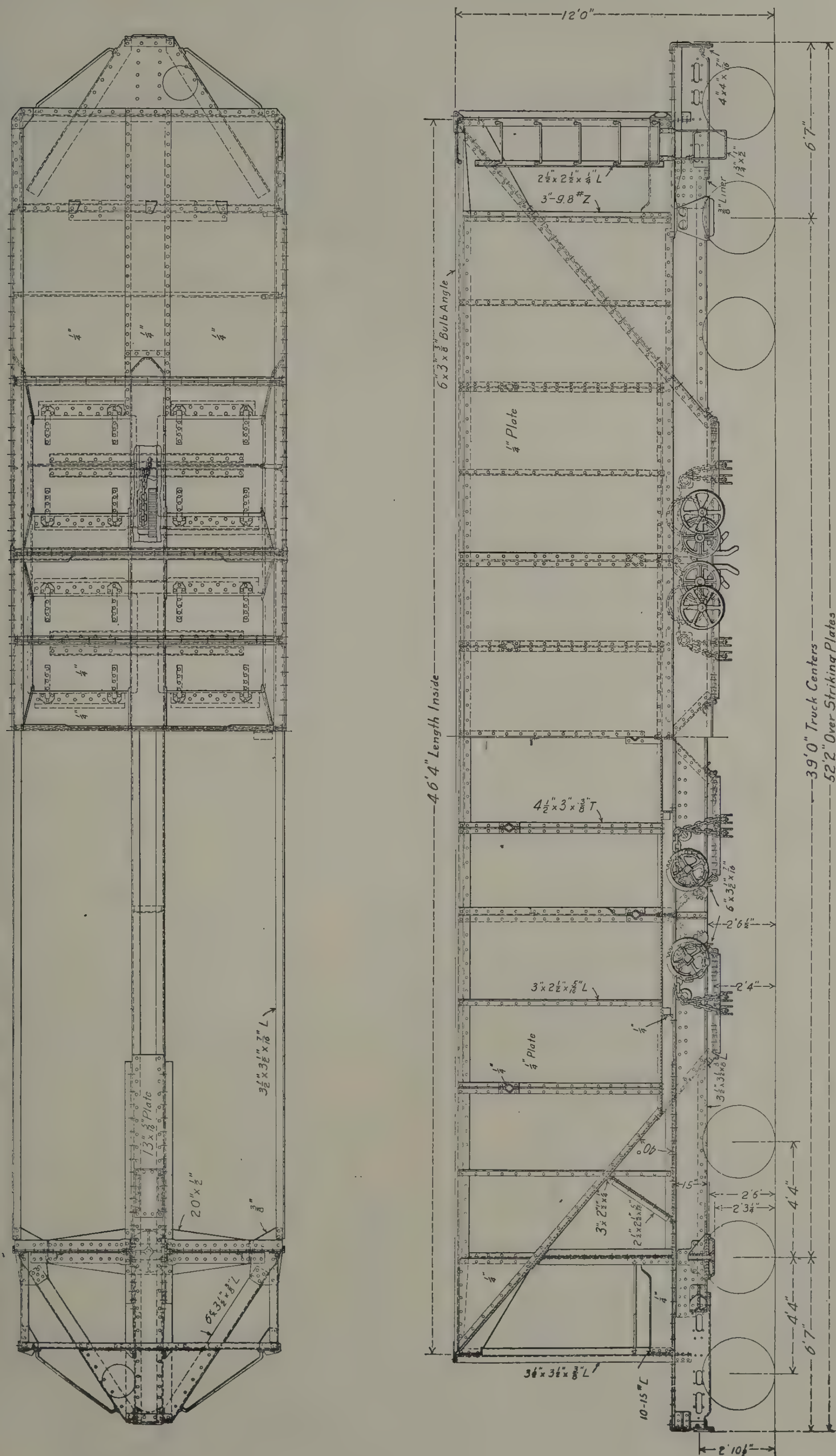


Fig. 54—Plan and Elevation, 100-Ton Hopper Car. Shown in Figs. 51-52.

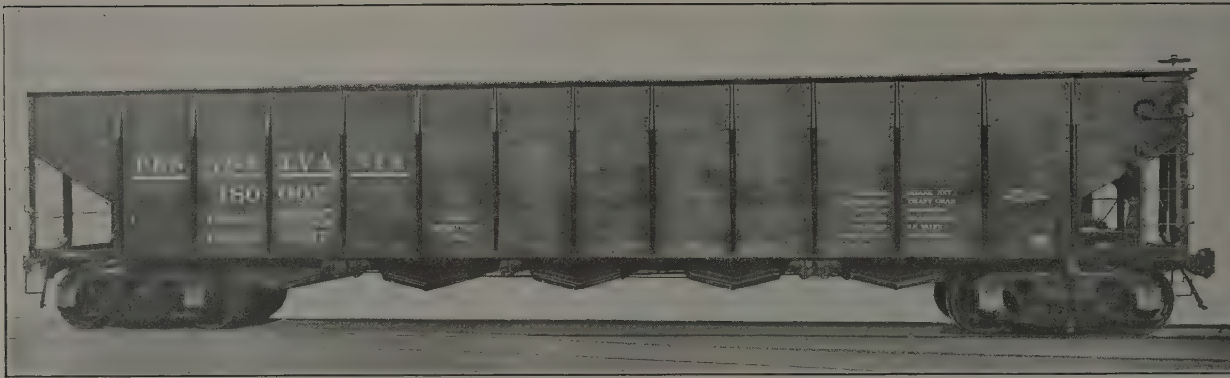


Fig. 55—All-Steel 85-Ton, 3,228 cu. ft. Capacity, Quintuple Hopper Car. Weight, 60,000 lb.; Inside Length, 46 ft. 6 in.; Inside Width, 9 ft. 4⅞ in. Builder, Pennsylvania Railroad.
(*See Figs.* 56-58.)

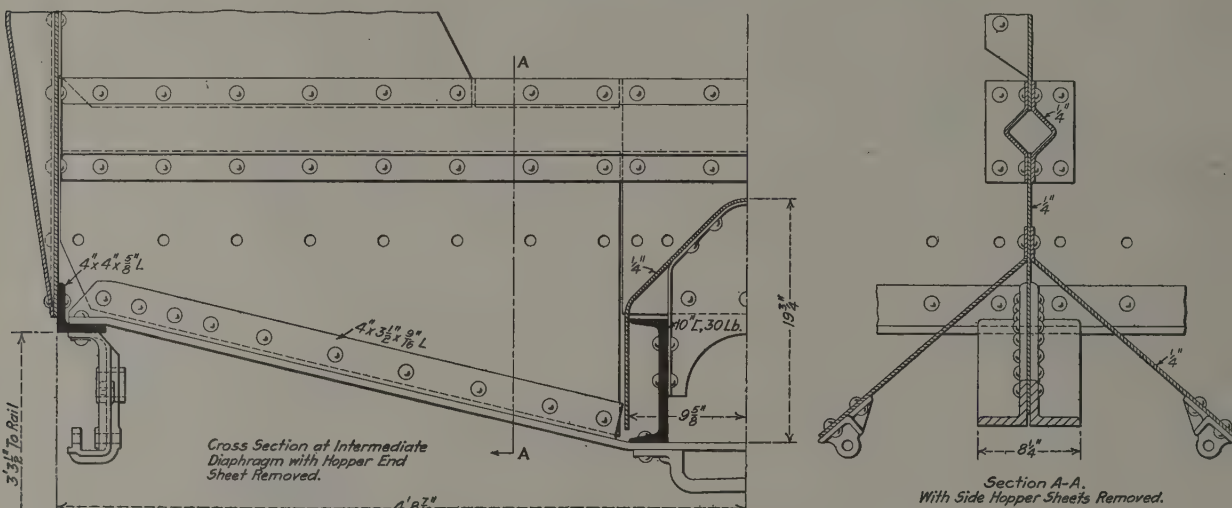


Fig. 56—Section Through Intermediate Diaphragm of Hopper Car Shown in Figs. 55, 57, 58.

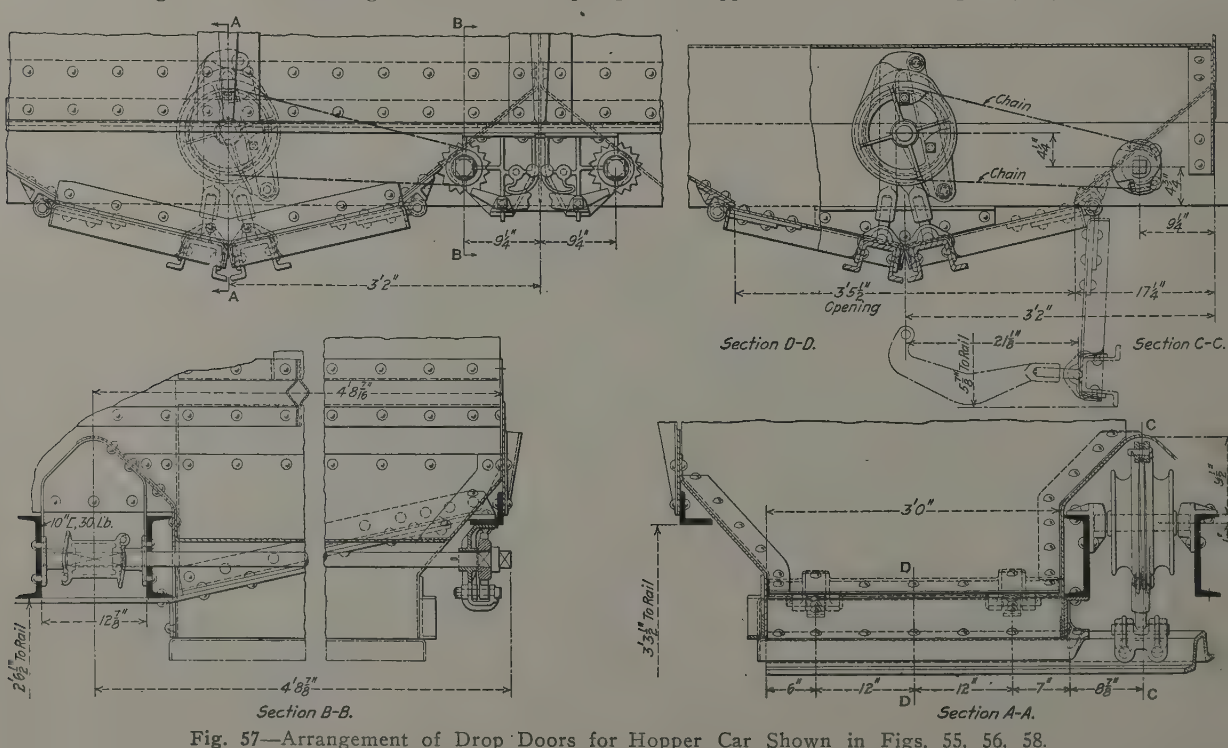


Fig. 57—Arrangement of Drop Doors for Hopper Car Shown in Figs. 55, 56, 58.

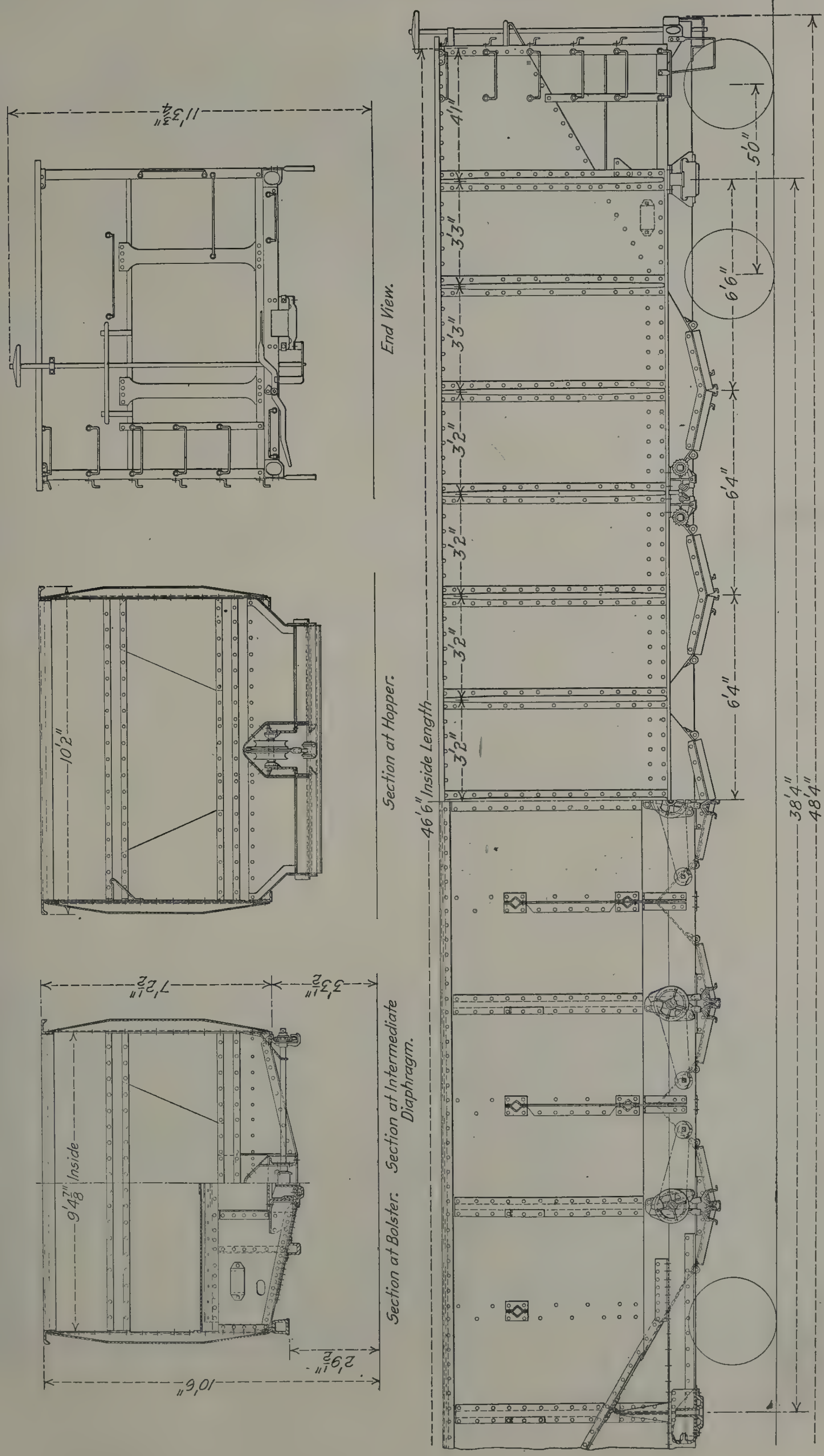


Fig. 58—Elevation, Cross Sections and End View 85-Ton Hopper Car Shown in Figs. 55-57.

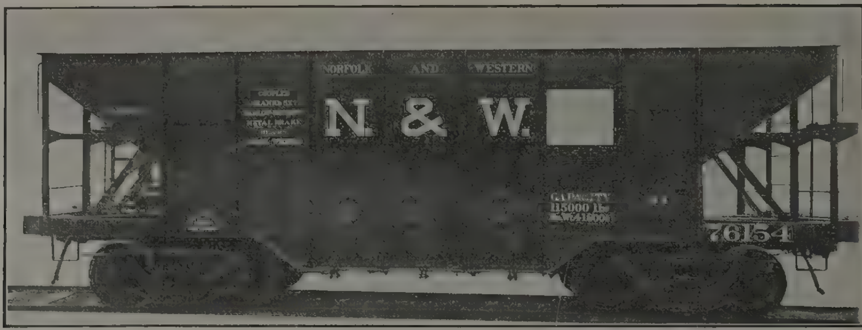


Fig. 59—All-Steel 57½-Ton Capacity Hopper Car. Weight, 41,800 lb.; Inside Length, 30 ft. 0½ in.; Inside Width, 9 ft. 2 in. Capacity Level Full, Cubic Feet, 1,590. Builder, The Barney & Smith Car Company.

(*See Figs. 60-62 for General Drawings.*)

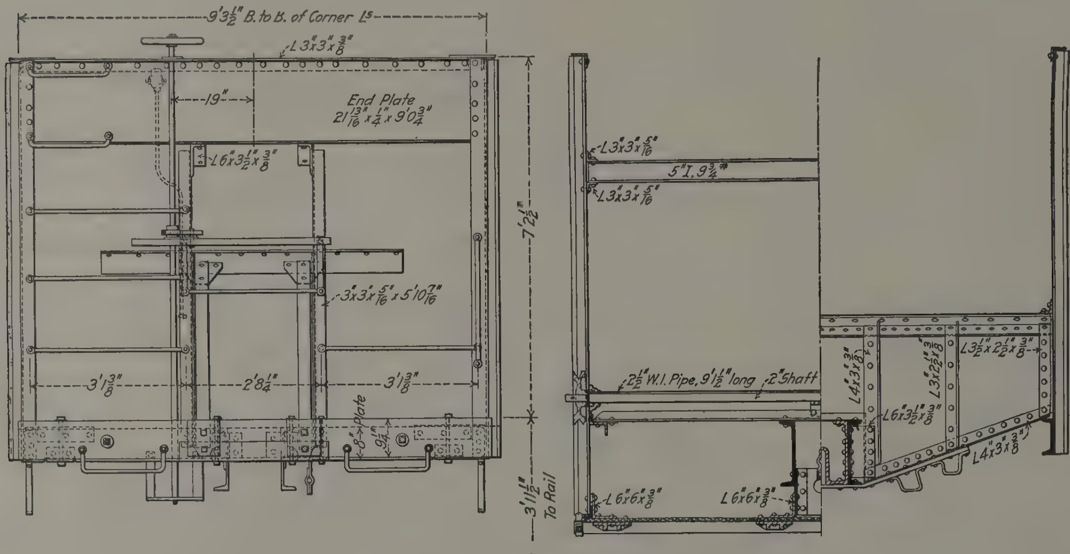


Fig. 60—End Elevation and Cross Sections of Norfolk & Western All-Steel Hopper Car Shown in Figs. 59 and 62.

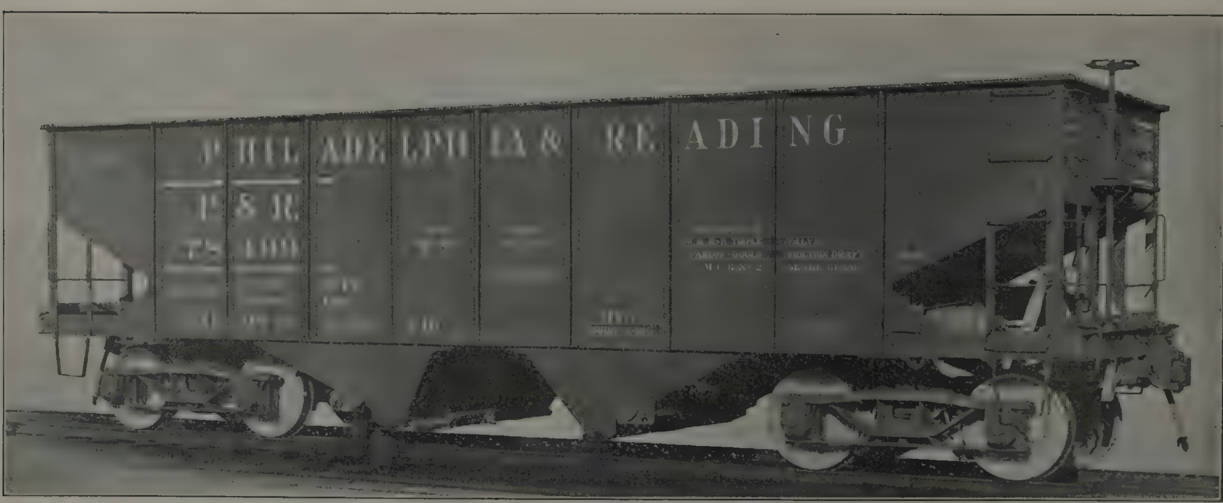


Fig. 61—All-Steel 55-Ton Capacity Hopper Car. Weight 42,900 lb.; Inside Length, 32 ft. 10¼ in.; Inside Width, 9 ft. 5⅝ in. Builder, Pressed Steel Car Company.

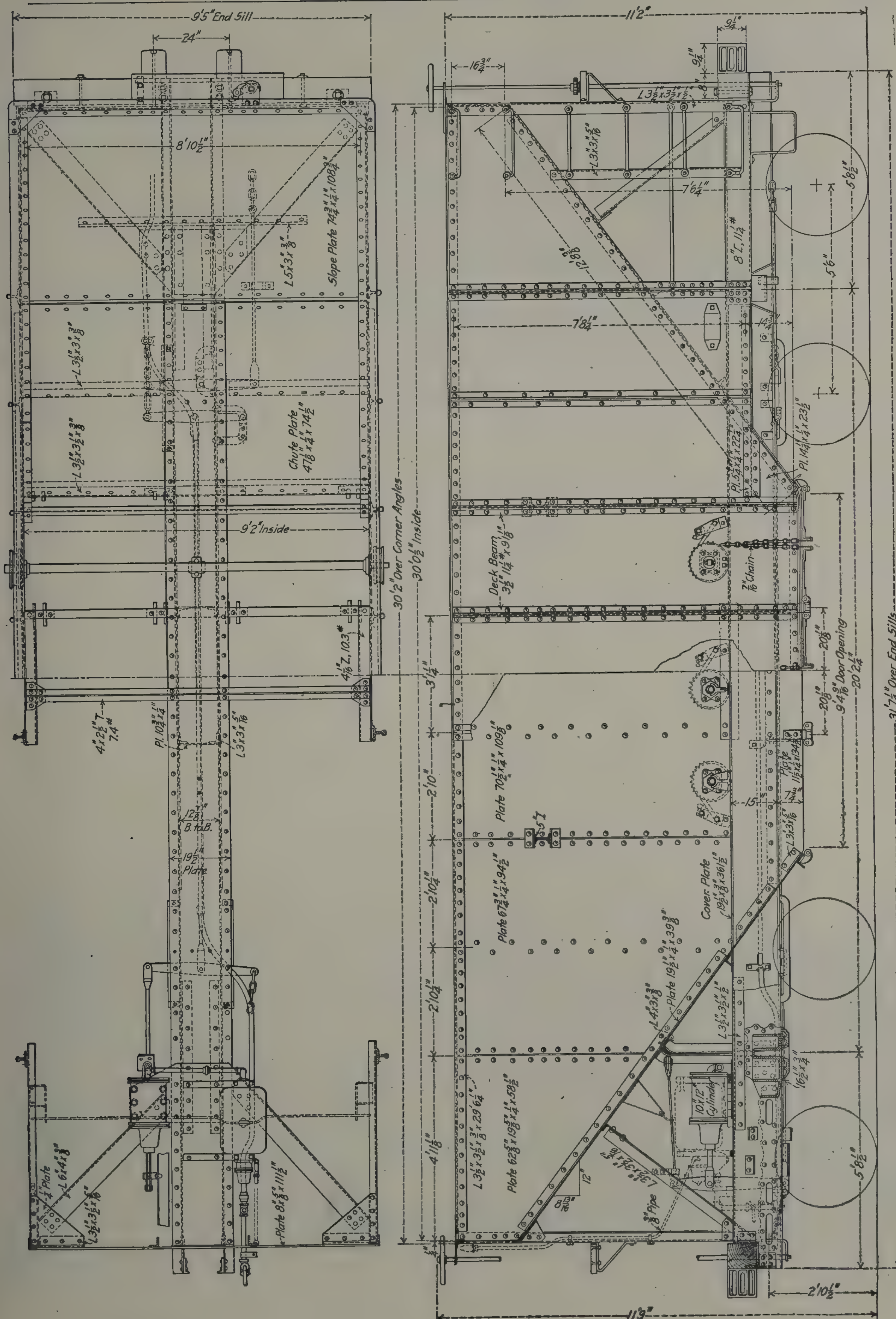


Fig. 62—Norfolk & Western All-Steel 57½-Ton Capacity Hopper Car Shown in Figs. 59 and 60. Builder, The Barney & Smith Car Company.

Fig. 63—All-Steel 50-Ton Capacity Hopper Car. Weight, 36,720 lb.; Inside Length, 30 ft. 0 in.; Inside Width, 9 ft. 5½ in. Builder, American Car & Foundry Company.

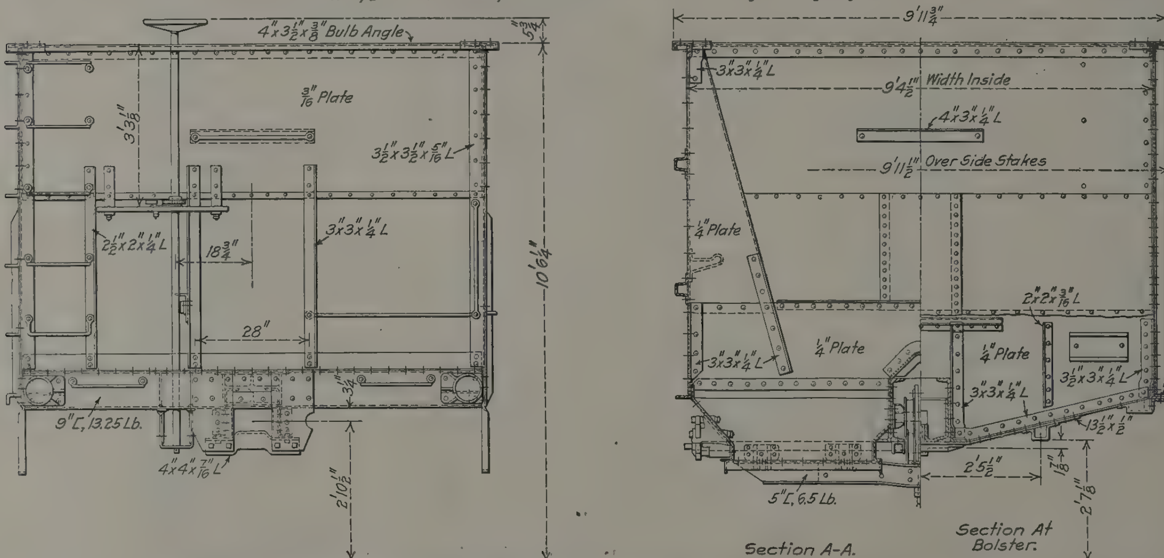


Fig. 64—End Elevation and Cross Sections 50-Ton Hopper Car Shown in Figs. 65-66.

Fig. 65—All-Steel 50-Ton Capacity Hopper Car. Weight, 41,400 lb.; Inside Width, 9 ft. 4½ in.; Inside Length, 30 ft. 6¾ in. Builder, Pressed Steel Car Company.

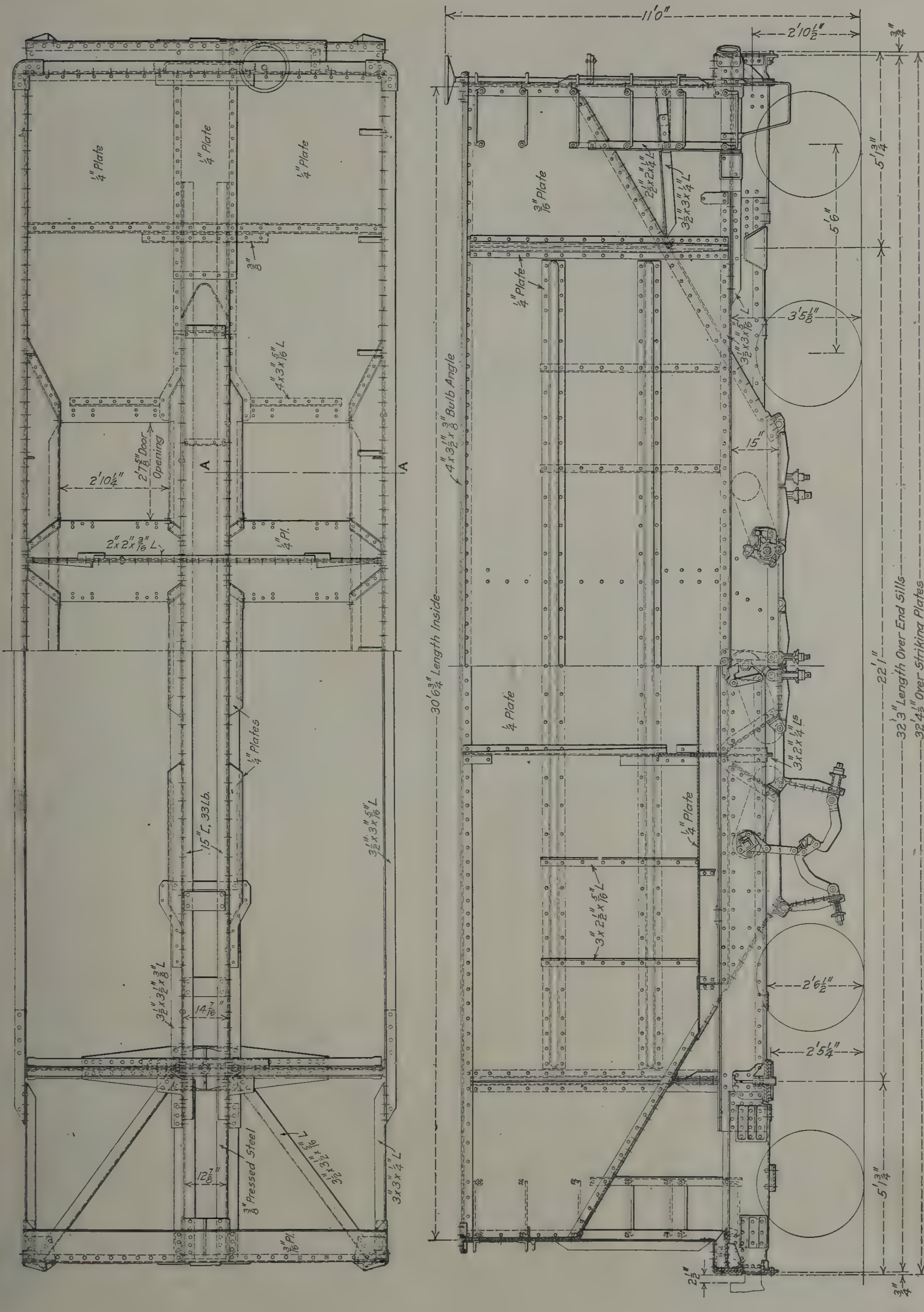


Fig. 66—Plan and Elevation of All-Steel 50-Ton Hopper Car Shown in Figs. 64-65.

Fig. 67—All-Steel 70-Ton Capacity Hopper Car. Weight, 45,900 lb.; Inside Length, 34 ft. 4½ in.; Inside Width, 10 ft. 1¾ in. Capacity Level Full, Cubic Feet, 2,441. Builder, Pressed Steel Car Company.

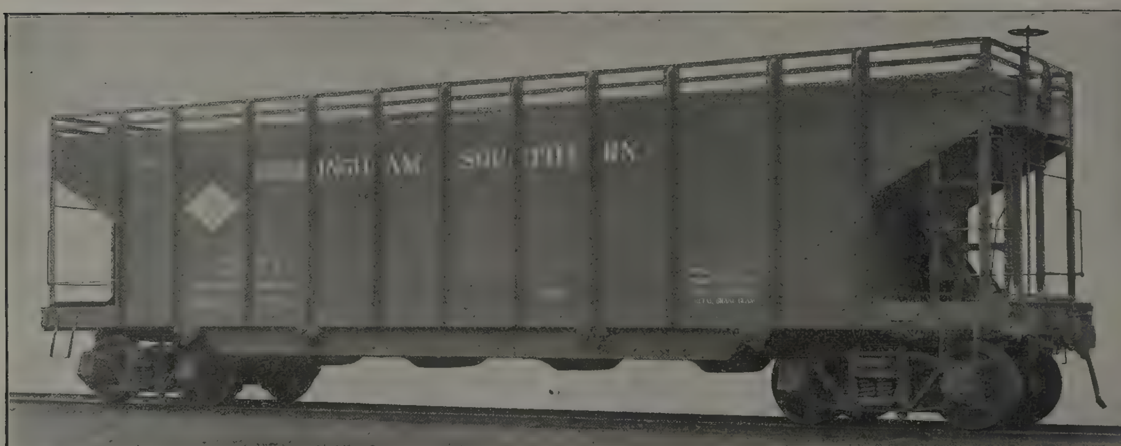


Fig. 68—All-Steel 70-Ton Capacity Hopper Car for Coke Traffic. Weight, 58,500 lb.; Inside Length, 40 ft.; Inside Width, 9 ft. 6 in.; Capacity Level Full, Cubic Feet, 2,851. Builder, Pressed Steel Car Company.

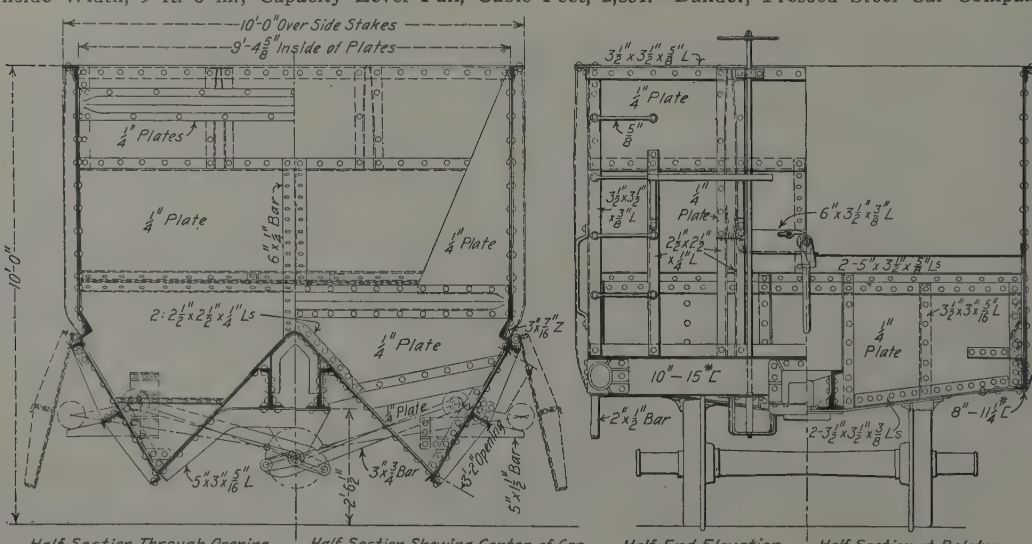


Fig. 69—Cross Sections and End Elevation of All-Steel Side Dump Coke Car Shown in Fig. 70.

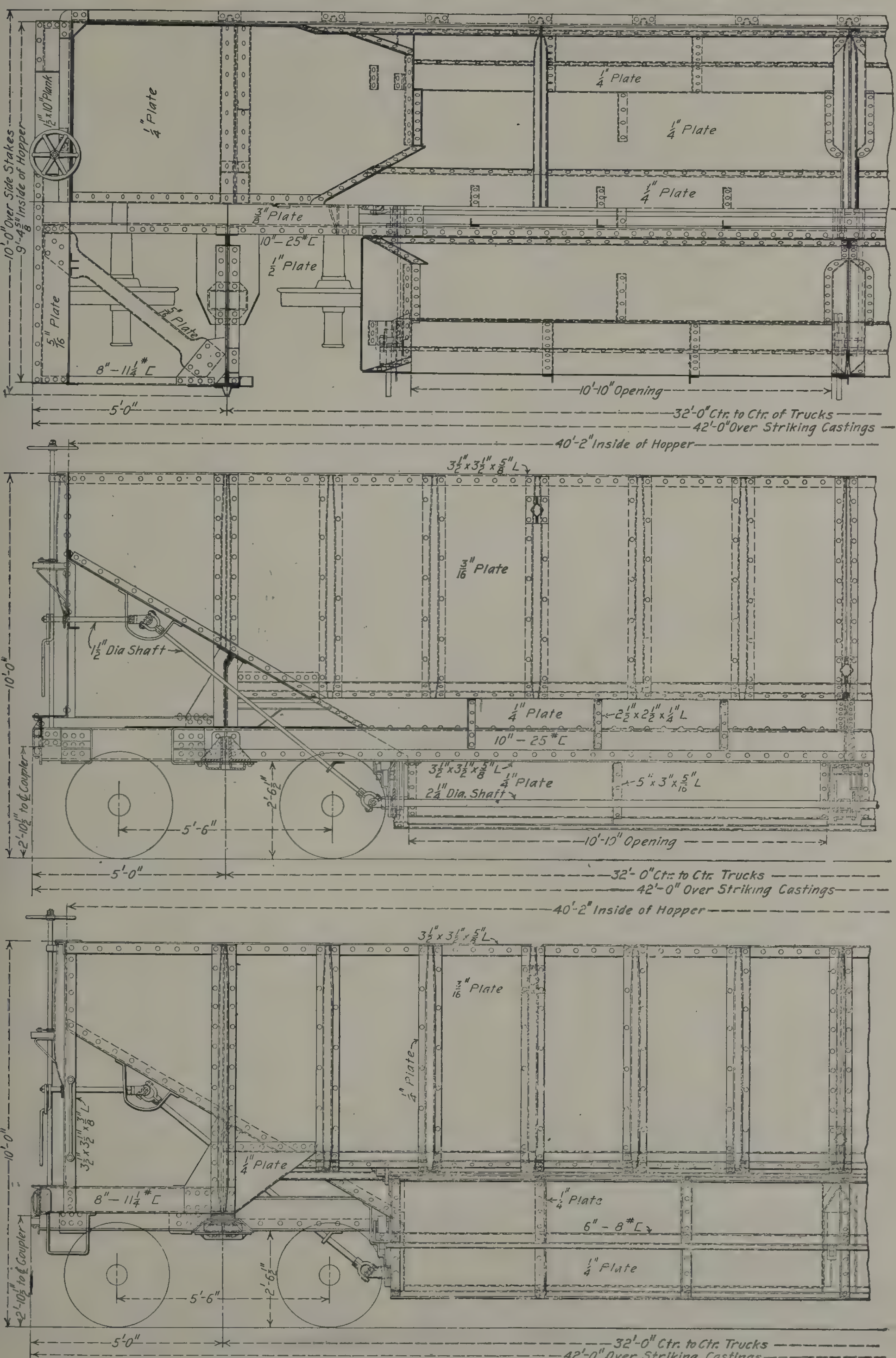


Fig. 70—All-Steel 50-Ton Capacity Side Dump Hopper Coke Car. Builder, Clark Car Company.

(See also Fig. 69.)

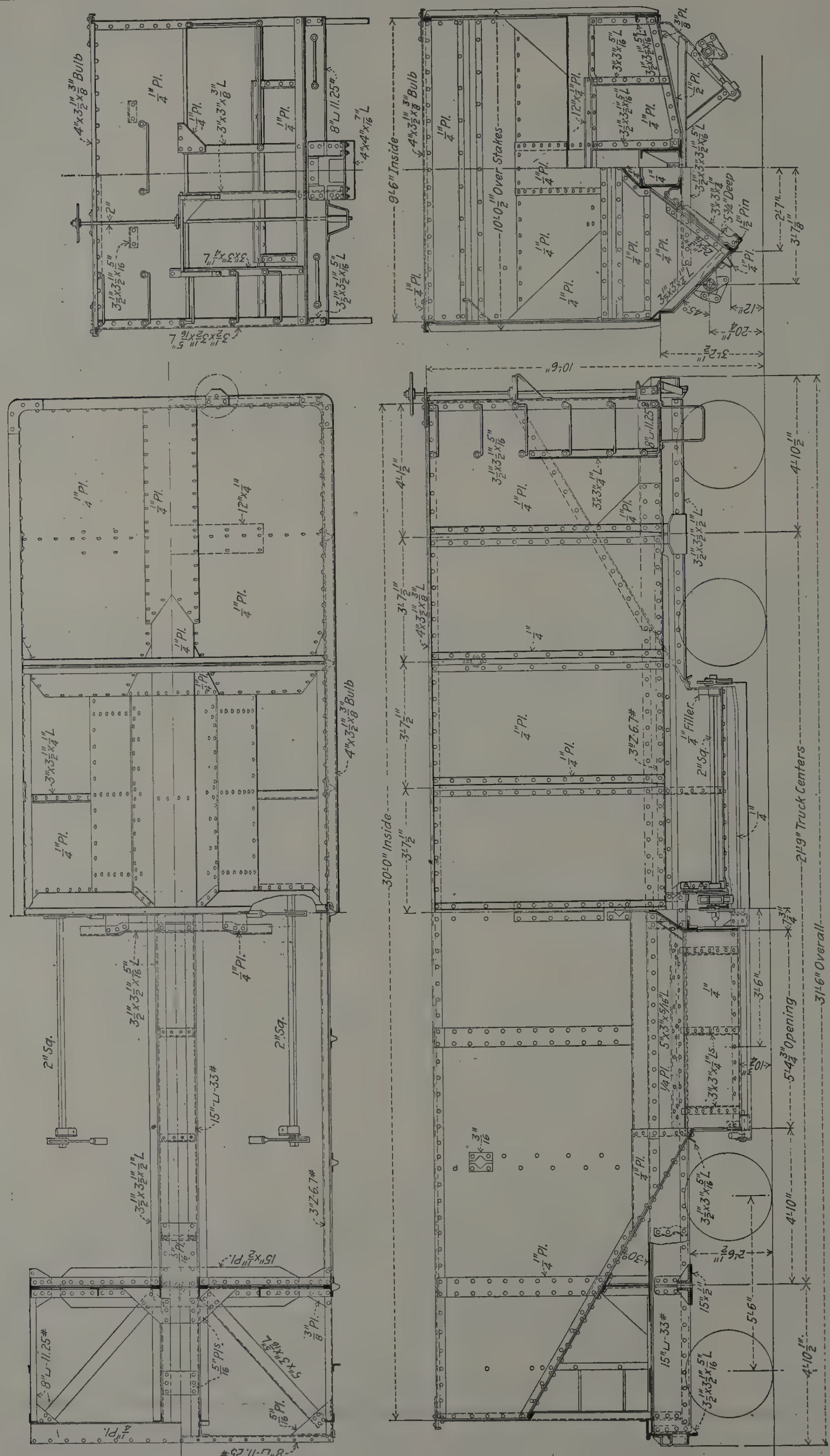


Fig. 71—All-Steel 55-Ton Center Discharge Hopper Car. Inside Length, 30 ft., 0 in.; Inside Width, 9 ft. 6 in. Builder, Enterprise Railway Equipment Company.

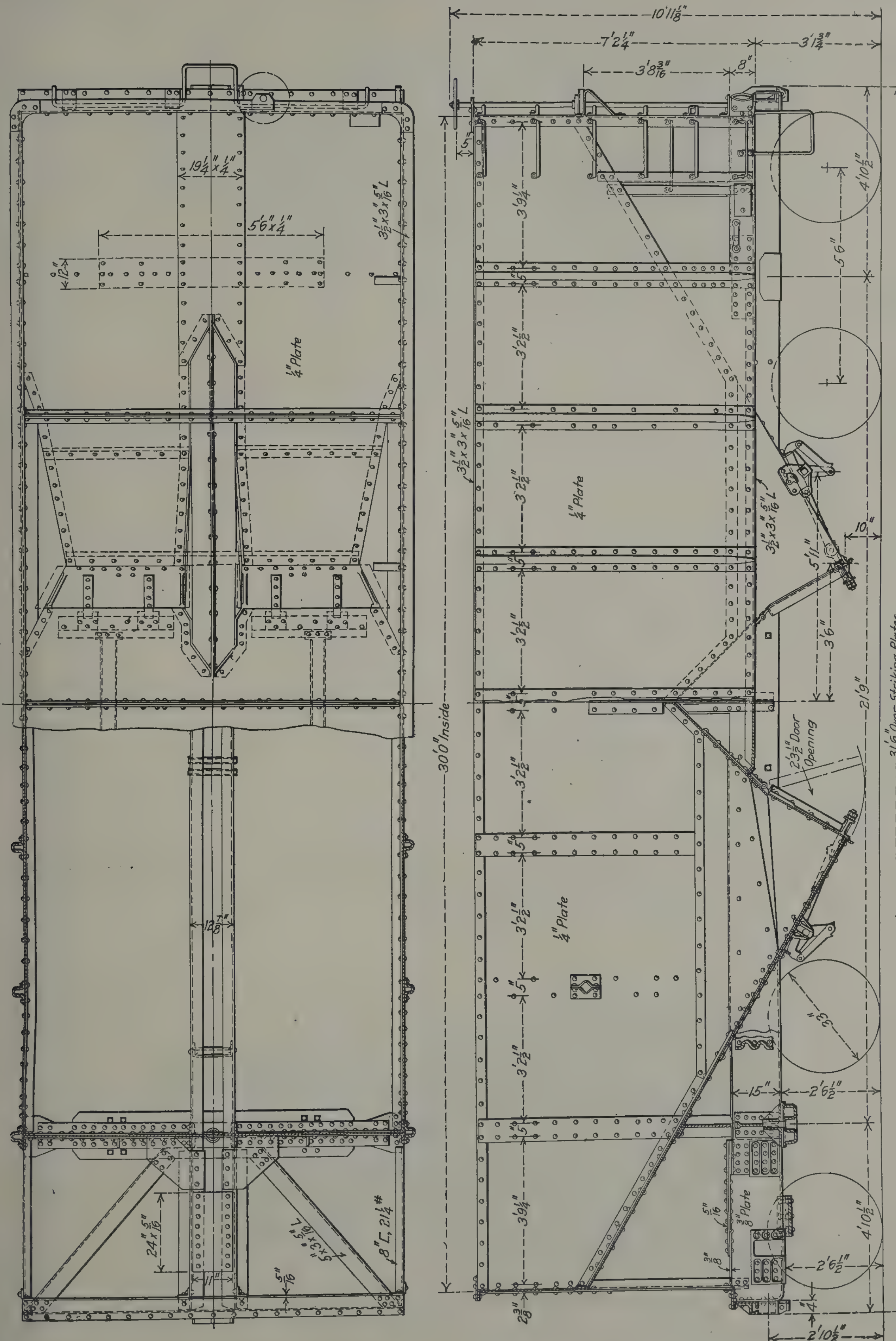


Fig. 72—Central Railroad of New Jersey All-Steel 50-Ton Capacity Hopper Car. Builder, Standard Steel Car Company.

Fig. 73—All-Steel 40-Ton Capacity Hopper Car for Coke Traffic. Weight, 41,000 lb.; Inside Length, 40 ft. 2¼ in.; Inside Width, 9 ft. 5 in. Builder, American Car & Foundry Company.

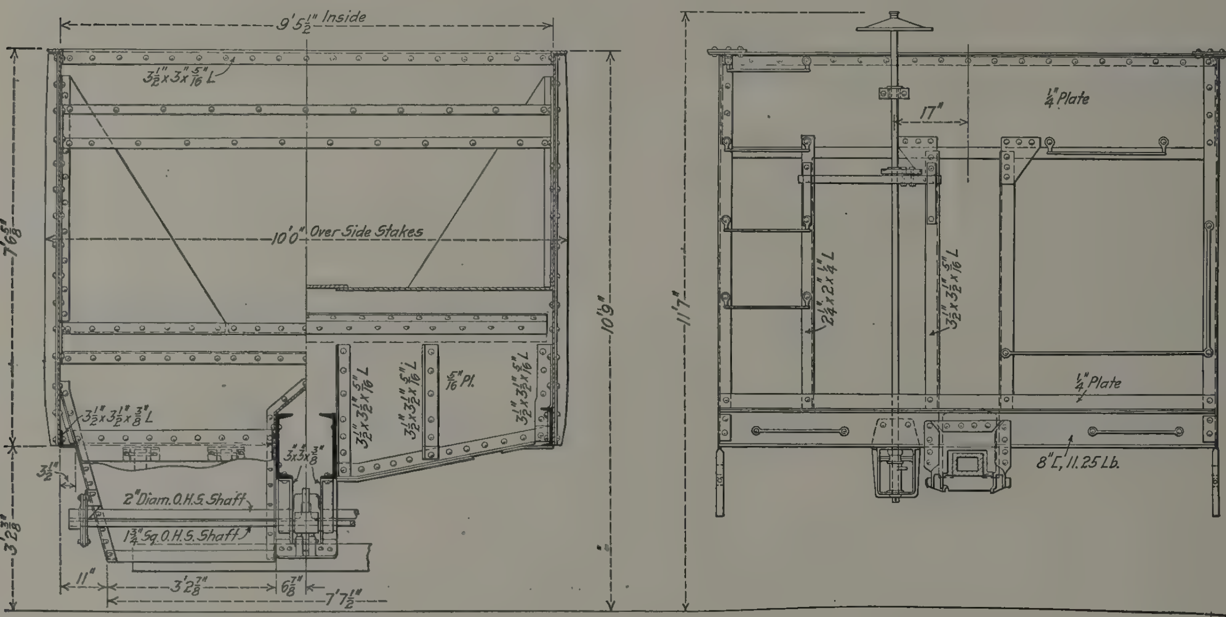


Fig. 74—Cross Sections and End Elevation of the Hillman Hopper Car Shown in Fig. 76.

Fig. 75—Steel-Frame 42½-Ton Capacity Hopper Car. Weight, 37,700 lb.; Inside Length, 32 ft.; Inside Width, 8 ft. 11 in. Capacity Level Full, Cubic Feet, 1,450. Builder, American Car & Foundry Company.

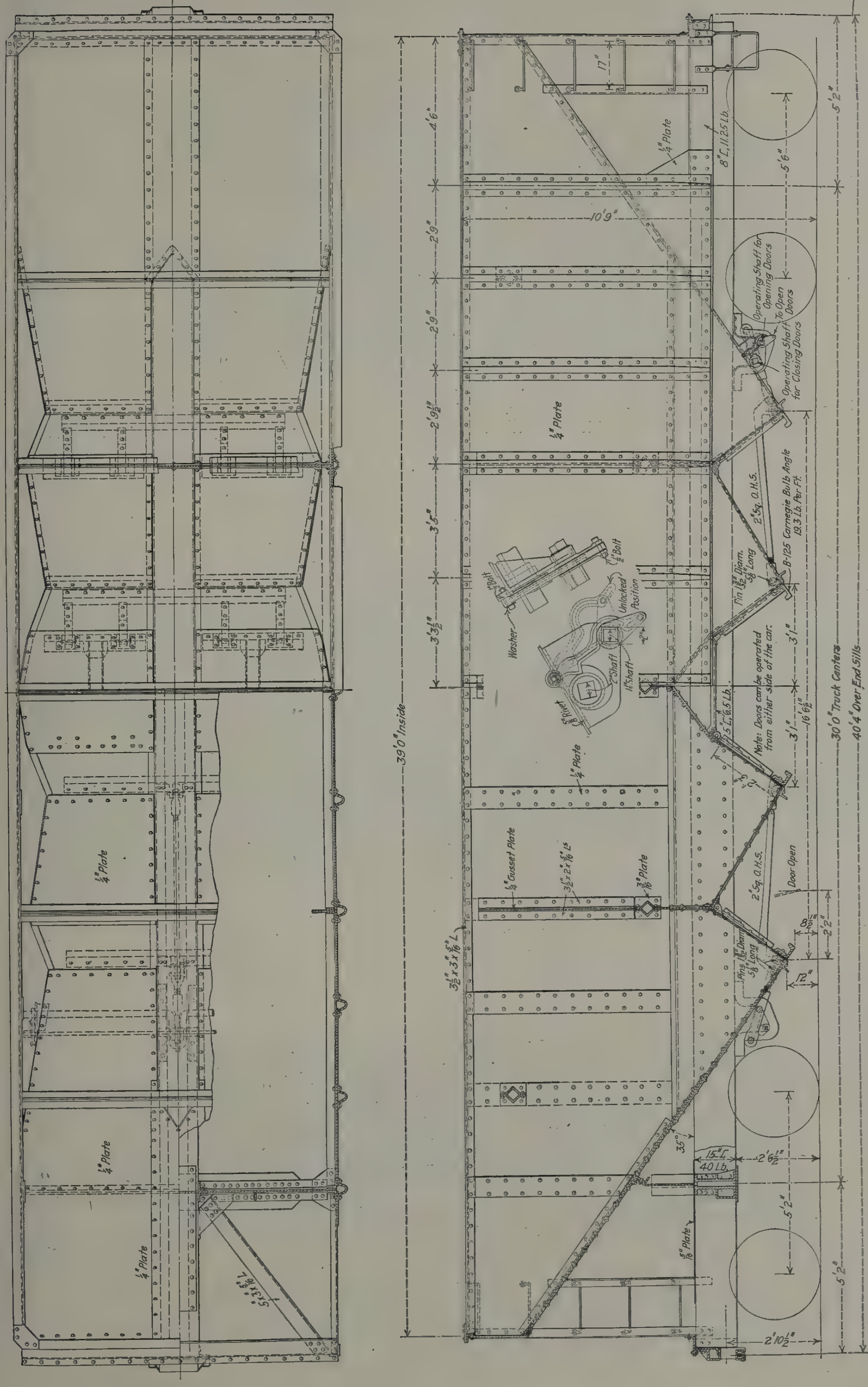


Fig. 76—Hillman 70-Ton Tandem Hopper Car. Insert Shows Hopper Door Operating and Locking Device. See Also Fig. 74. National Railway Appliance Company.

Fig. 77—All-Steel 50-Ton Capacity Hopper Car. Weight, 42,900 lb.; Inside Length, 36 ft.; Inside Width, 9 ft. 9 in. Capacity Level Full, Cubic Feet, 1,400. Built Under Clark Car Company Patents by the Ralston Steel Car Company.

Fig. 78—All-Steel 50-Ton 2,420 cu. ft., Capacity Hopper Car. Builder, The Bettendorf Company.

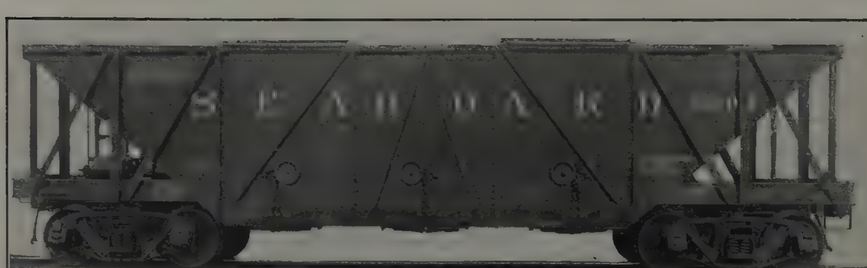


Fig. 79—All-Steel 50-Ton Capacity Hopper Car for Phosphate Traffic. Weight, 42,000 lb.; Inside Length, 34 ft.; Inside Width, 9 ft. 1⅝ in.; Length Over End Sills, 37 ft, 2 in.; Height, Rail to Top of Body, 9 ft. 8¾ in.; Extreme Height, 11 ft. 1¼ in. Capacity Level Full, Cubic Feet, 1,615. Builder, The Barney & Smith Car Company.

Hopper Car Parts.

1 *Draft Sill*
2 *Center Sill*
3 *Center Sill Top Cover Plate*
4 *End Sill*
5 *Draft Plate or Cheek Casting*
6 *Body Center Plates*
7 *Body Bolster*
8 *Cross Bearer*
9 *Diagonal or Corner Brace*
10 *Push Pole Pocket*
11 *Striking Plate*
12 *Uncoupling Lever*
13 *Coupler*
14 *Brake Mast*
15 *Hand Brake Wheel*
16 *Hopper Door*
17 *Door Operating Gear*
18 *Slope Floor Sheet*
19 *End Sheet*
20 *Side Sheets*
21 *Side Stake*
22 *Coupler Carrier*
23 *Corner Post Grab Iron*
24 *Side Sill Step*
25 *Brake Step*
26 *Brake Ratchet Wheel*
27 *Top Side Angle of Coke Rack*
28 *Wheel*
29 *Corner Post*
30 *Gusset; Cross Ridge to Side*
31 *Body Cross Tie*
32 *Intermediate Side Angles of Coke Rack*

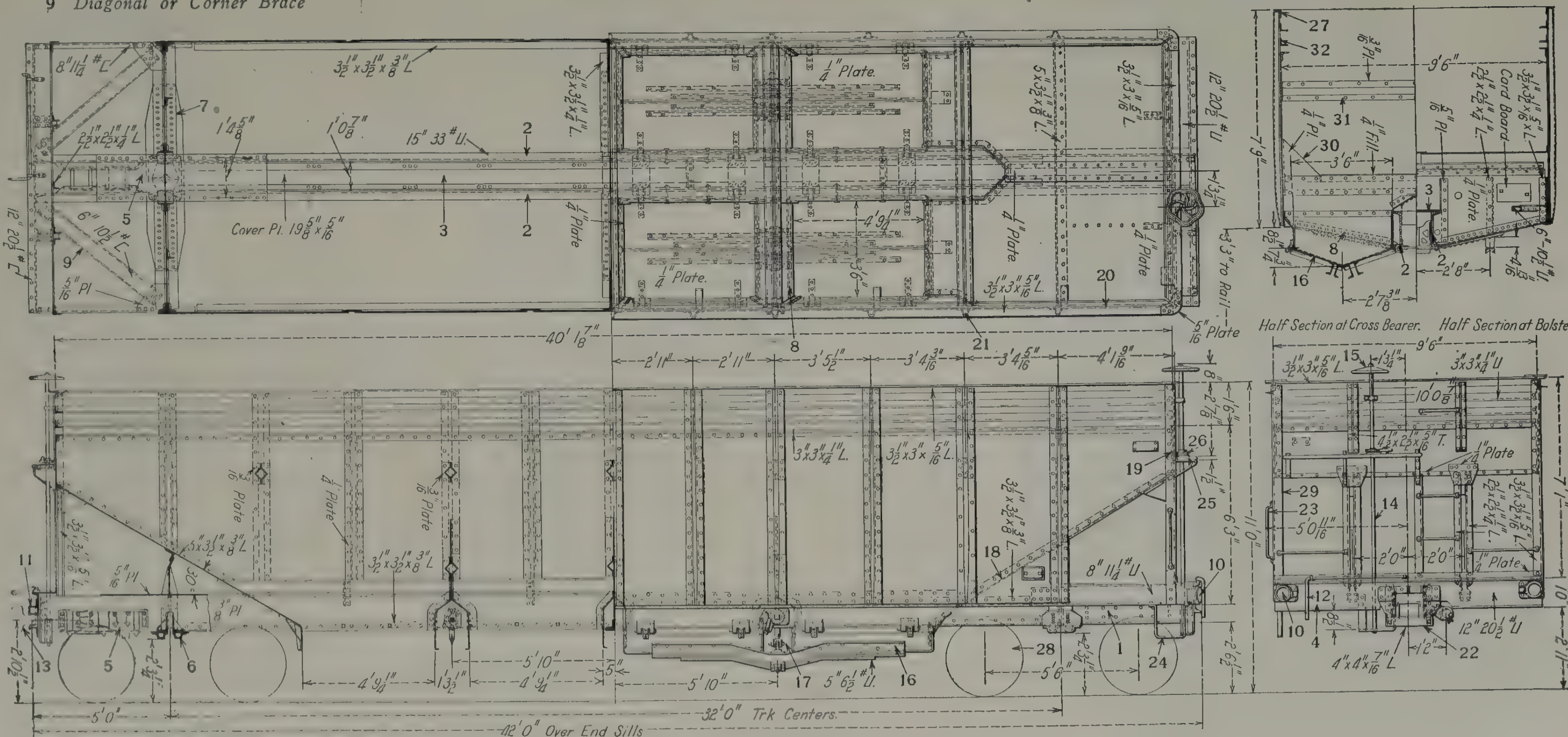


Fig. 80—Southern Railway All-Steel 50-Ton Capacity Hopper Coke Car. Builder, Cambria Steel Company.

Fig. 81—Wooden Hopper Car with Steel Center Sill and Bolsters Capacity 57½ Tons, 1,980 cu. ft.; Inside Length, 33 ft. 4⅞ in.; Inside Width, 9 ft. 2¼ in. Builder, Norfolk & Western Railway.

(*See Figs.* 82-83.)

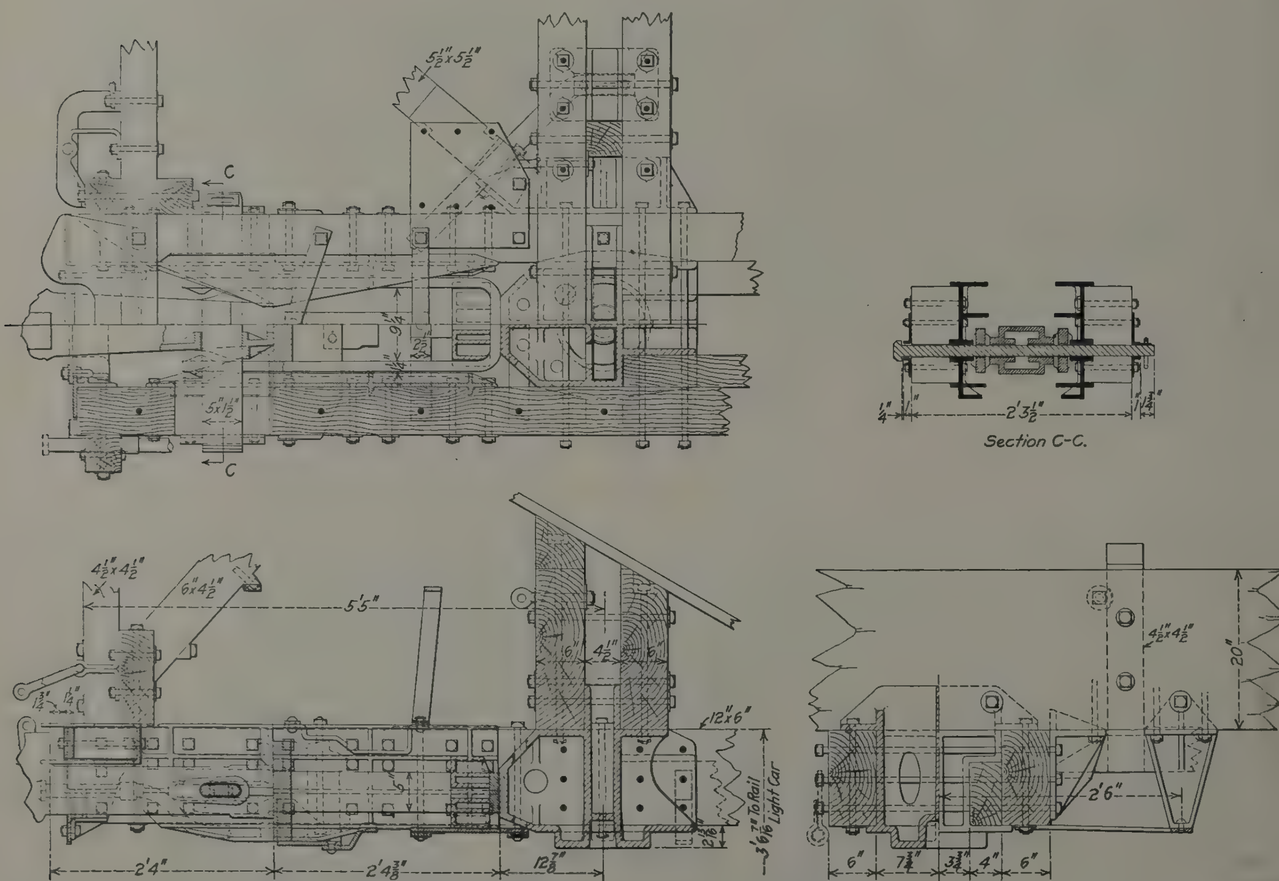


Fig. 82—Draft Gear and Bolster Details. Wooden Hopper Car Shown in Figs. 81 and 83.

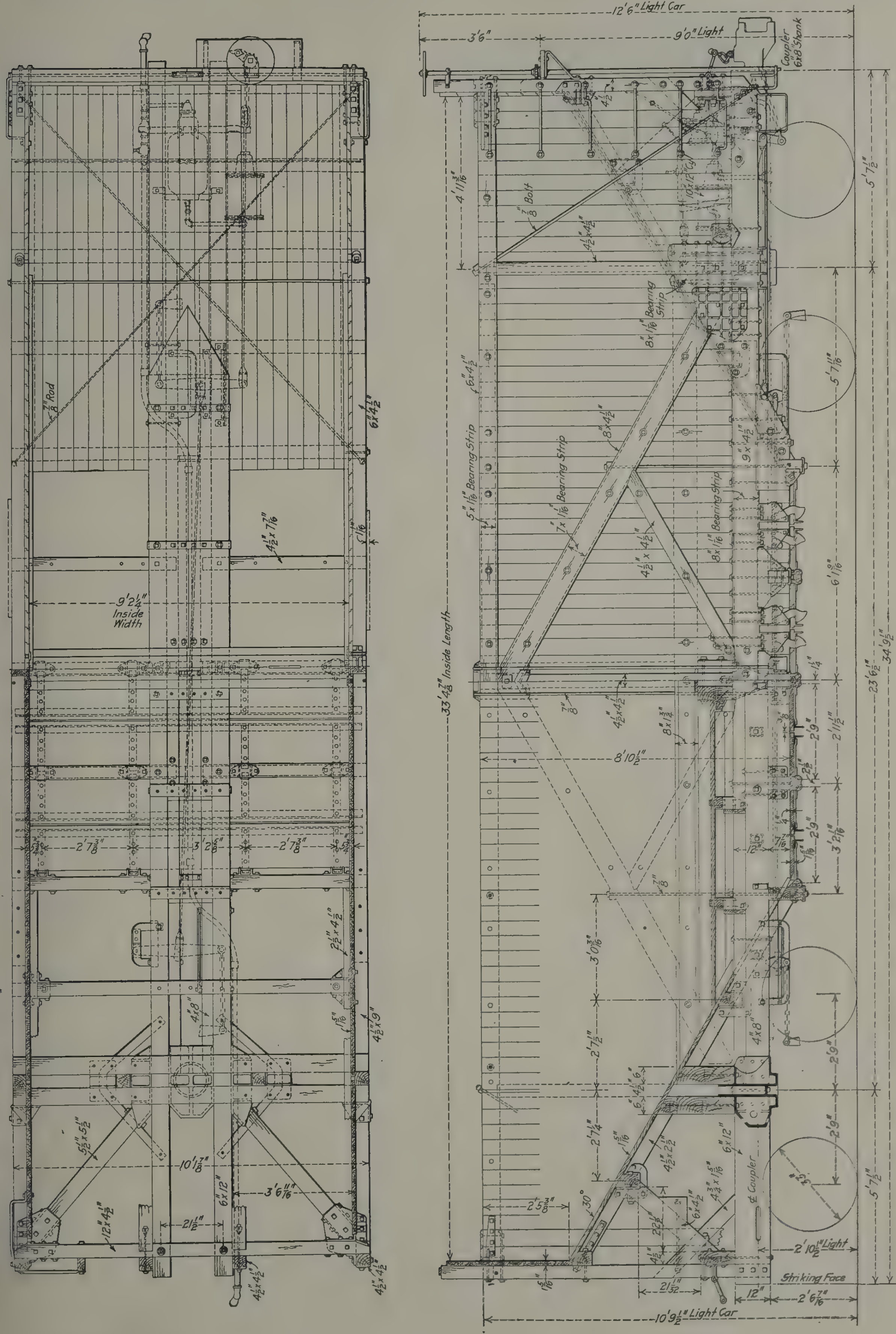


Fig. 83—Plan and Elevation of the Norfolk & Western Wooden Hopper Car Shown in Figs. 81-82.

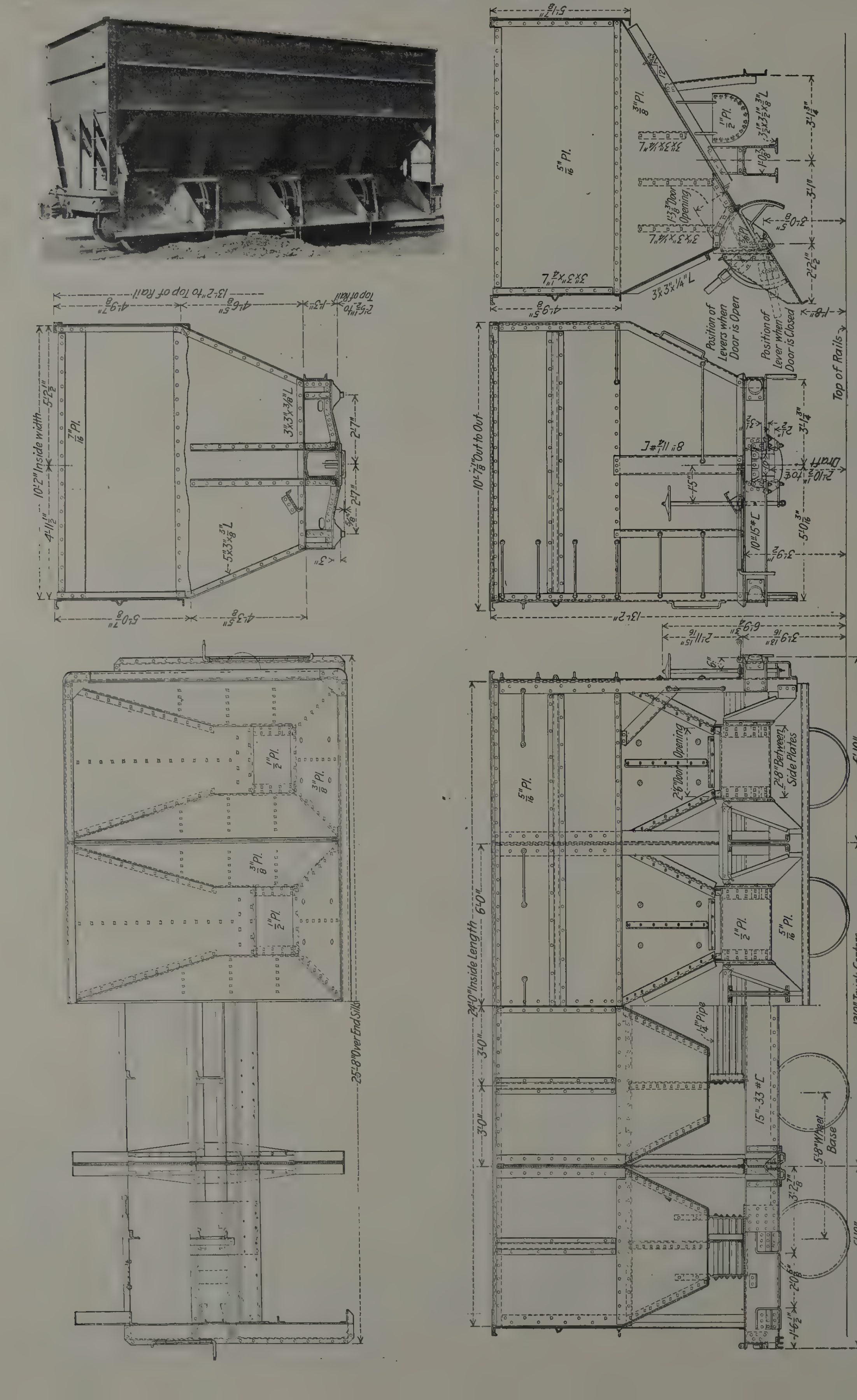


Fig. 84—All-Steel 100-Ton, 1,540 cu. ft. Capacity, Ore Hopper Car. Builder, Cambria Steel Company.

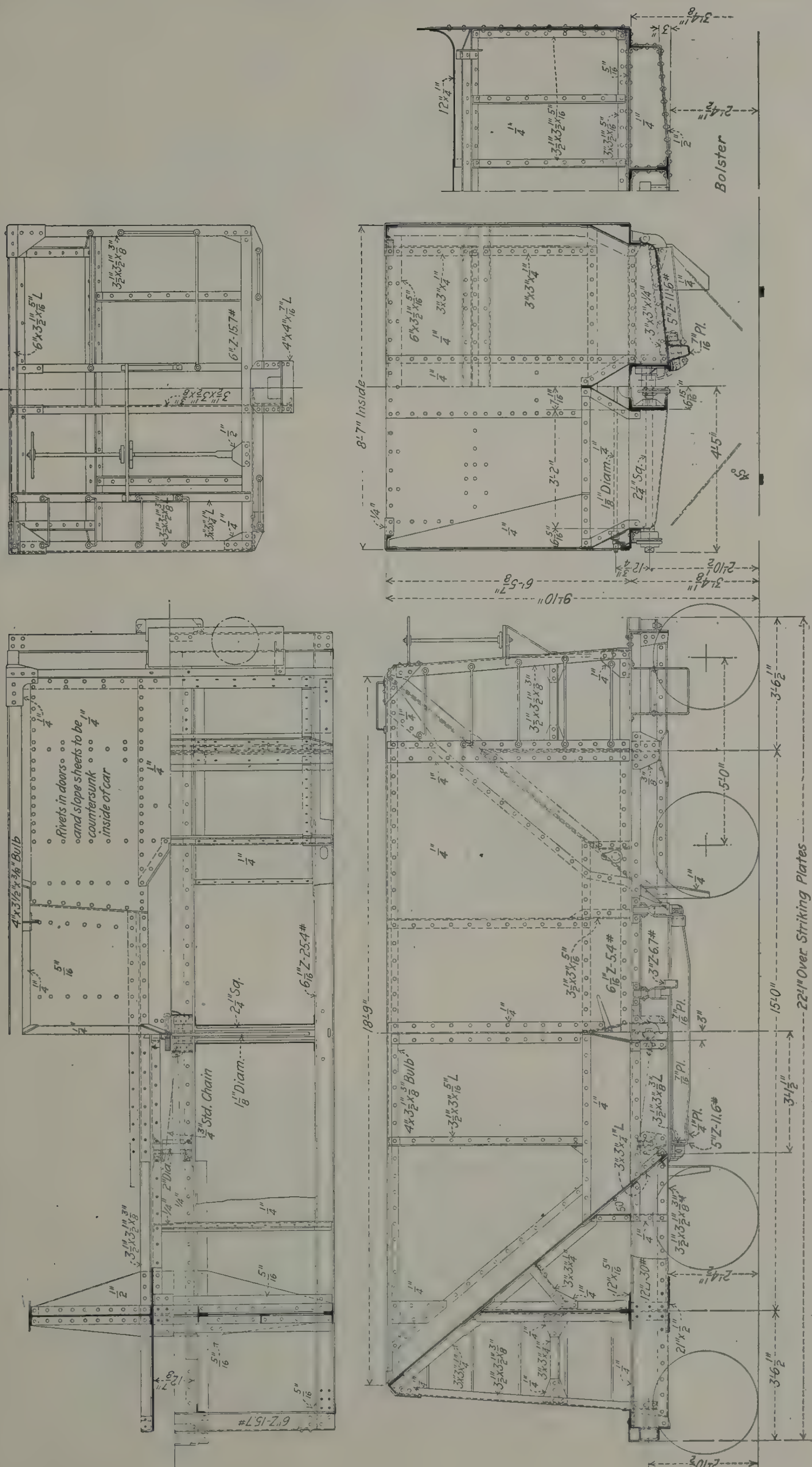


Fig. 85—All-Steel 55-Ton Ore Hopper Car. Inside Length, 18 ft. 9 in.; Inside Width, 8 ft. 7 in. Builder, Enterprise Railway Equipment Company.

Fig. 86—All-Steel 50-Ton Capacity Hopper Car for Coke Traffic. Weight, 47,500 lb.; Inside Length, 40 ft. 5 in.; Inside Width, 9 ft. 7 in. Builder, Pressed Steel Car Company.

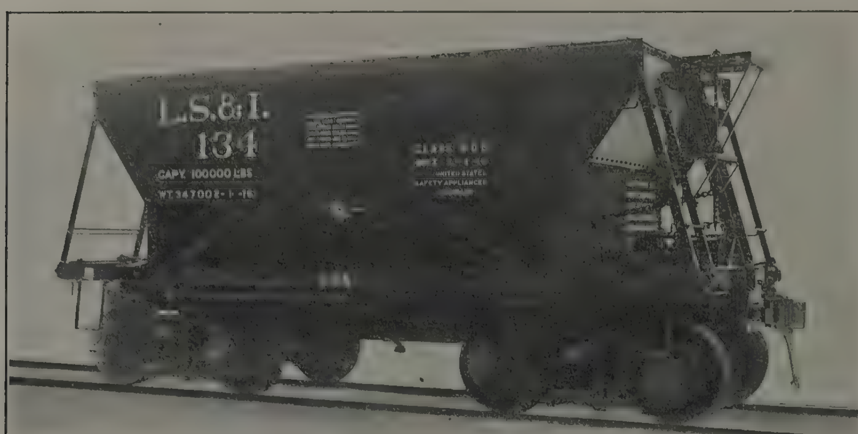


Fig. 87—All-Steel 50-Ton Capacity Ore Hopper Car. Weight, 34,700 lb. Builder, Clark Car Company.

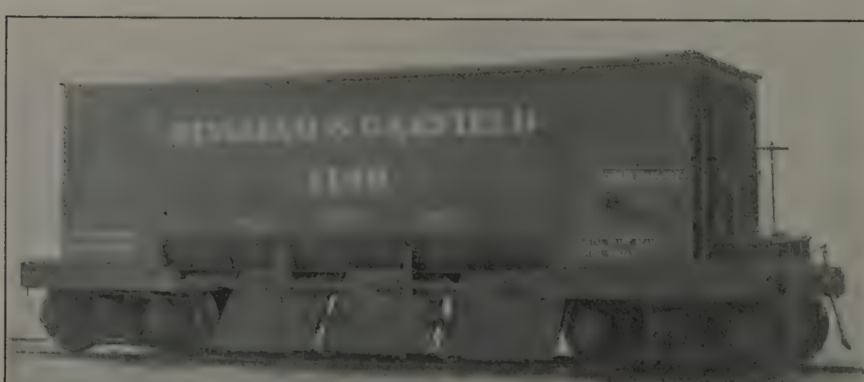


Fig. 88—All-Steel 60-Ton Capacity Ore Car. Weight, 42,300 lb.; Inside Length, 23 ft. 10⅜ in.; Inside Width, 9 ft. 10 in.; Inside Height, 6 ft. 9½ in. Builder, Pressed Steel Car Company.

(See Fig. 89.)

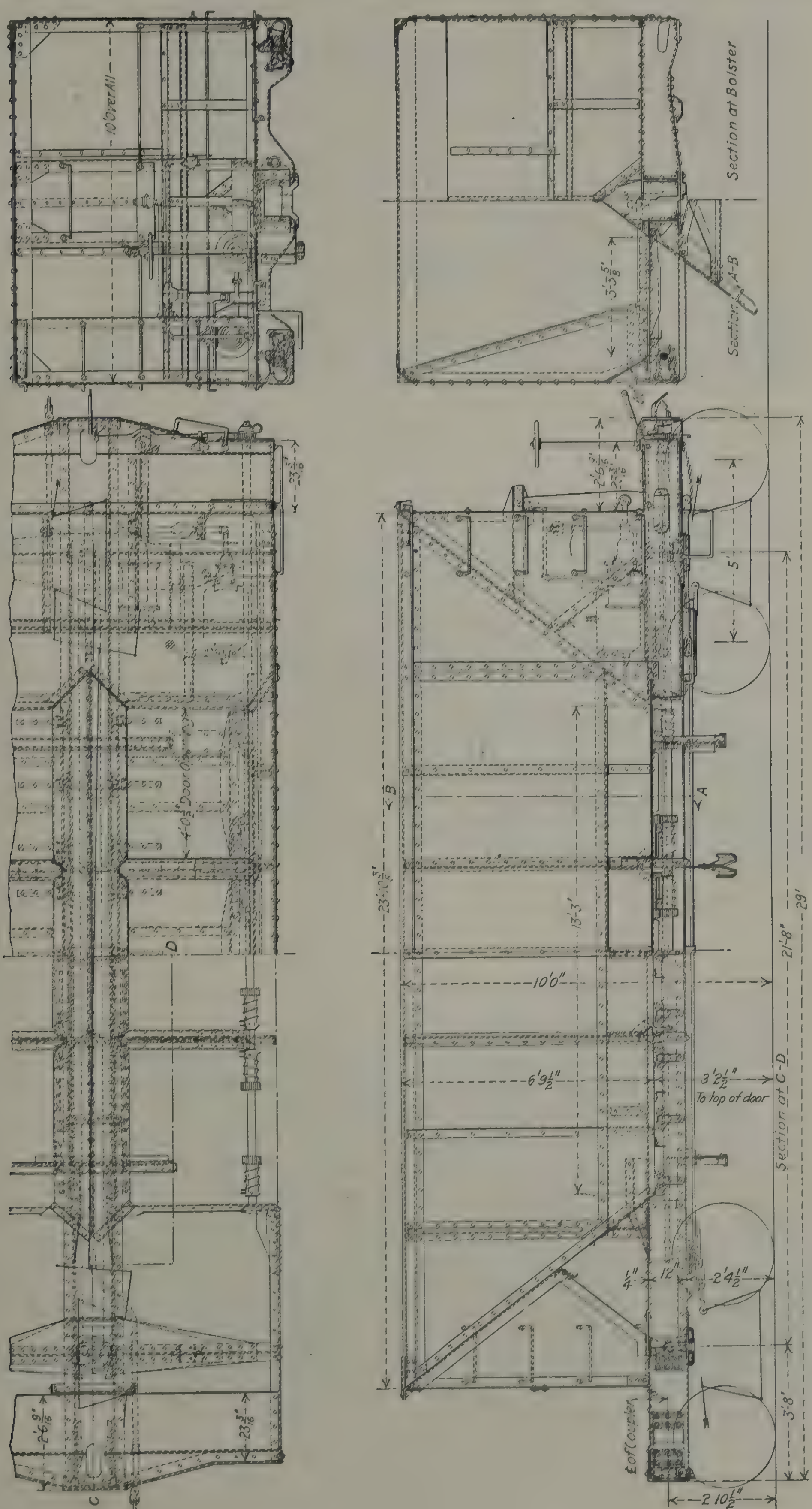


Fig. 89—Bingham & Garfield All-Steel 60-Ton Capacity Hopper Ore Car Shown in Fig. 88. Builder, Pressed Steel Car Company.

Fig. 90—All-Steel 50-Ton Capacity Ore Car. Weight, 34,600 lb. Inside Length, 18 ft. 6 in.; Inside Width, 8 ft. 6 in. Builder, Standard Steel Car Company.

Fig. 91—All-Steel 50-Ton Capacity Ore Car. Weight, 34,200 lb.; Inside Length, 17 ft. 5 in.; Inside Width, 8 ft. 10 in. Capacity Level Full, Cubic Feet, 704. Builder, Western Steel Car & Foundry Company.

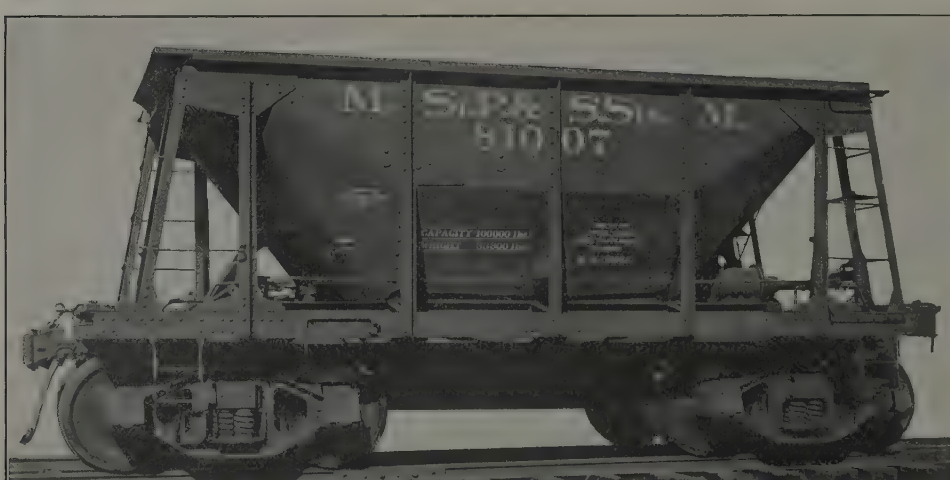


Fig. 92—All-Steel 50-Ton Capacity, Ore Hopper Car. Weight, 33,300 lb. Builder, American Car & Foundry Company.

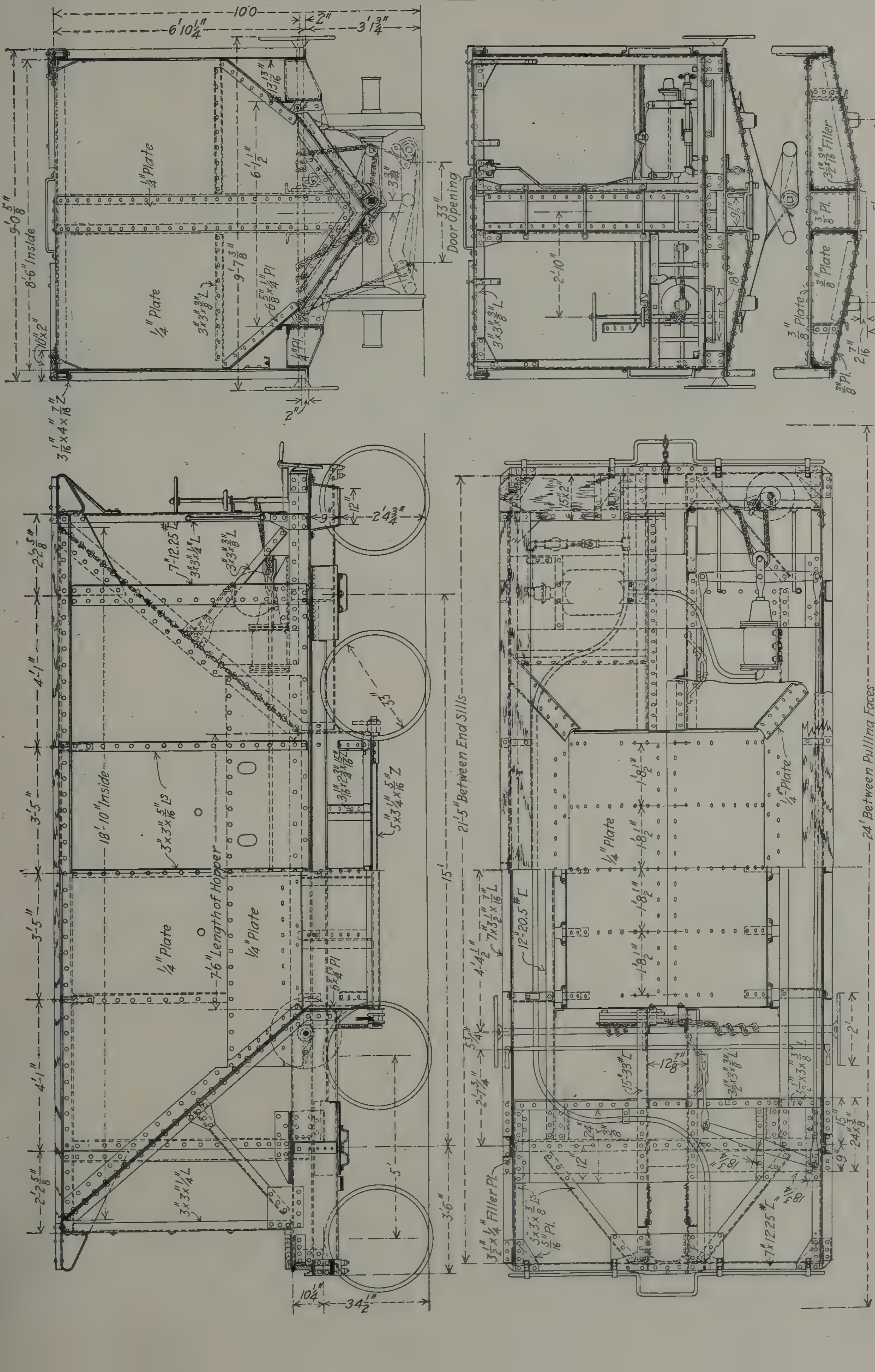


Fig. 93—All-Steel 50-Ton Capacity Hopper Ore Car. Builder, National Dump Car Company.

Fig. 94—30-Ton Capacity Calcine Hopper Car. Builder, The Youngstown Steel Car Company.

(*See Figs.* 95-97.)

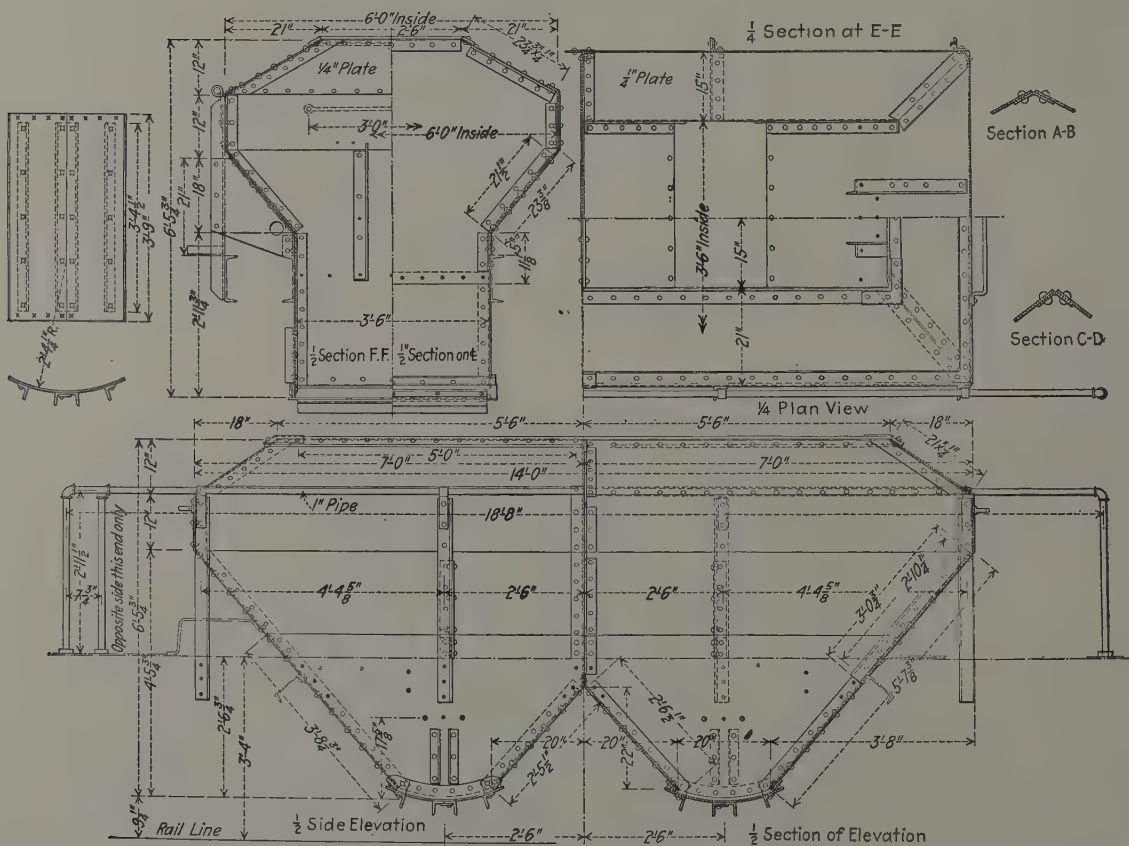


Fig. 95—Steel Body for Calcine Hopper Car Shown in Figs. 94, 96, 97.

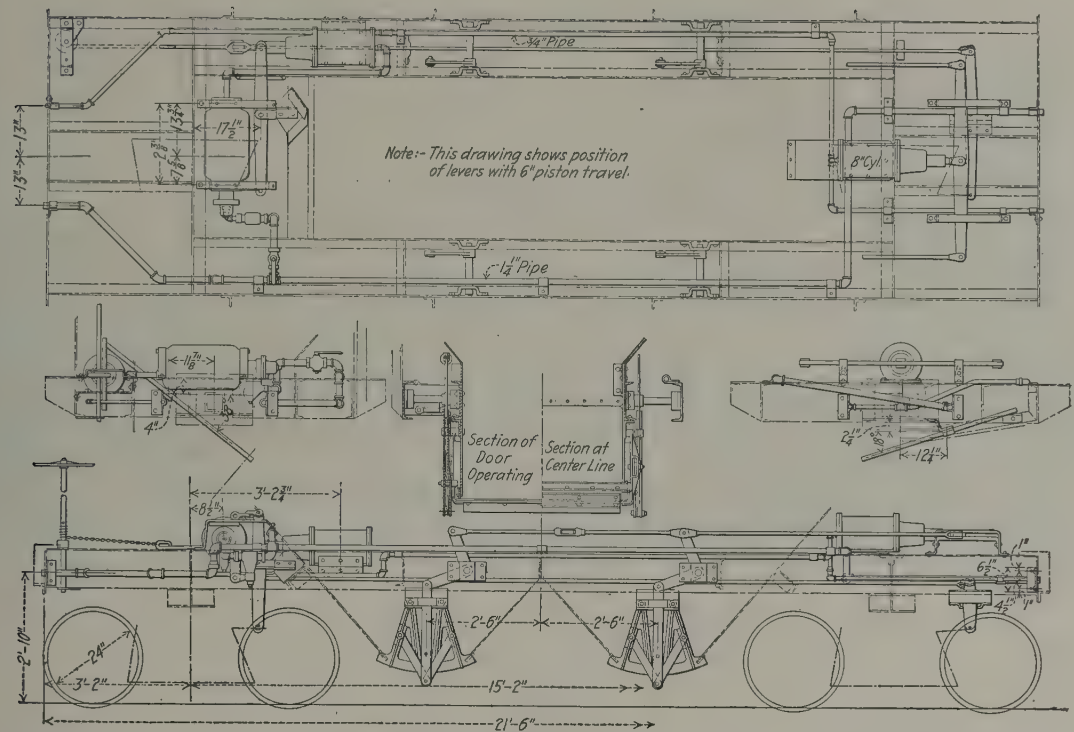


Fig. 96—Air Brake and Door Operating Mechanism for Calcine Hopper Car Shown in Figs. 94, 95, 97.

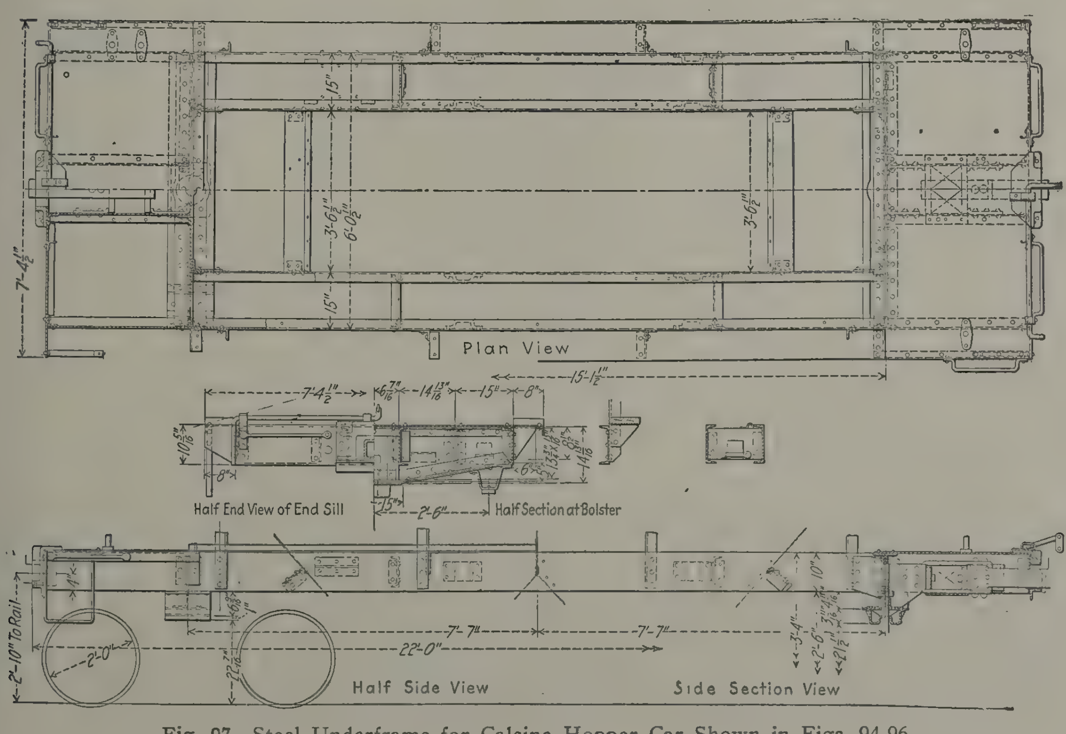


Fig. 97—Steel Underframe for Calcine Hopper Car Shown in Figs. 94-96.

Fig. 98—All-Steel 120-Ton, 3,785 cu. ft. Capacity Flat Bottom Gondola Car. Weight, 73,900 lb.; Inside Length, 50 ft. 0 in.; Inside Width, 9 ft. 8½ in.; Inside Height at Ends, 7 ft. 3¾ in. Builder, Virginia Bridge & Iron Company.

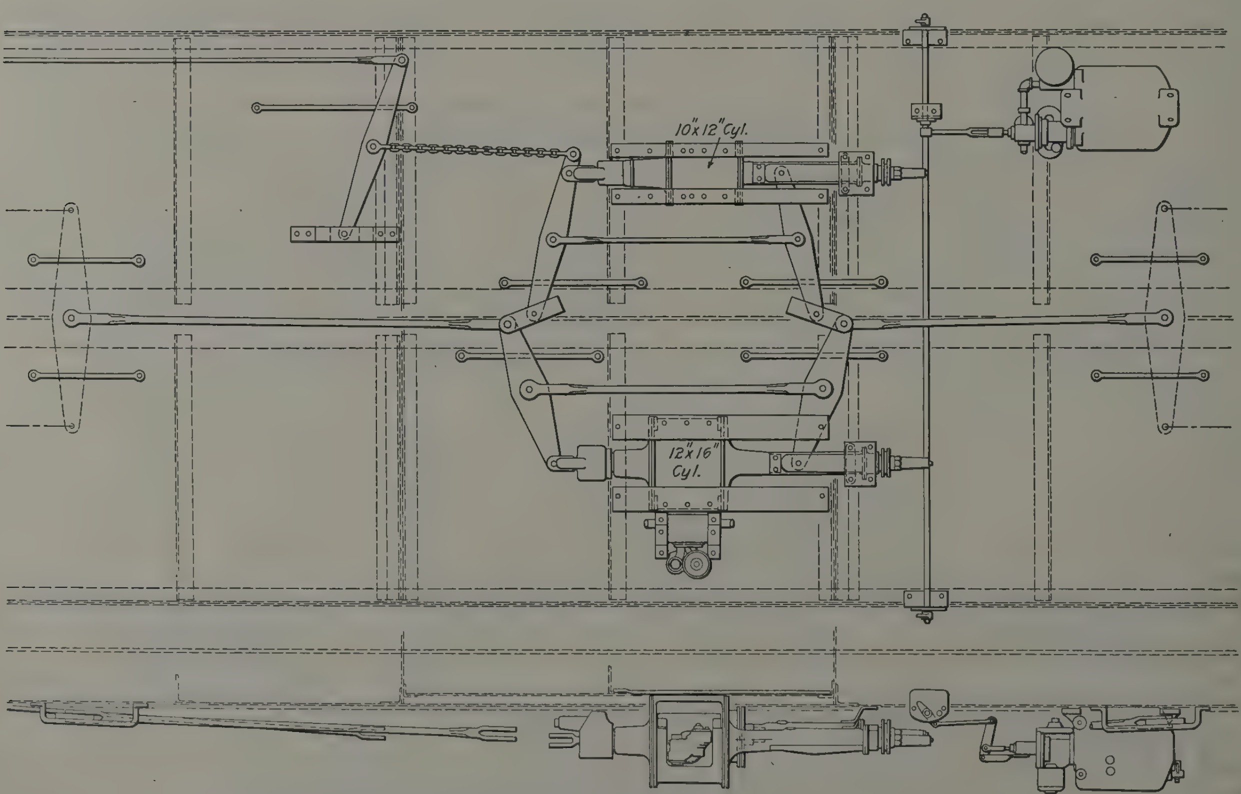


Fig. 99—Brake Connections, 120-Ton Gondola Car Shown in Figs. 98, 100 and 101.

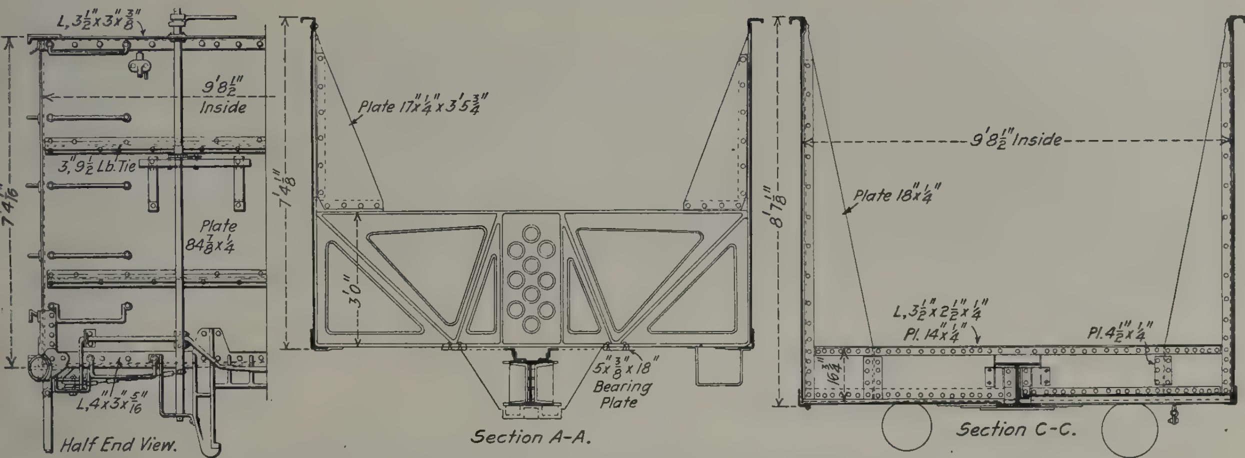


Fig. 100—End View and Cross Section 120-Ton Gondola Car Shown in Figs. 98, 99, 101.

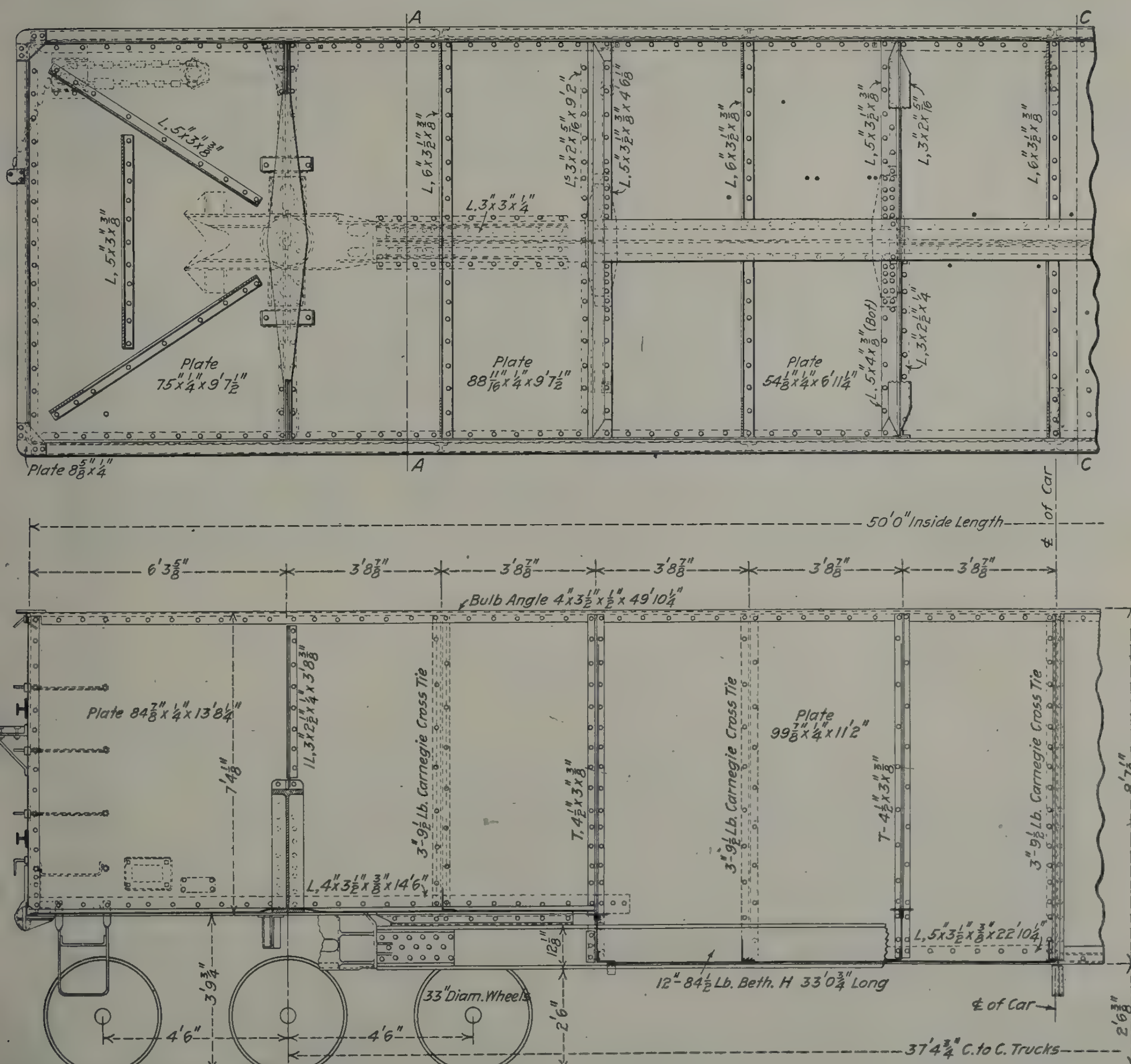


Fig. 101—Plan and Elevation, 120-Ton Gondola Car Shown in Figs. 98-101.

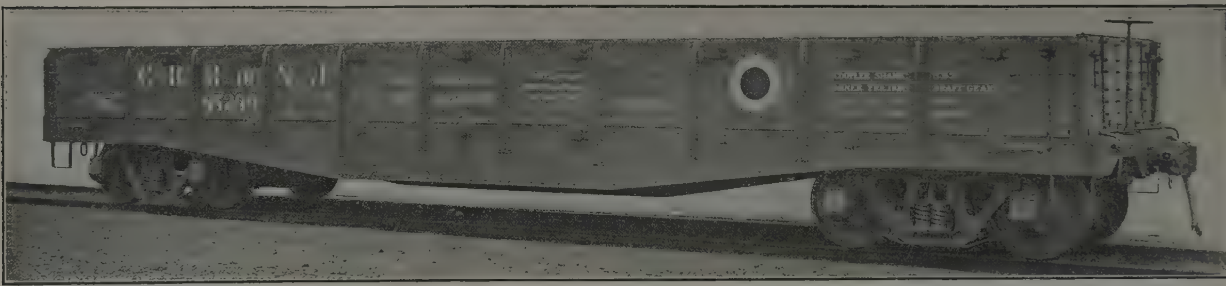


Fig. 102—Steel Underframe 50-Ton Capacity Gondola Car with Drop Ends. Weight, 44,100 lb.; Inside Length, 40 ft.; Inside Width, 8 ft. 6 in.; Inside Height, 2 ft. 6 in. Builder, American Car & Foundry Company. (*See Fig.* 106.)

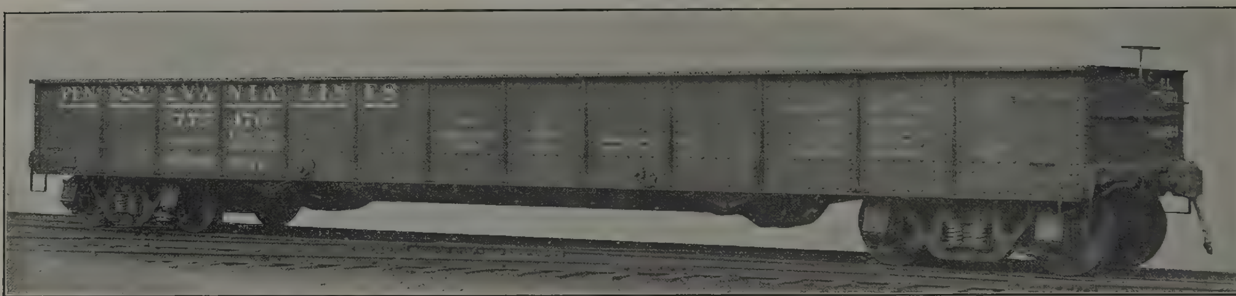


Fig. 103—All-Steel 70-Ton Capacity Gondola Car. Weight, 49,500 lb.; Inside Length, 46 ft. 2½ in.; Inside Width, 9 ft. 3½ in. Builder, Pressed Steel Car Company.

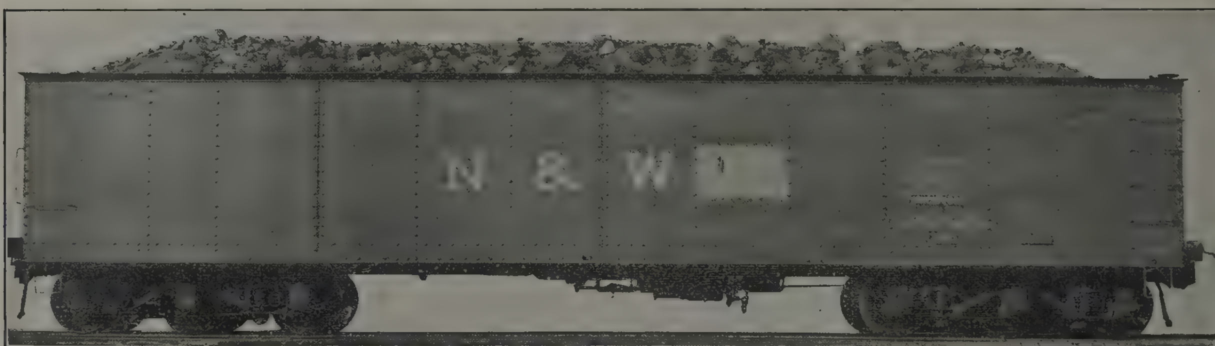


Fig. 104—All-Steel 90-Ton Capacity Gondola Car with Drop-Bottom Doors. Weight, 65,200 lb.; Inside Length, 45 ft. 6 in.; Inside Width, 9 ft. 6 in.; Inside Height, 6 ft. 6 in. Builder, Norfolk & Western Railway.

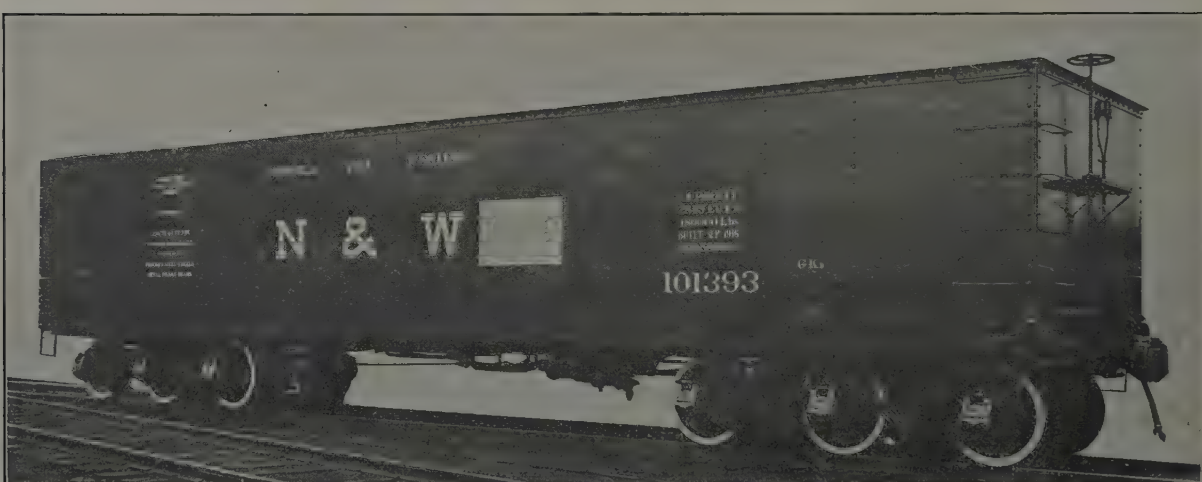


Fig. 105—All-Steel 100-Ton Capacity Gondola Car. Weight, 58,000 lb.; Inside Length, 44 ft. 3 in.; Inside Width, 9 ft. 6 in. Builder, Norfolk & Western Railway.

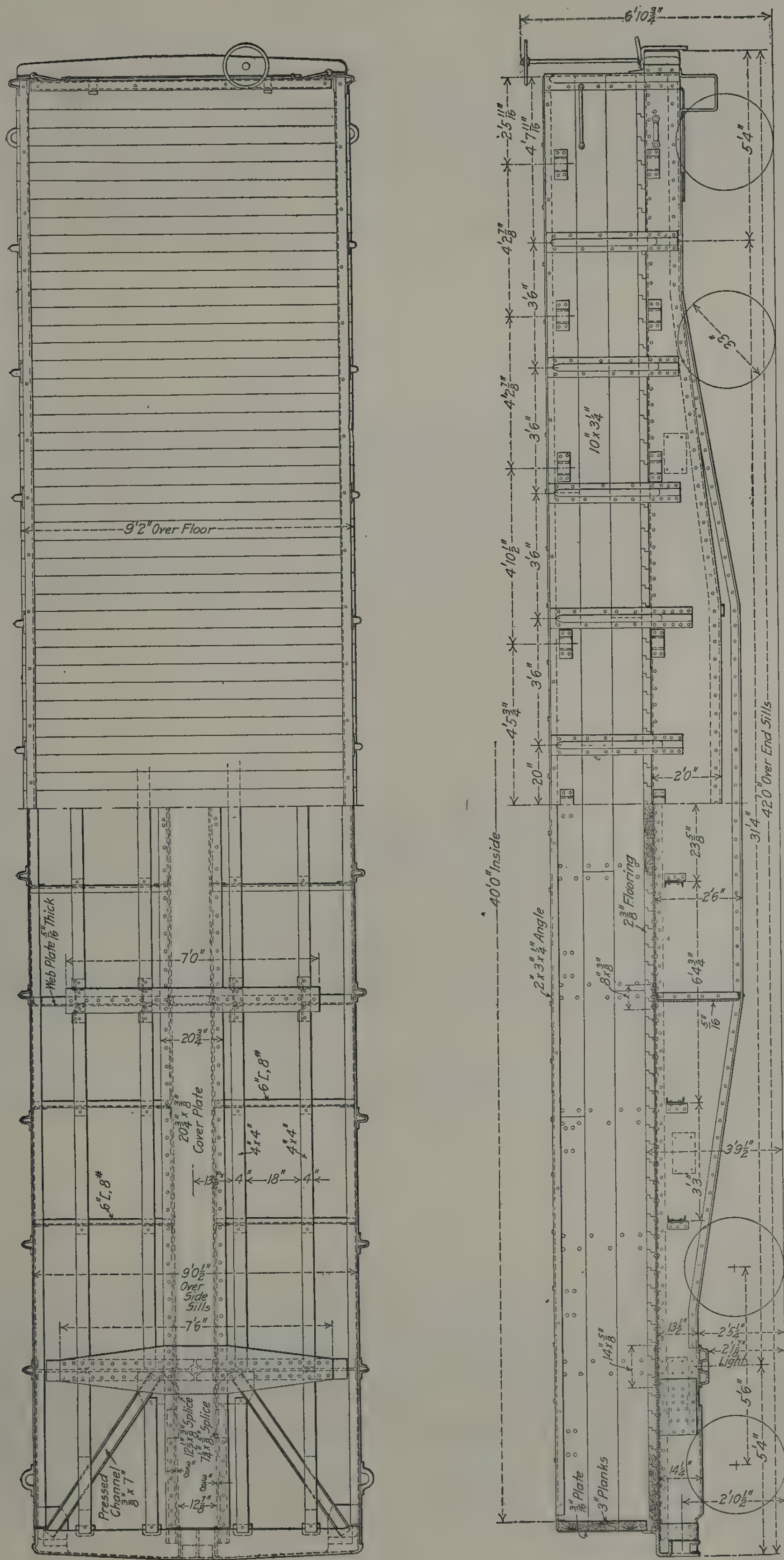


Fig. 106—Central Railroad of New Jersey Steel Underframe 50-Ton Capacity Gondola Car. See Also Fig. 102. Builder, American Car & Foundry Company.

Fig. 107—All-Steel 50-Ton Capacity Drop-Bottom Gondola Car. Weight, 44,600 lb.; Inside Length, 41 ft.; Inside Width, 9 ft. 2 in.; Inside Height, 4 ft. 2 in. Builder, Pressed Steel Car Company.

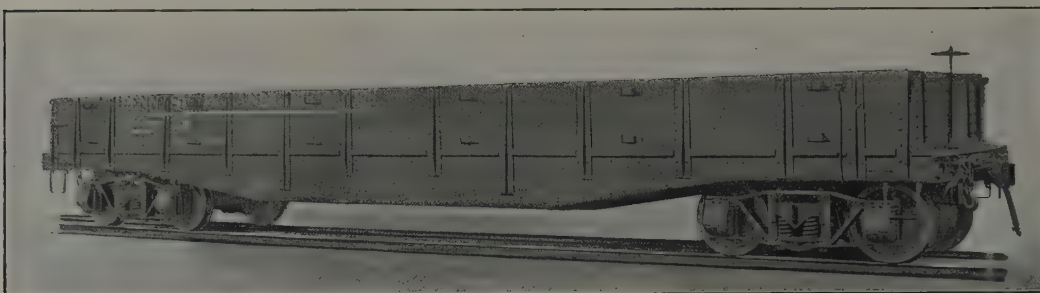


Fig. 108—Steel Frame 50-Ton Capacity Solid Bottom Gondola Car with Drop Ends. Weight, 52,000 lb.; Inside Length, 40 ft. 8 in.; Inside Width, 8 ft. 9¼ in.; Inside Height, 2 ft. 6¼ in.; Capacity Level Full, Cubic Feet, 897. Builder, American Car & Foundry Company.

Fig. 109—All-Steel 50-Ton Capacity Side Dump Hopper Bottom Gondola Car with Air Operating Device. Weight, 47,800 lb.; Inside Length, 30 ft. 1 in.; Inside Width, 8 ft. 6½ in. Capacity, Level Full, Cubic Feet, 980. Builder, Pressed Steel Car Company.

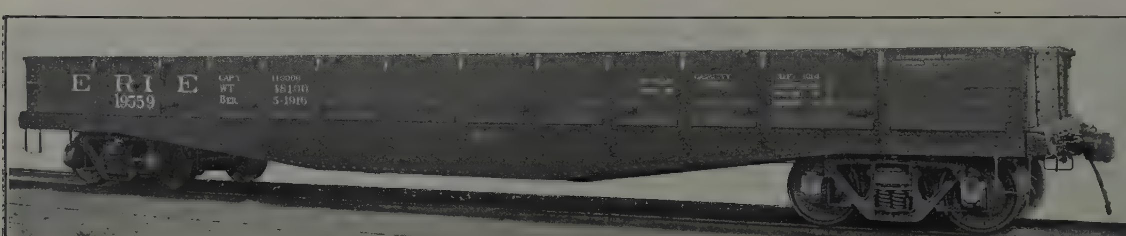


Fig. 110—Steel Frame 55-Ton Low Side, Drop End Gondola Car. Weight, 48,100 lb.; Inside Length, 45 ft. 11½ in.; Inside Width, 8 ft. 9 in.; Inside Height, 2 ft. 6¼ in. Builder, American Car & Foundry Company.

Gondola Car Parts.

1	*Center Sill*	6	*End Stiffener*	11	*Crossbearer*	16	*Drawbar*
2	*Side Sill*	7	*Side Stake*	13	*Striking Casting*	17	*Hand Brake Shaft*
3	*End Sill*	8	*Drop Door*	14	*Center Plate*	18	*Hand Brake Step*
4	*Side Sheet*	9	*Door-Operating Gear*	15	*Draft Castings*	19	*Truck*
5	*End Sheet*	10	*Body Bolster*				

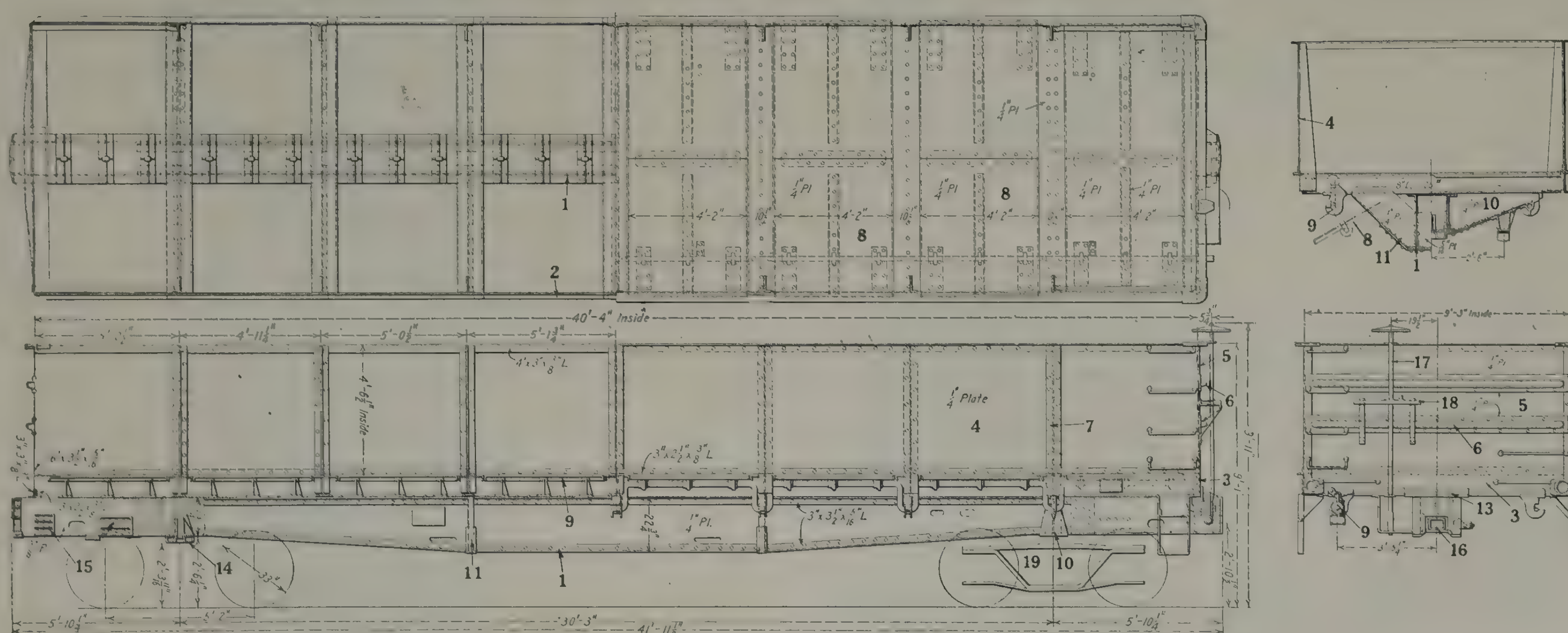


Fig. 111—Kanawha & Michigan Railway 50-Ton Capacity Drop Bottom Gondola Car. Builder, Ralston Steel Car Company.

Fig. 112—Car Shown in Fig. 114 with Drop Bottom Arranged for Use as Coal Car.

Fig. 113—Car Shown in Fig. 114, Arranged for Use as a Center Dumping Ballast Car.

(*See Figs.* 114-115.)

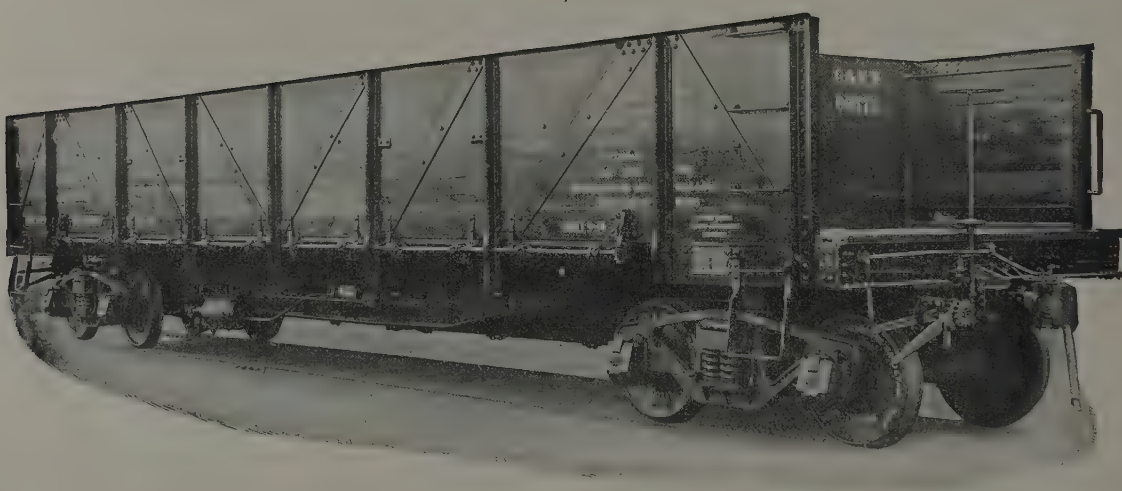


Fig. 114—Steel Frame 55-Ton Capacity Convertible Gondola and Ballast Car. Weight, 44,000 lb.; Inside Length, 30 ft. or 40 ft. Car as Shown Arranged for Center Dumping of Ballast, with Ends Set In. Builder, Rodger Ballast Car Company.

(*See Figs.* 112, 113 *and* 115.)

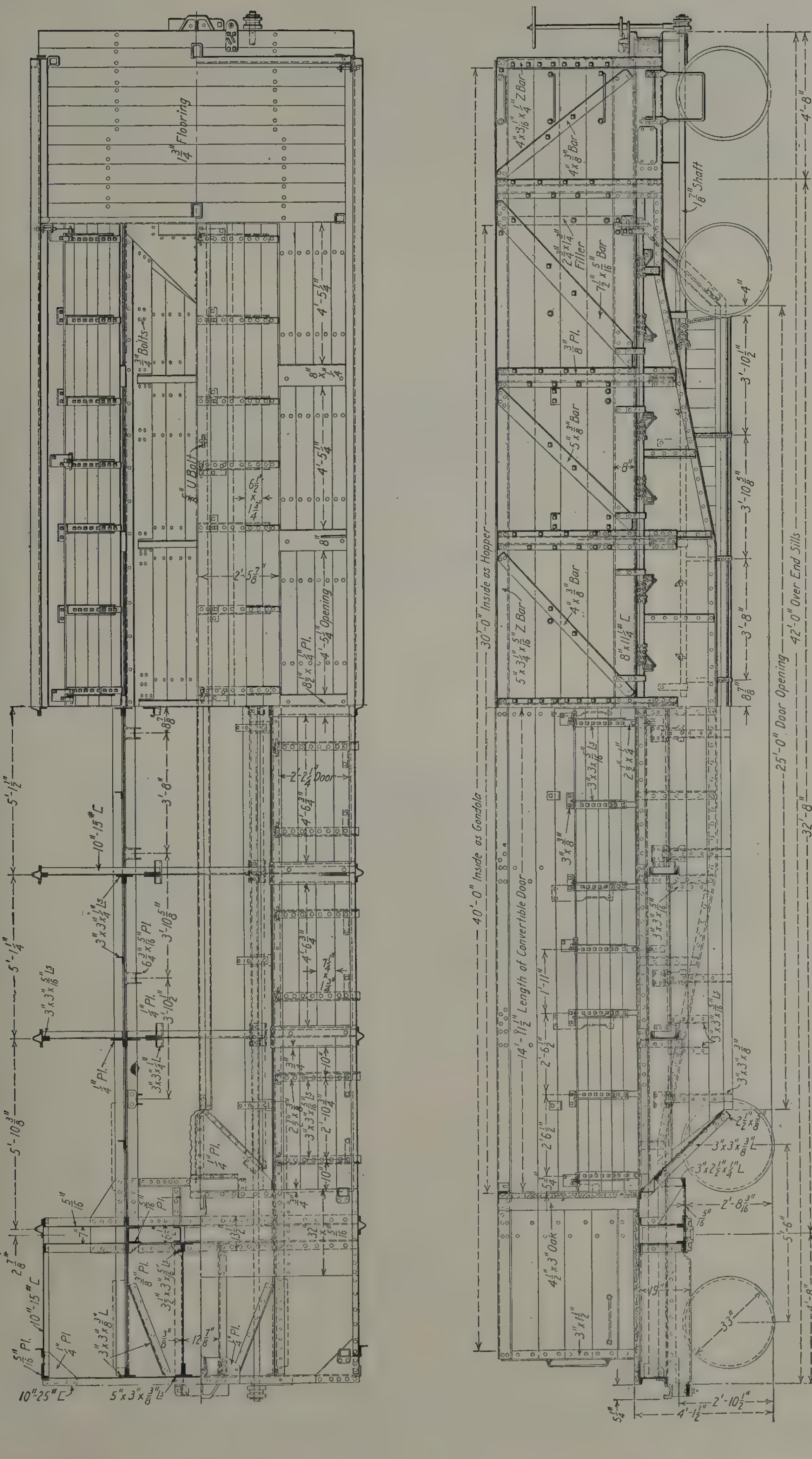


Fig. 115—Steel Underframe 50-Ton Capacity Hart Convertible Ballast and Gondola Car. See also Figs. 112-114. Builder, Rodger Ballast Car Company.

Fig. 116—All-Steel 50-Ton Capacity Drop-Bottom Gondola Car. Weight, 43,200 lb.; Inside Length, 40 ft.; Inside Width, 9 ft. 4 in.; Inside Height, 4 ft. 6 in. Builder, Pressed Steel Car Company.

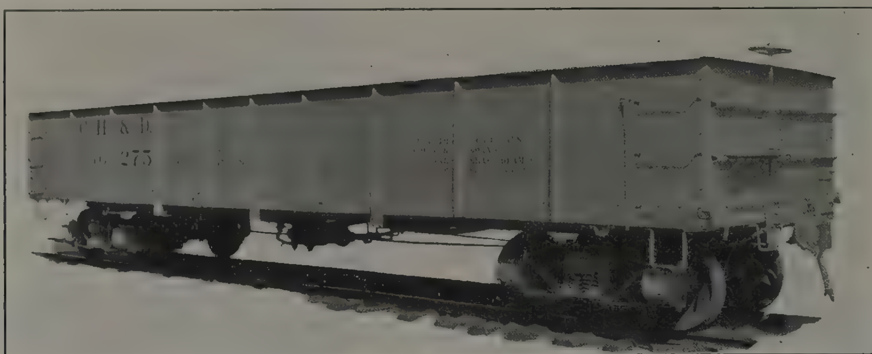


Fig. 117—All-Steel 50-Ton Capacity Drop-Bottom Gondola Car. Weight, 37,700 lb.; Inside Length, 40 ft.; Inside Width, 9 ft. 7 in.; Inside Height, 4 ft. 2 in. Builder, Cambria Steel Company.

Fig. 118—All-Steel 50-Ton Capacity Drop-Bottom Gondola Car. Weight, 39,300 lb.; Inside Length, 40 ft.; Inside Width, 9 ft. 6 in.; Inside Height, 4 ft. 7 in. Capacity, Level Full, Cubic Feet, 1,742. Builder National Dump Car Company.

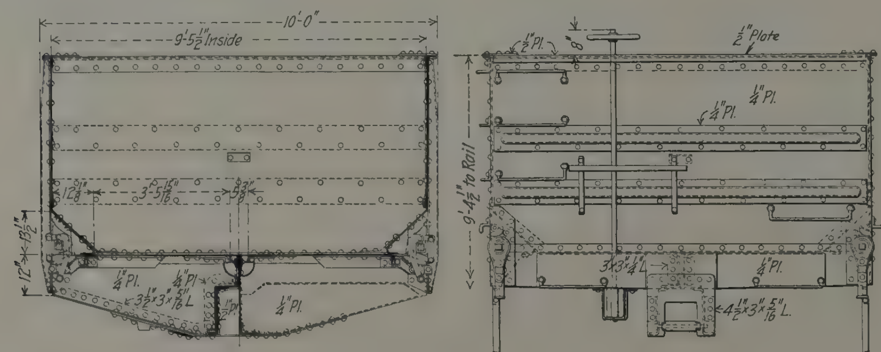


Fig. 119—Cross Sections and End Elevation of All-Steel Drop Bottom Gondola Car Shown in Fig. 120.

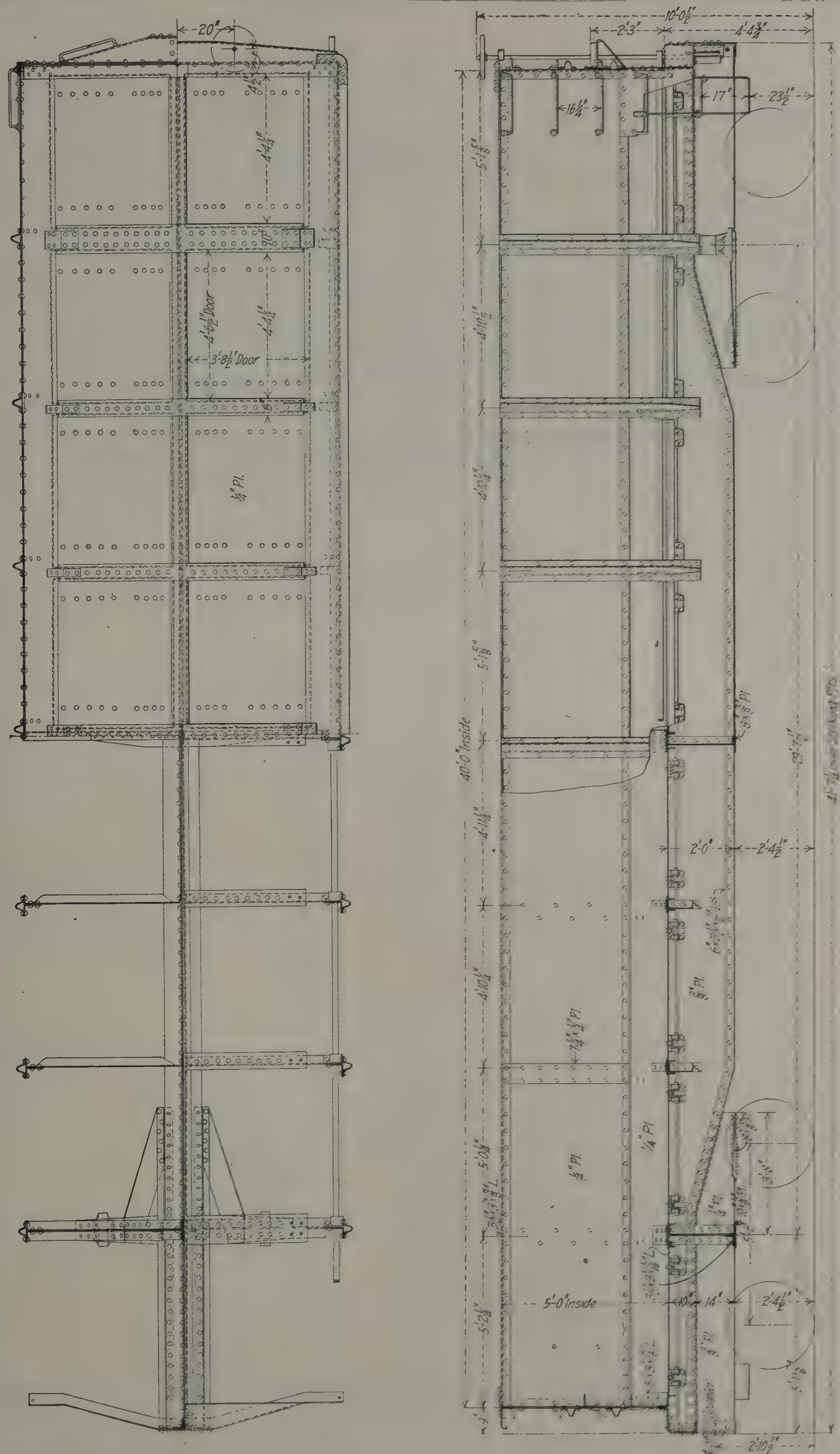


Fig. 120—All-Steel 50-Ton Capacity Drop Bottom Side Dump Gondola Car. See also Fig. 119. Builder, Standard Steel Car Company.

Fig. 121—Steel Frame 50-Ton Side Dump Car. Inside Length, 36 ft. 4 in.; Inside Width, 9 ft. 3 in.; Inside Height, 5 ft. 2 in. Builder, The Eastern Car Company.

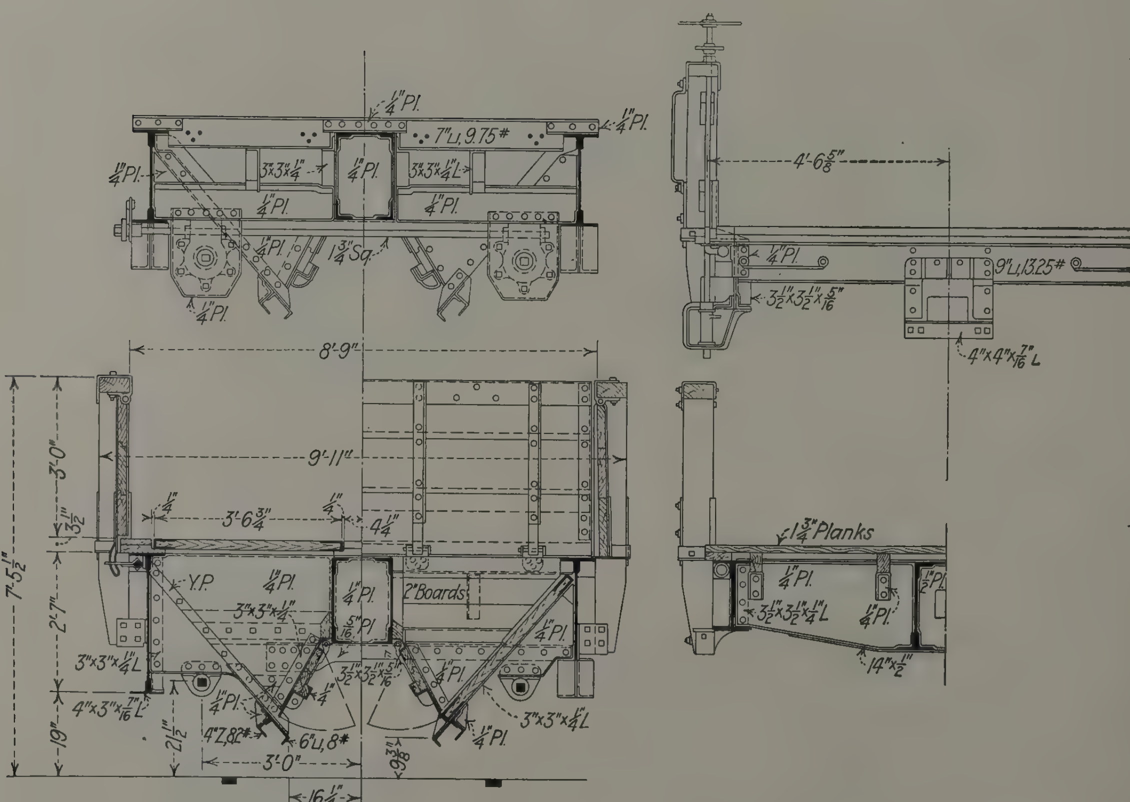


Fig. 122—Cross Sections of 50-Ton Plow Gondola Car Shown in Fig. 123. Builder, Enterprise Railway Equipment Company.

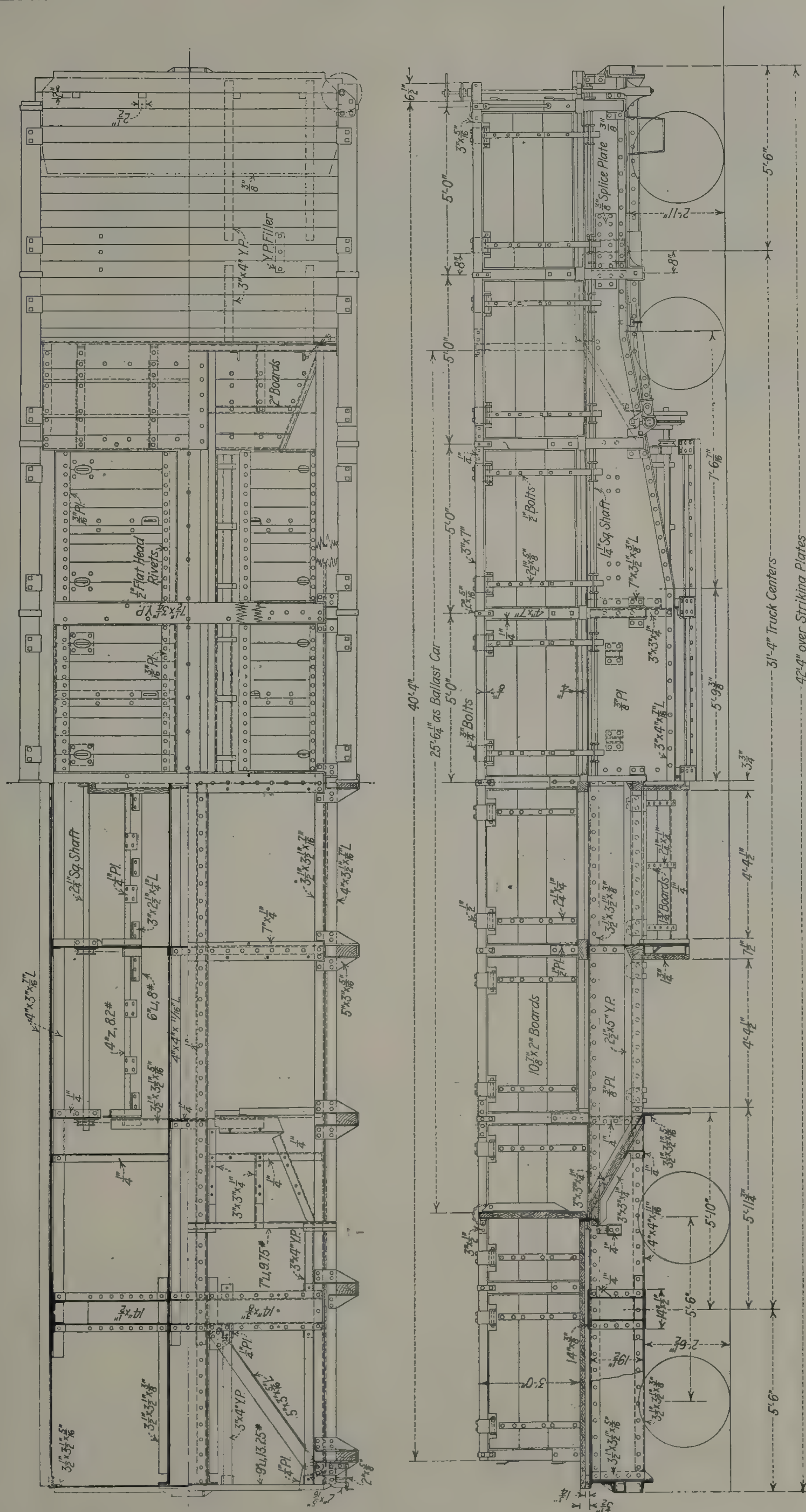


Fig. 123—Steel Frame 50-Ton Plow Gondola or Ballast Car. Builder, Enterprise Railway Equipment Company.

(See Fig. 122.)

Fig. 124—All Steel 50-Ton Capacity Drop-Bottom Gondola Car. Weight, 40,300 lbs.; Inside Length, 40 ft. 4 in.; Inside Width 9 ft. 3 in.; Inside Height, 4 ft. 6½ in. Capacity, Level Full, Cubic Feet, 1,693. Builder Ralston Steel Car Company.

Fig. 125—Composite 50-Ton Capacity Drop-Bottom Gondola Car. Weight, 41,600 lb.; Inside Length, 41 ft. 9 in.; Inside Width, 9 ft. 2½ in.; Inside Height, 4 ft. 5½ in.; Capacity Level Full, 1,714 cu. ft. Builder, Western Steel Car & Foundry Company.

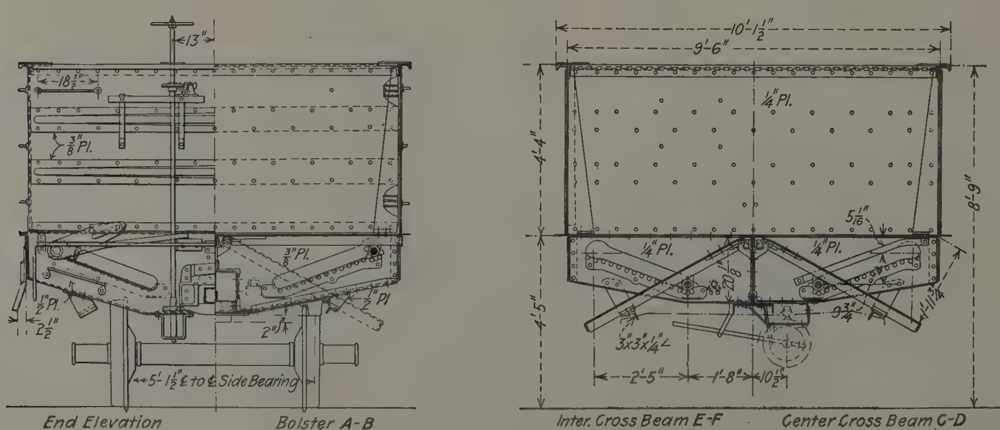


Fig. 127—End Elevation and Cross Sections of Cleveland, Cincinnati, Chicago & St. Louis All-Steel 50-Ton Capacity Drop Bottom Gondola Car Shown in Fig. 128. National Dump Car Company.

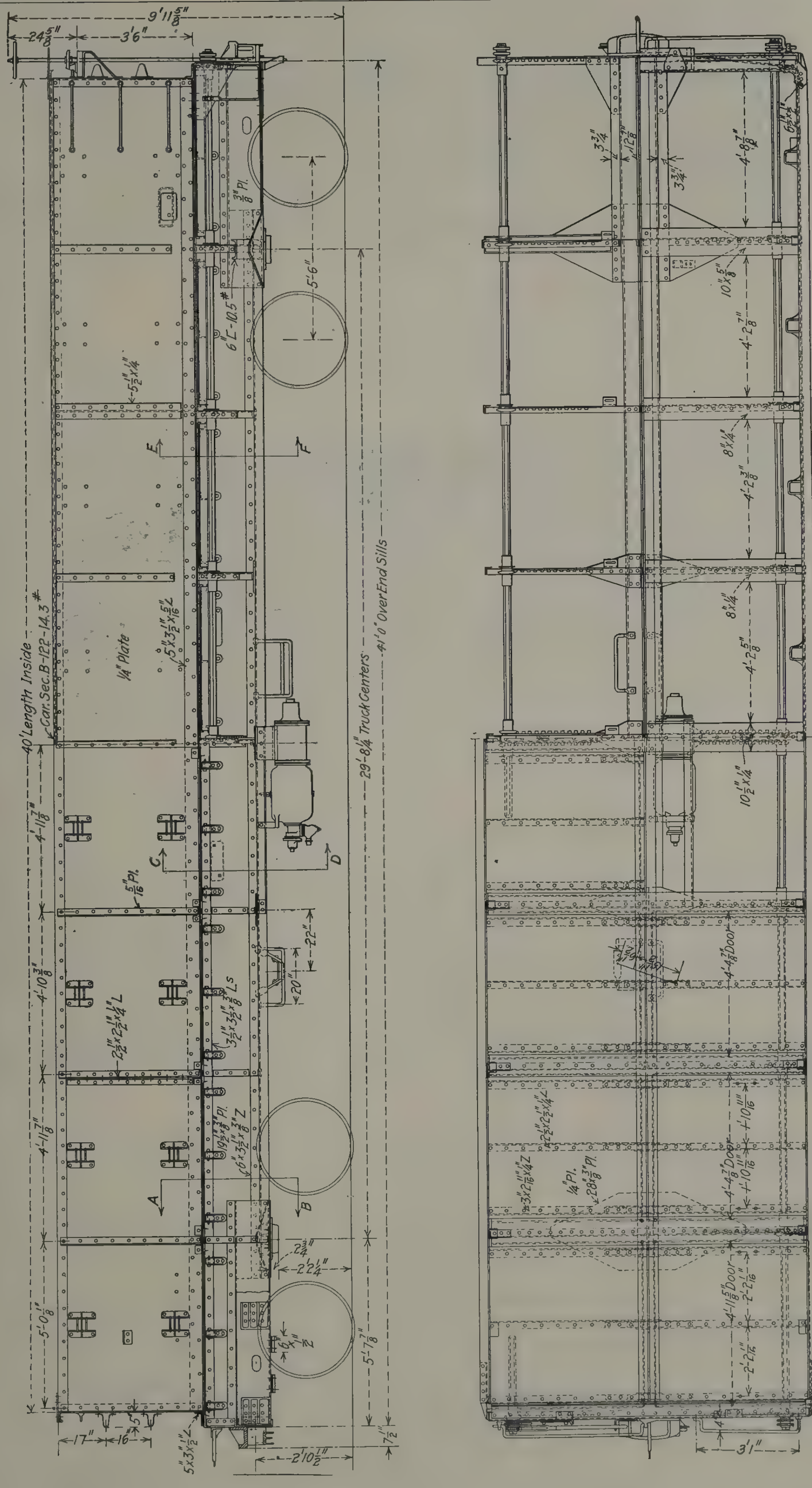


Fig. 128—Cleveland, Cincinnati, Chicago & St. Louis All-Steel 50-Ton Capacity Drop Bottom Gondola Car Shown in Fig. 127. Builder, National Dump Car Company.

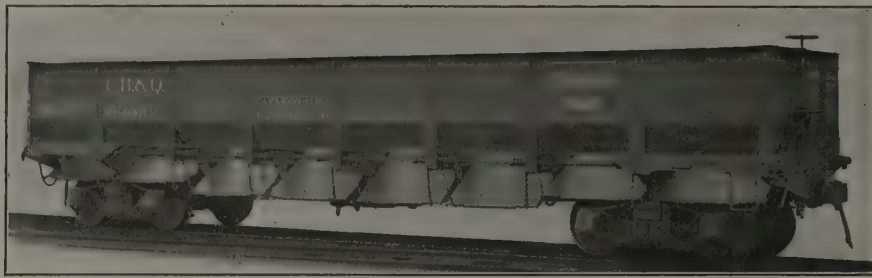


Fig. 129—All-Steel 50-Ton Capacity Drop-Bottom Gondola Car. Weight, 40,300 lb.; Inside Length, 40 ft. Inside Width, 9 ft. 6¾ in.; Inside Height, 4 ft. 2 in. Builder, Pressed Steel Car Company.

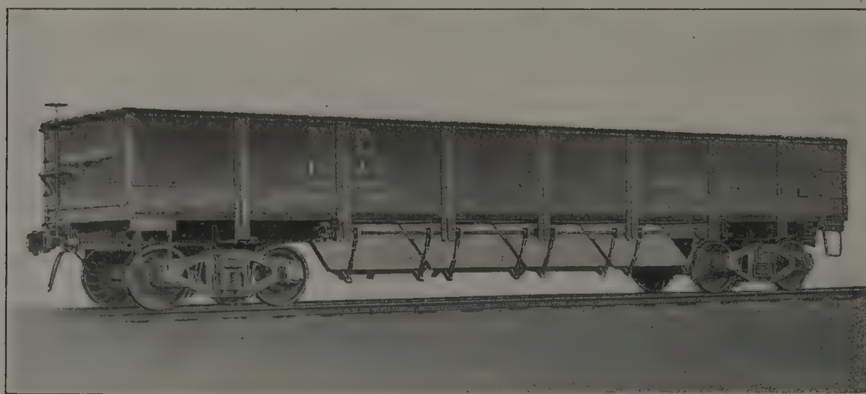


Fig. 130—All-Steel 50-Ton Capacity Drop-Bottom Gondola Car. Weight, 39,000 lb.; Inside Length, 40 ft. 4 in.; Inside Width, 9 ft. 5 in.; Inside Height, 4 ft. 6 in. Builder, The Bettendorf Company.
(*See Fig.* 132.)

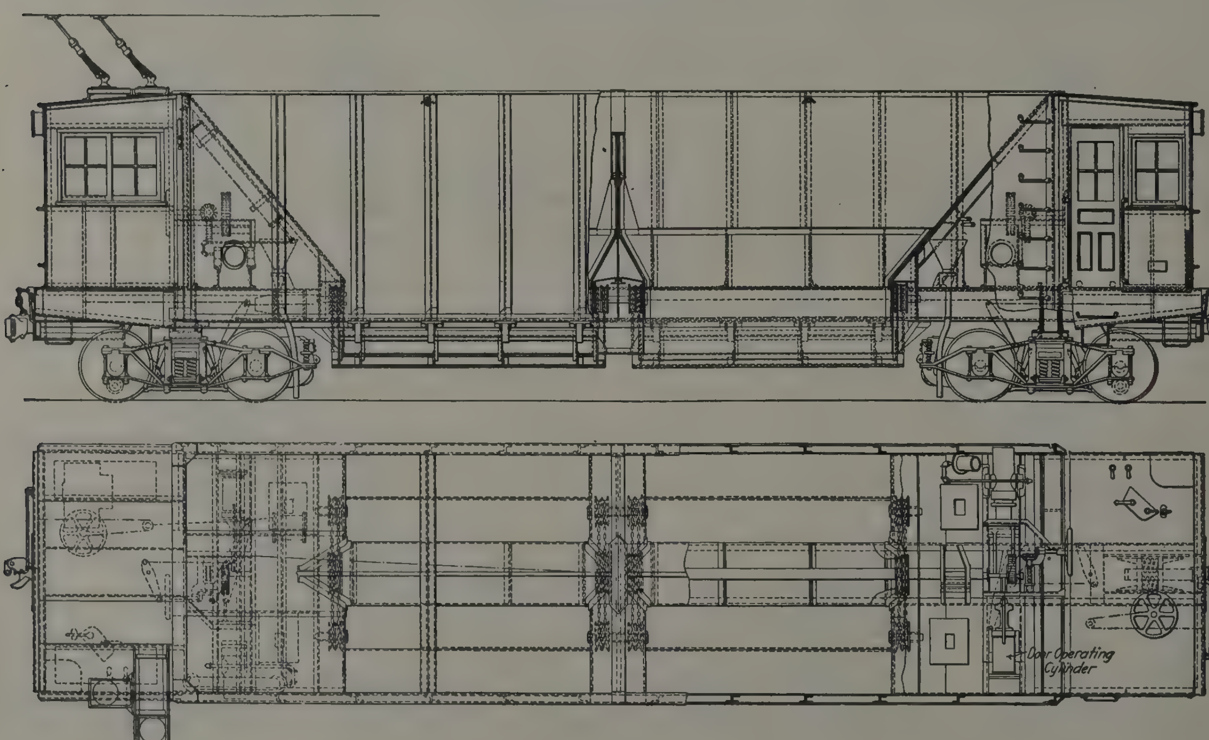


Fig. 131—All-Steel 60-Ton Capacity Electrically Operated Conveyor Hopper Car for Use on Virginian Railway Coal Wharf.

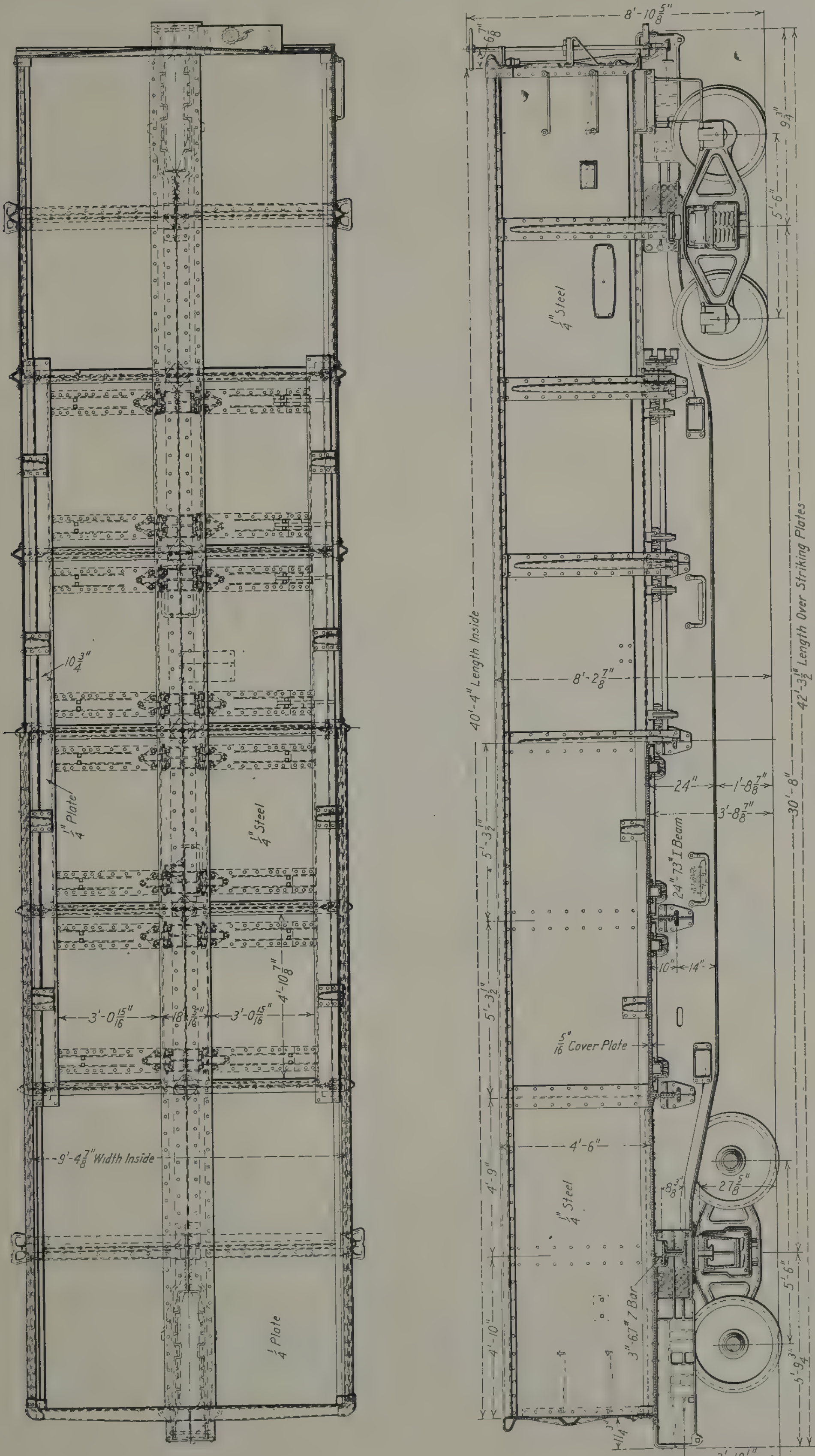


Fig. 132—Union Pacific All-Steel 50-Ton Capacity Drop Bottom Gondola Car. See also Fig. 130. Builder, The Bettendorf Company.

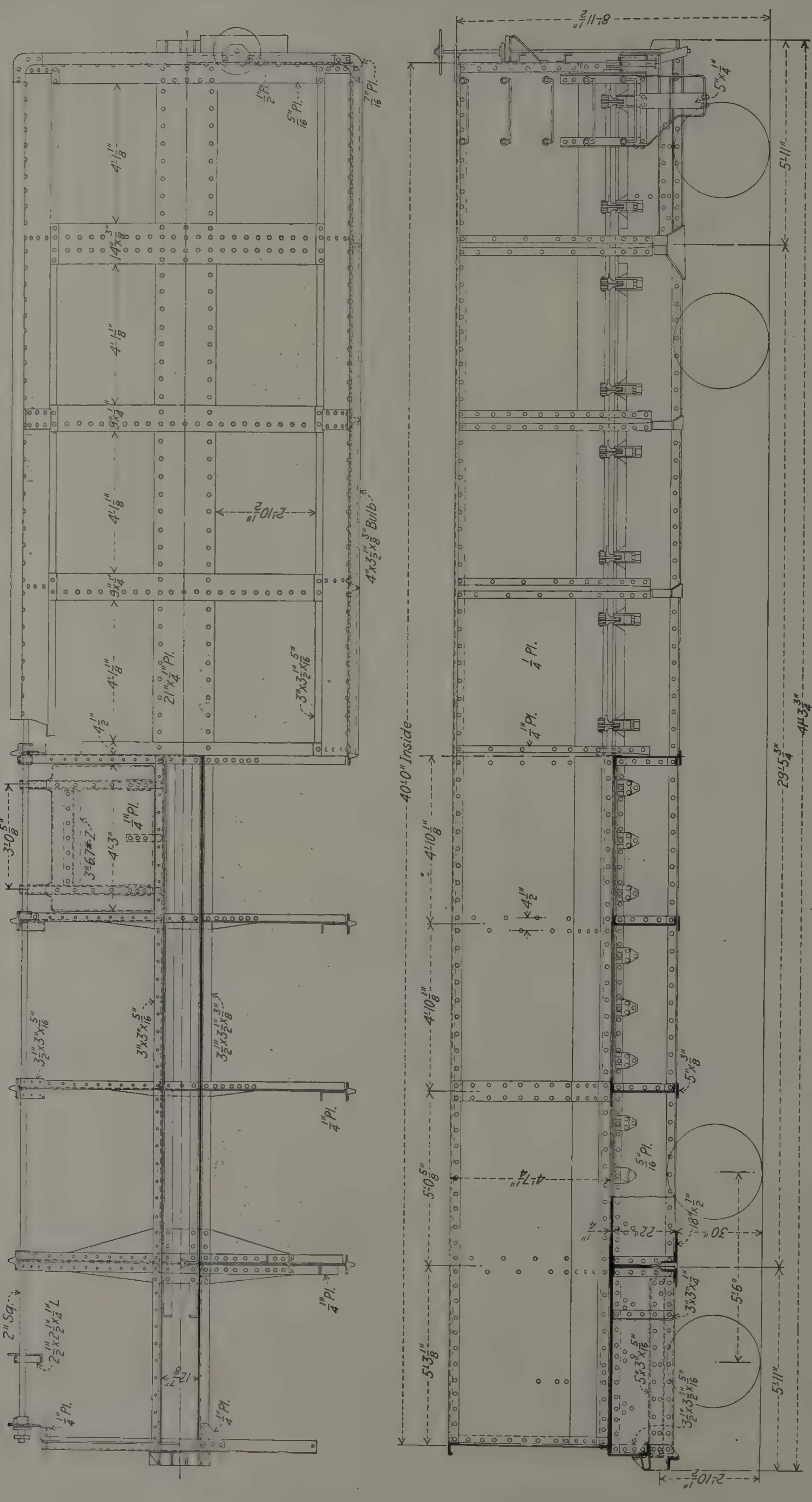


Fig. 133—All-Steel, 50-Ton Side Dump Gondola Car with 16 Doors. Inside Height, 40 ft. 0 in.; Inside Width, 9 ft. 6 in. Builder, Enterprise Railway Equipment Company.

Fig. 134—Steel Underframe 12-Yard Dump Car with Cab and Motor for Use with Third Rail System. Builder, Western Wheeled Scraper Company.

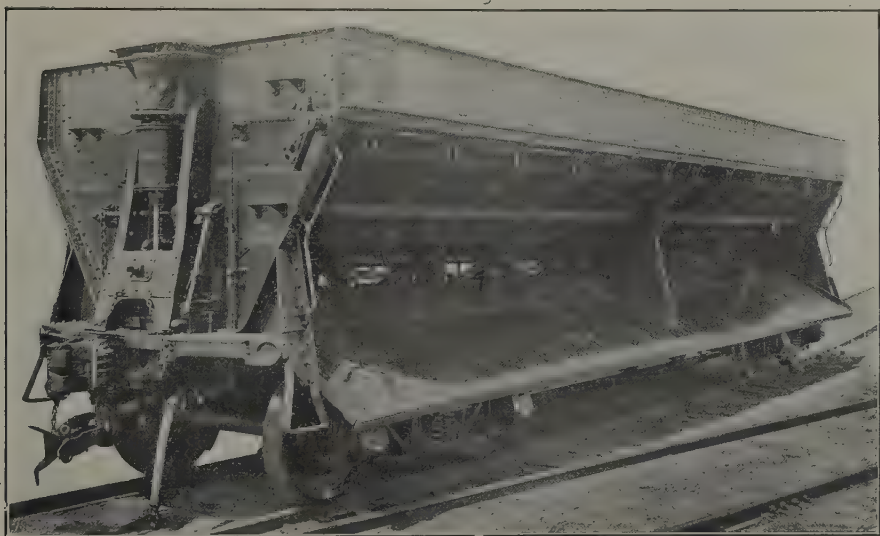


Fig. 135—All-Steel Air or Hand Operated Side or Center Dump Car of 40 Tons Capacity. Weight, 50,000 lb. Builder, Goodwin Car & Manufacturing Company.

Fig. 136—Steel Frame Two-Way Air Operated Dump Car. Builder, Magor Car Corporation.

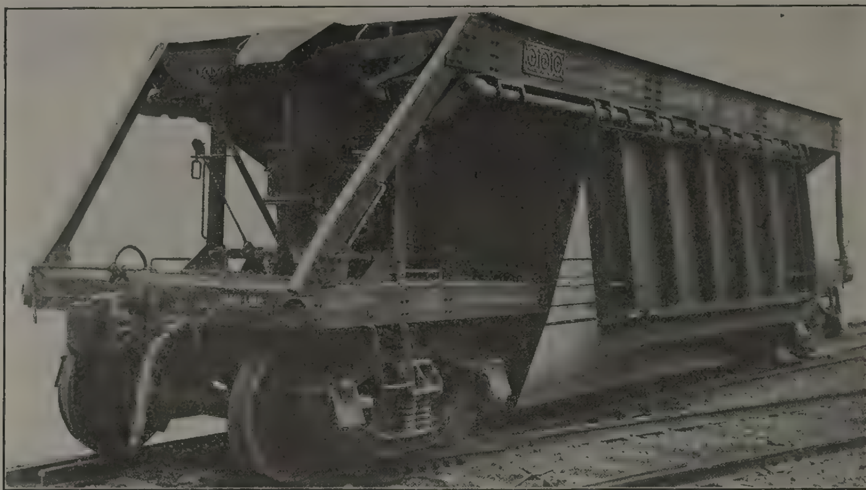


Fig. 137—All-Steel 50-Ton Capacity Air-Operated Side or Center Dump Car. Weight 53,000 lb.; Inside Length, 25 ft.; Capacity, 30 Cubic Yards. Builder, Goodwin Car & Manufacturing Company.

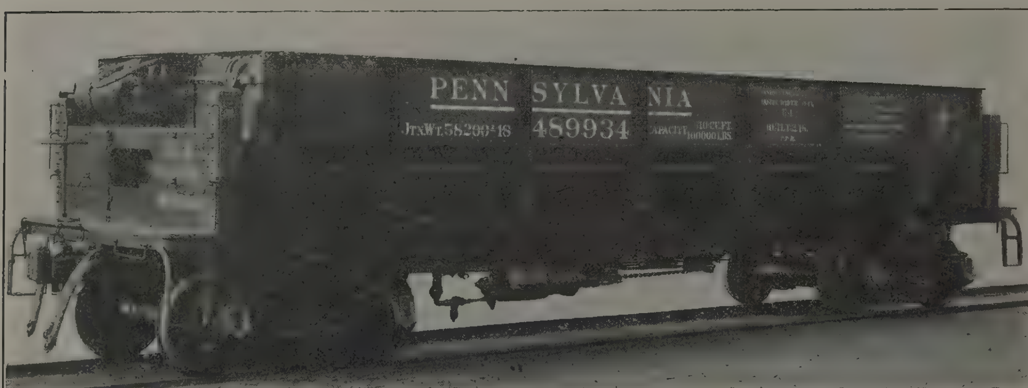


Fig. 138—All-Steel 50-Ton, 30 cu. yd. Capacity, Two way Air Operated, Extension Sides Dump Car. Builder, Clark Car Company.

Fig. 139—Dumped Position of All-Steel Dump Car Shown in Fig. 138.

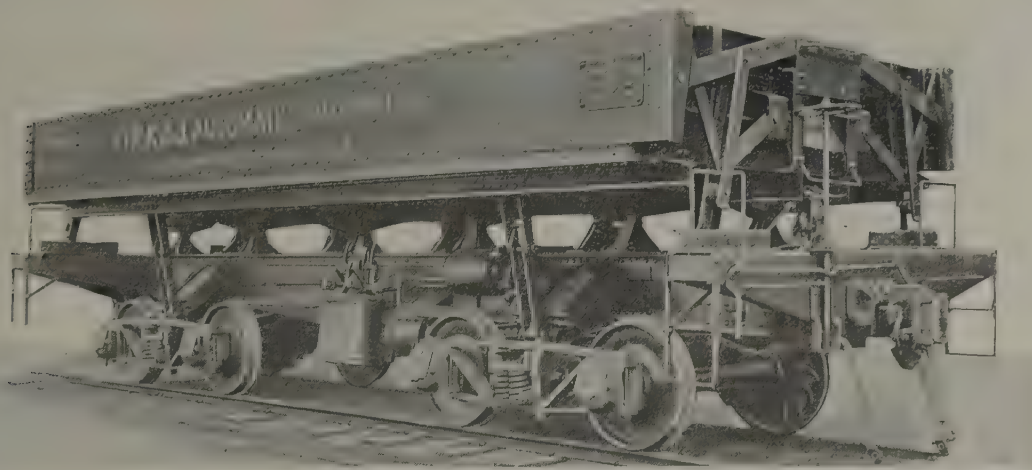


Fig. 140—All-Steel 20-yd. Capacity Automatic Two-Way Air Dump Car.
Builder, The Kilbourne & Jacobs Manufacturing Company.

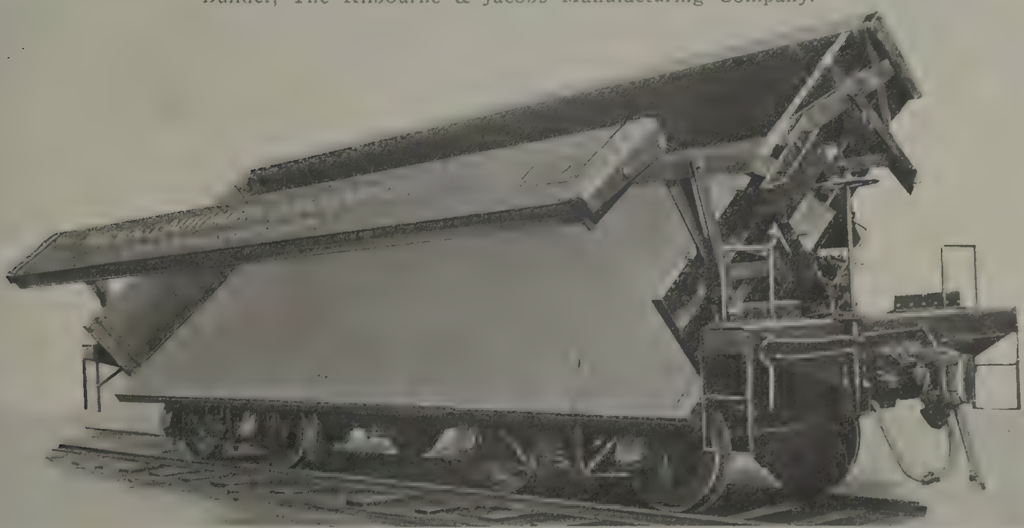


Fig. 141—Dumped Position of Dump Car Shown in Fig. 140.

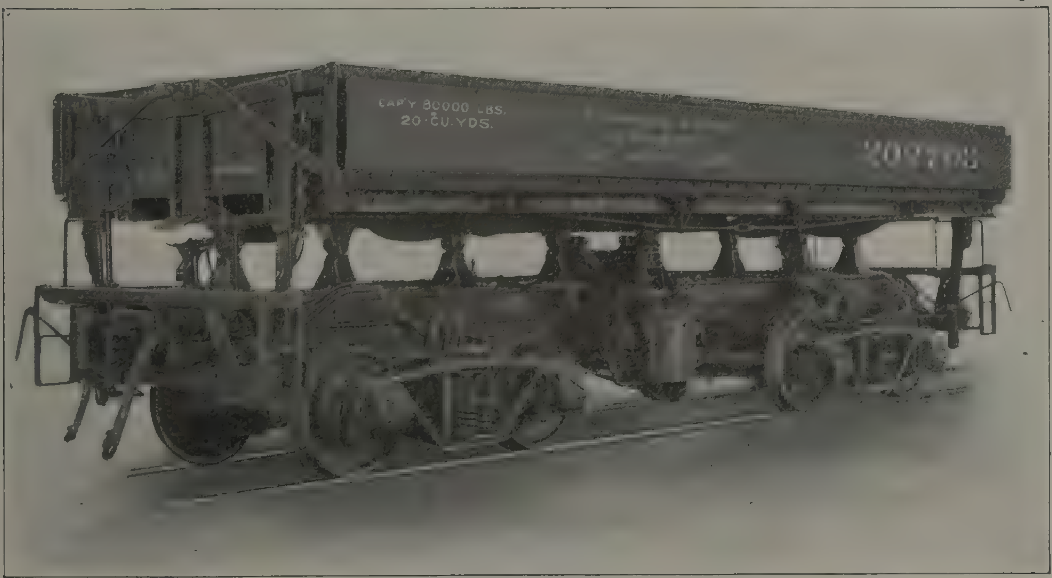


Fig. 142—All-Steel 20-yd. Capacity, Air Dump Car. Weight 51,000 lb.
Builder, Western Wheeled Scraper Company.

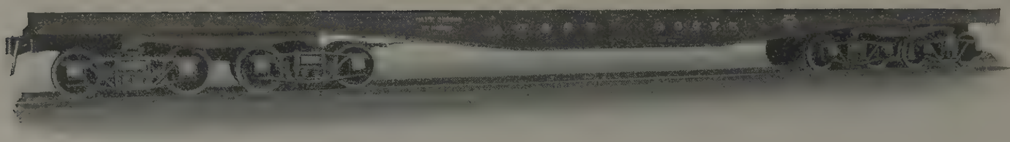


Fig. 143—Steel Frame 100-Ton Capacity Four-Truck Flat Car. Weight, 90,000 lb.; Length of Platform, 70 ft. 7 in.; Width of Platform, 8 ft. 6 in. Builder, McGuire-Cummings Manufacturing Company.

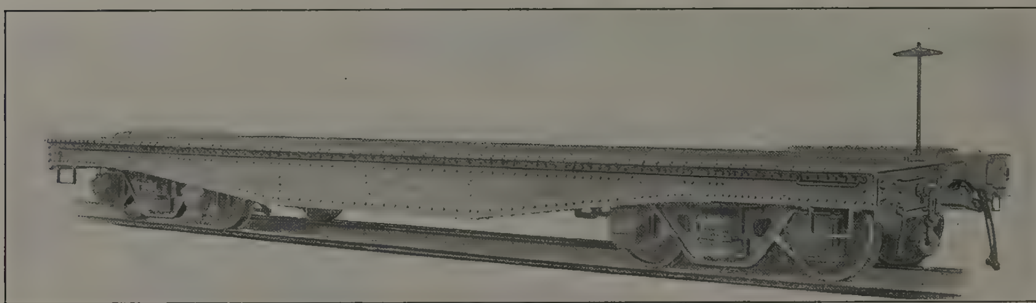


Fig. 144—Steel Frame 75-Ton Capacity Flat Car. Weight, 44,000 lb.; Length of Platform, 34 ft. 7 in.; Width of Platform, 10 ft.; Height, Rail to Top of Platform, 3 ft. 2 in.
Builder, American Car & Foundry Company.

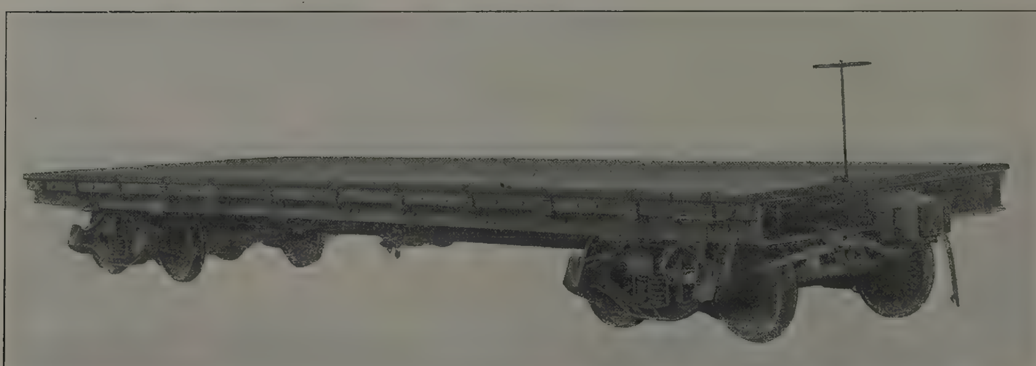


Fig. 145—Steel Frame 50-Ton Capacity Flat Car. Weight, 32,100 lb.; Length of Platform, 41 ft. 2 in.; Width of Platform, 9 ft. 4½ in.; Height, Rail to Top of Platform, 3 ft. 11 in.
Builder, The Bettendorf Company.

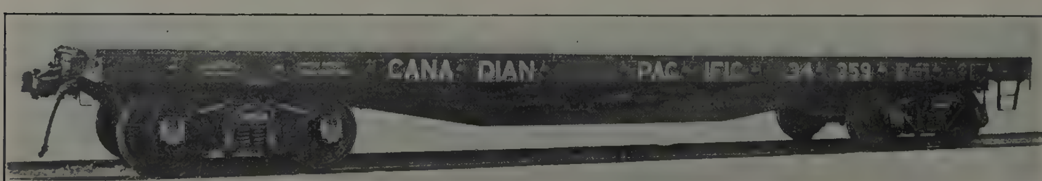


Fig. 146—Steel Frame 40-Ton Capacity Flat Car. Weight, 33,100 lb.; Length of Platform, 41 ft. 6 in.; Width of Platform, 9 ft.; Height, Rail to Top of Platform, 4 ft. 2¾ in.
Builder, Canadian Car & Foundry Company.

(*See Fig.* 147.)

Flat Car Parts.

1 Center Sill
2 Side Sill
3 Floor Stringer
4 Body Bolster
5 Center Plate
6 Cross Bearer
7 Stringer Support or Floor Beam
8 End Sill
9 Push Pole Pocket
10 Side Stake Pocket
11 Dead Wood or Buffer Block
12 Floor
13 Center Sill Cover Plate
14 Floor Nailing Strip

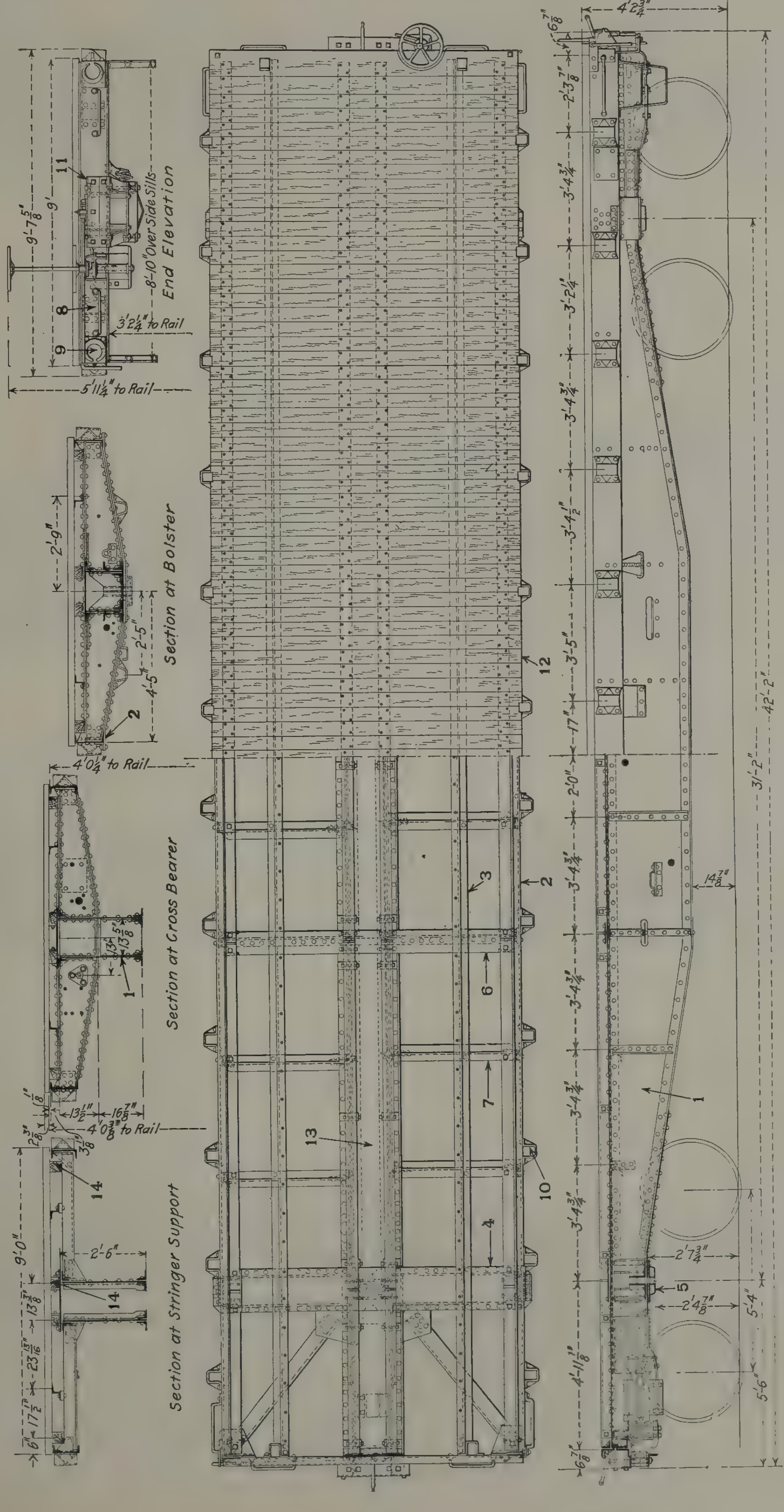


Fig. 147—Canadian Pacific Steel Frame 40-Ton Capacity Flat Car Shown in Fig. 146. Builder, Canadian Car & Foundry Company.

Fig. 148—All-Steel 40-Ton Capacity Truck Car with Pockets in Side for Wreck Equipment. Weight 38,800 lb.; Length, 40 ft. 0 in.; Width, 10 ft. 0 in. Pennsylvania Railroad.
(*See Fig.* 149.)

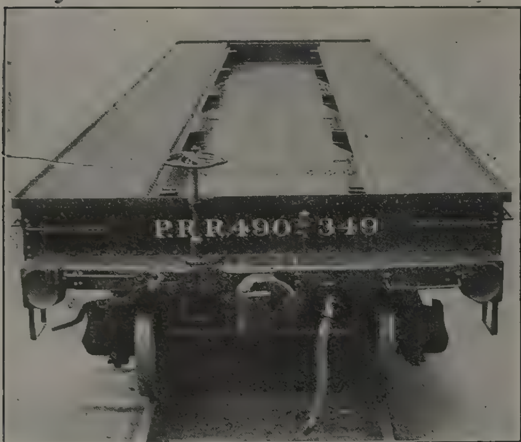


Fig. 149—End and Plan View of Car Shown in Fig. 148.

Fig. 150—End View of Flat Car Shown in Fig. 151.

Fig. 151—All-Steel 75-Ton Capacity Flat Car. Weight 39,900 lb.; Length, 30 ft. 0 in.; Width, 9 ft. 0 in. Pennsylvania Railroad.

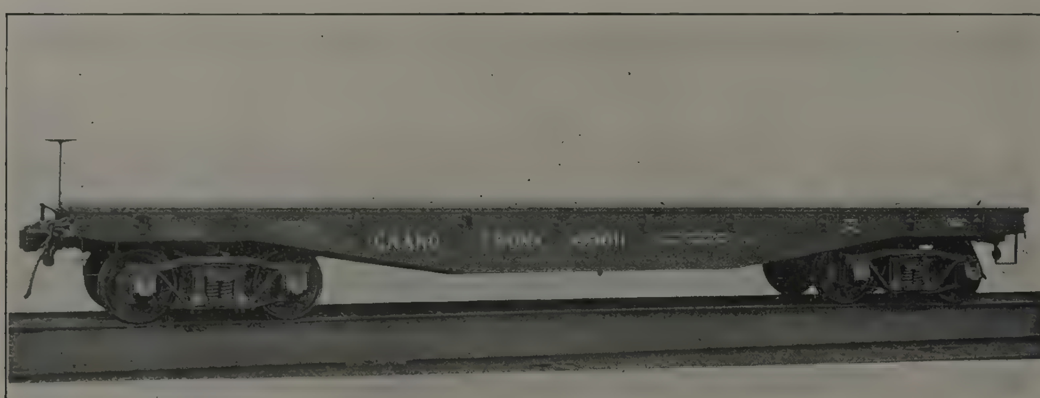


Fig. 152—Steel Frame 50-Ton Capacity Flat Car. Weight, 34,600 lb.; Length of Platform, 40 ft. 6 in.; Width of Platform, 9 ft.; Height, Rail to Top of Platform, 4 ft. 2½ in.
Builder, Western Steel Car & Foundry Company.

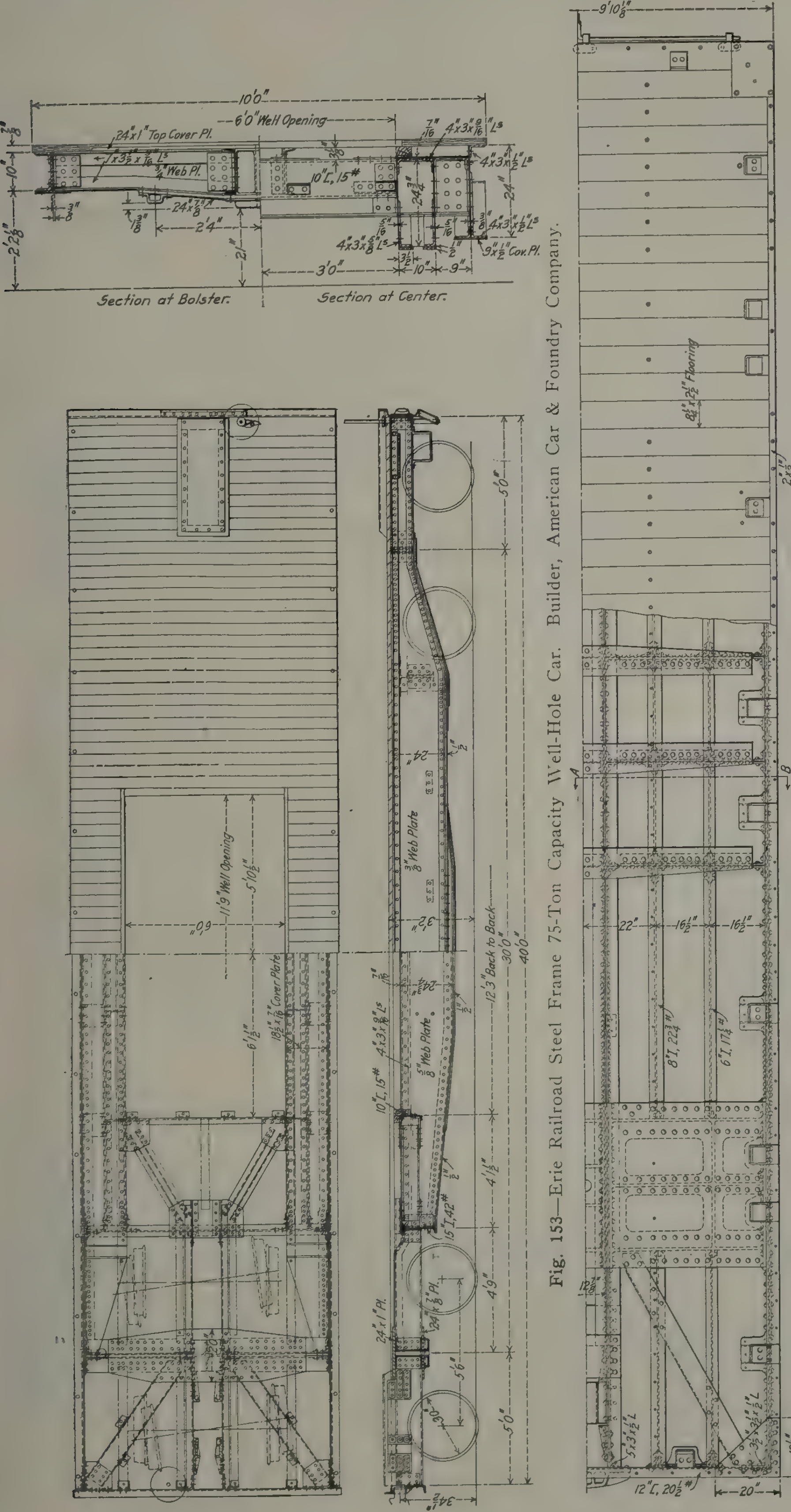


Fig. 153—Erie Railroad Steel Frame 75-Ton Capacity Well-Hole Car. Builder, American Car & Foundry Company.

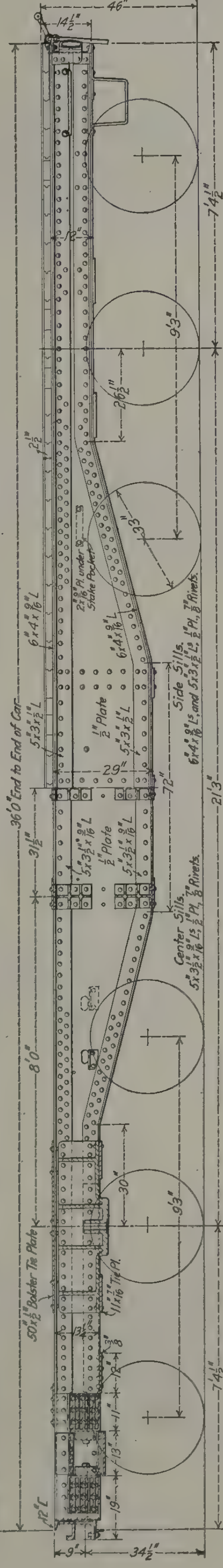


Fig. 153A—Pittsburgh & Lake Erie Steel Frame 100-Ton Capacity Flat Car.

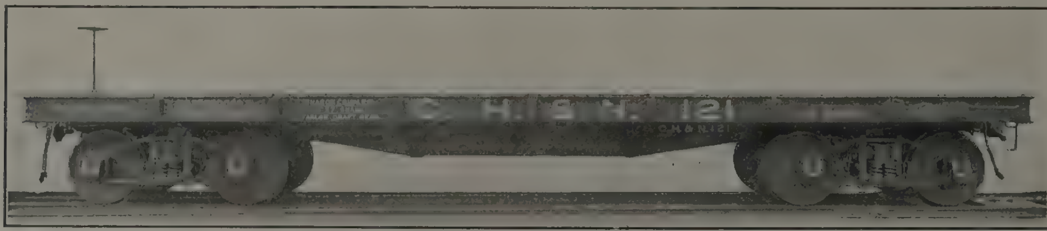


Fig. 154—Steel Frame 30-Ton Capacity Flat Car. Weight, 24,200 lb.; Builder, The Barney & Smith Car Company.

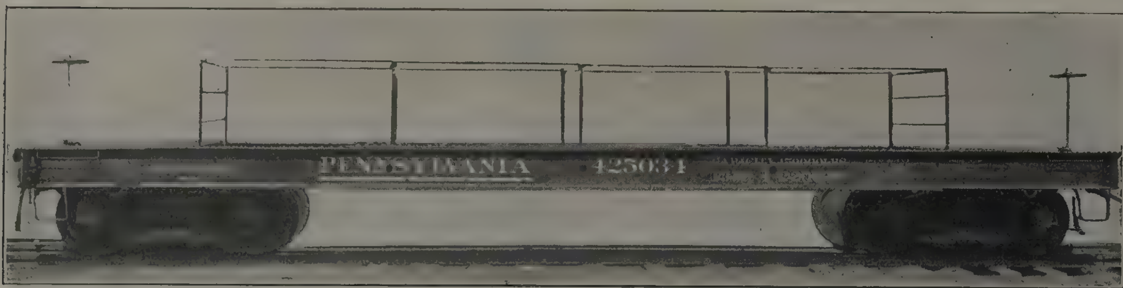


Fig. 155—All-Steel 75-Ton Capacity Well-Hole Car. Weight, 42,200 lb.; Length, 38 ft. 0 in.; Width, 10 ft. 0 in. Pennsylvania Railroad.

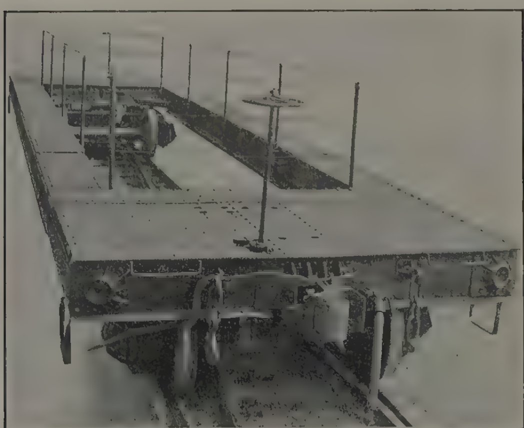


Fig. 156—Plan View of Well-Hole Car in Figs. 151 and 153.

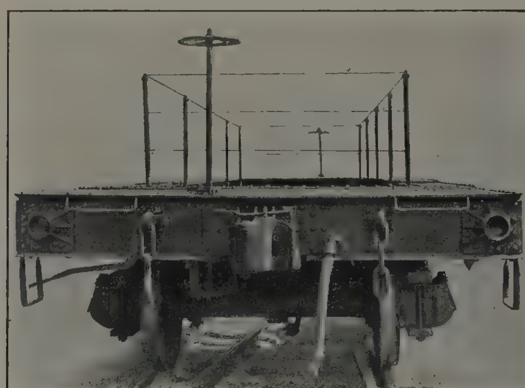


Fig. 157—End View of Well-Hole Car in Figs. 151 and 152.

Fig. 158—All-Steel 110-Ton Capacity Flat Well-Hole Car. Weight, 91,900 lb.; Length of Platform, 55 ft. 7 in.; Width of Platform, 9 ft. 10 in.; Height, Rail to Top of Platform, 3 ft. 2 in.; Well Opening, 26 ft. 2 in. by 6 ft. 1 in. Builder, Lehigh Valley Railroad.

(*See Fig.* 159.)

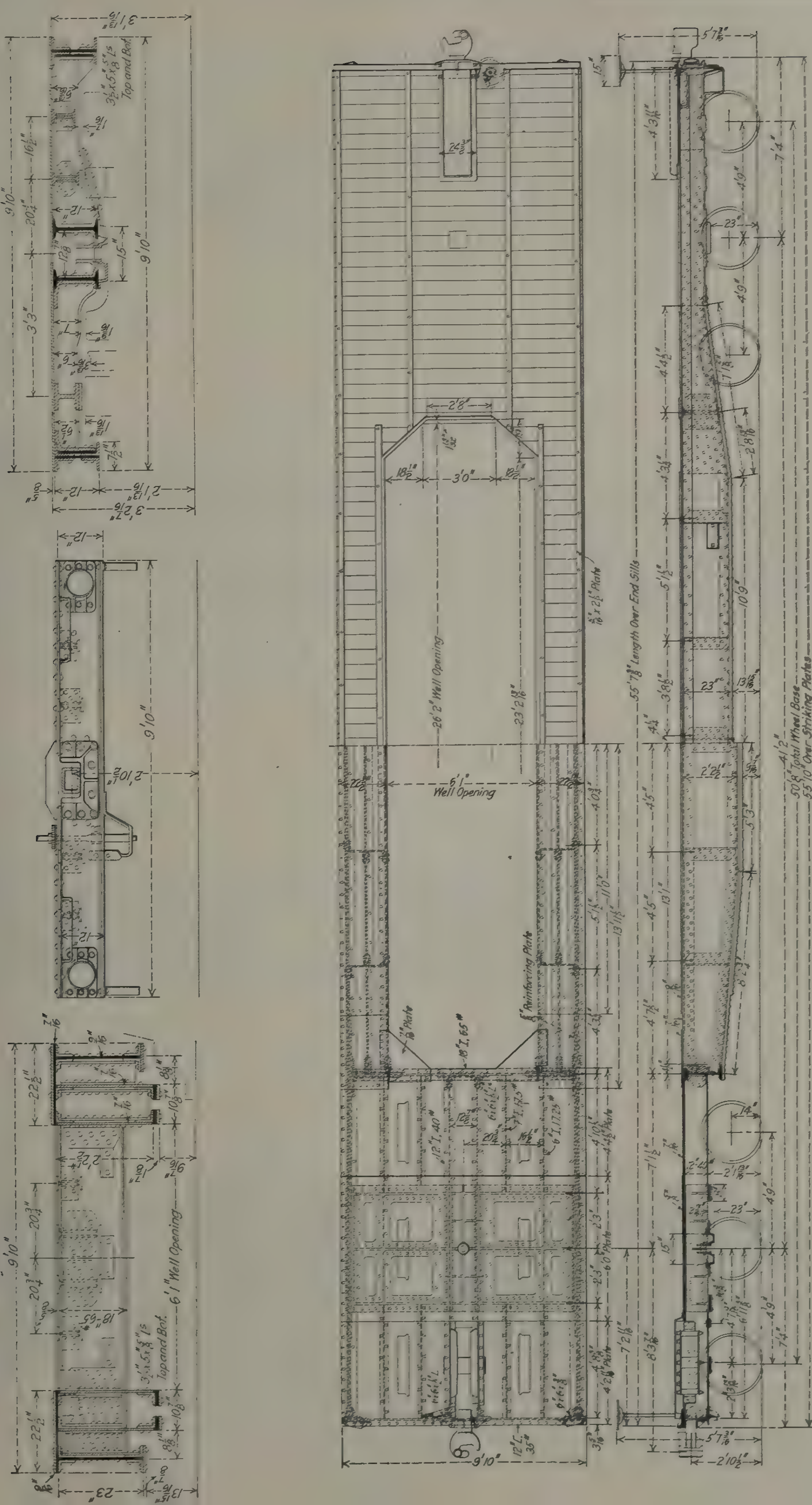


Fig. 159—Lehigh Valley Steel Frame 110-Ton Capacity Well-Hole Car Shown in Fig. 158.

Fig. 160—Steel Frame 50-Ton Capacity Flat Car. Weight, 39,500 lb.; Length of Platform, 40 ft.; Height, Rail to Top of Platform, 4 ft. Builder, Pressed Steel Car Company.

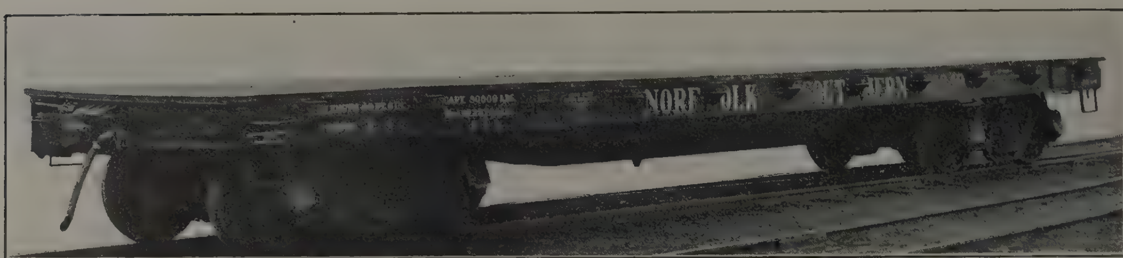


Fig. 161—Steel Underframe, 40-Ton Capacity Flat Car. Weight, 28,550 lb.; Length, 40 ft. 0 in.; Width, 9 ft. 4 in.; Rail to Top of Platform, 3 ft. 9 13/16 in. Builder, American Car & Foundry Company

Fig. 162—All-Steel 70-Ton Rail Floor Flat Car for Hot Metal Service. Weight, 46,400 lb. Builder, Cambria Steel Company.

(*See Fig.* 164.)

Fig. 163—All-Steel, 70-Ton Rail Floor Car for Hot Metal Service, Similar to Car Shown in Fig. 162, with Low Sides. Weight, 54,100 lb. Builder, Cambria Steel Company.

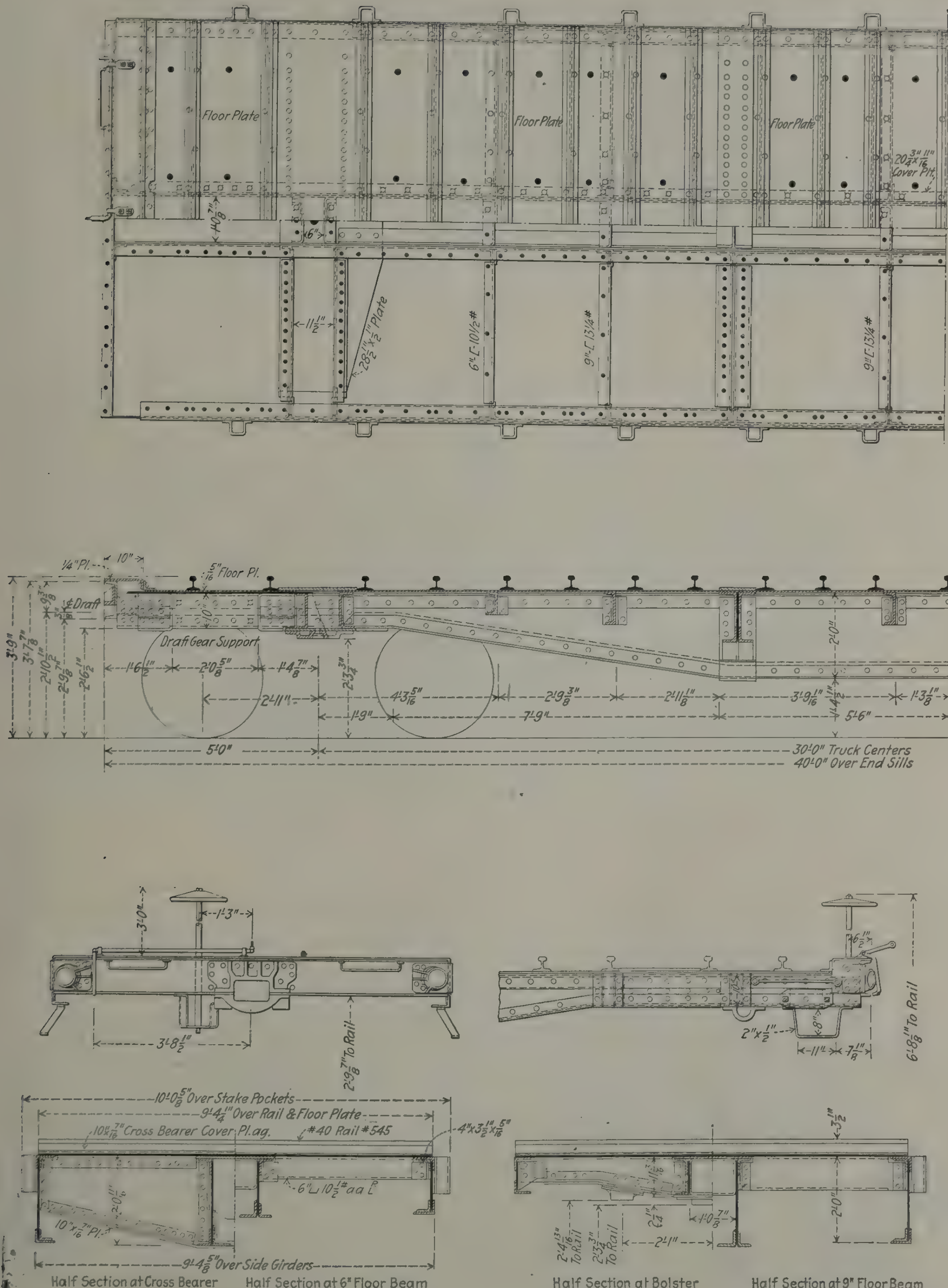


Fig. 164—All-Steel 70-Ton Rail Floor Flat Car. Builder, Cambria Steel Company.

(See Fig. 162.)

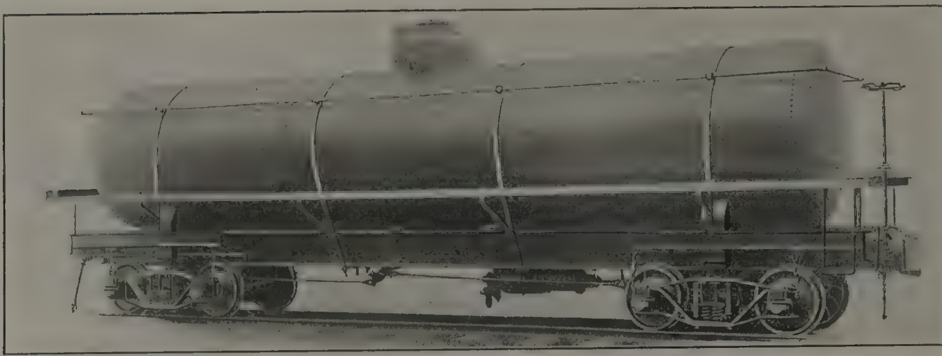


Fig. 165—Steel Tank Car for West India Oil Company, For Transporting Fuel Oil, Molasses, etc.; Capacity, 5,000 U. S. Gallons. Builder, The Gregg Company, Ltd.

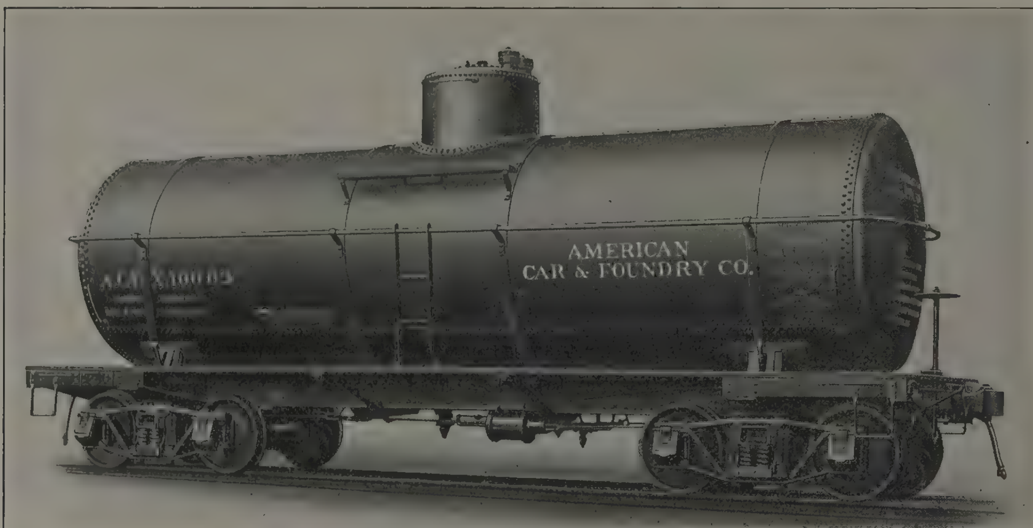


Fig. 166—Steel Tank Car. Capacity, 10,000 U. S. Gallons, or 100,000 lb.; Weight, 45,800 lb. Builder, American Car & Foundry Company.

Fig. 167—Insulated Tank Car for Transporting Highly Volatile Oils. Builder, American Tank Car Corporation.

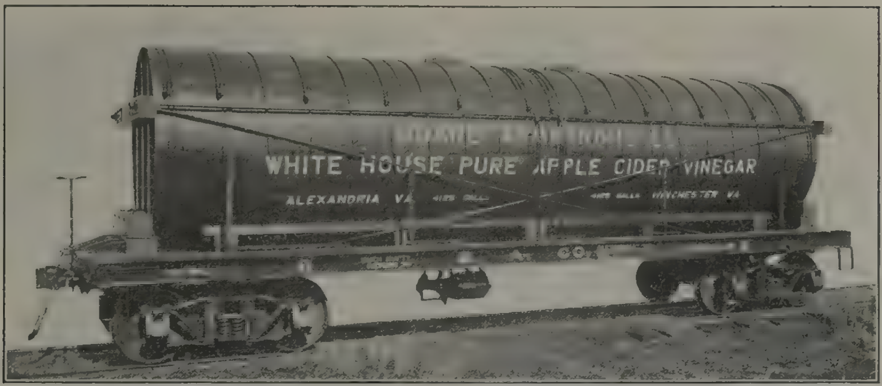


Fig. 168—Steel Frame Tank Car with Wooden Tank for Vinegar Transportation. Capacity, 8,250 U. S. Gallons; Weight, 39,000 lb. Builder, McGuire-Cummings Manufacturing Company.

Fig. 169—Steel Tank Car with Three Compartments. Capacity, 10,000 U. S. Gallons, or 80,000 lb. Builder, McGuire-Cummings Manufacturing Company.

Fig. 170—Steel Tank Car. Capacity, 10,000 U. S. Gallons, or 100,000 lb.; Weight, 44,600 lb. Builder, Cambria Steel Company.

Fig. 171—Steel Tank Car. Capacity, 14,600 U. S. Gallons; Weight, 45,600 lb. Builder, Chicago Steel Car Company.

(*See Fig.* 173.)

Tank Car Parts—See Fig. 173

1 *Center Sill*
2 *Body Bolster*
3 *Side Sill*
4 *End Sill*
6 *Coupler or Drawbar*
7 *Center Plate*
8 *Tank*
9 *Tank Head*
10 *Dome*
11 *Manhole Cover*
12 *Safety Valve*
13 *Valve Rod*
14 *Outlet Valve*
15 *Brake Cylinder*
16 *Running Board*
17 *Hand Brake Shaft*
18 *Brake Pipe*
19 *Hand Brake Step*

Fig. 172—Steel Tank Car. Capacity, 8,000 U. S. Gallons, or 80,000 lb.; Weight, 40,300 lb. Builder, Pressed Steel Car Company.

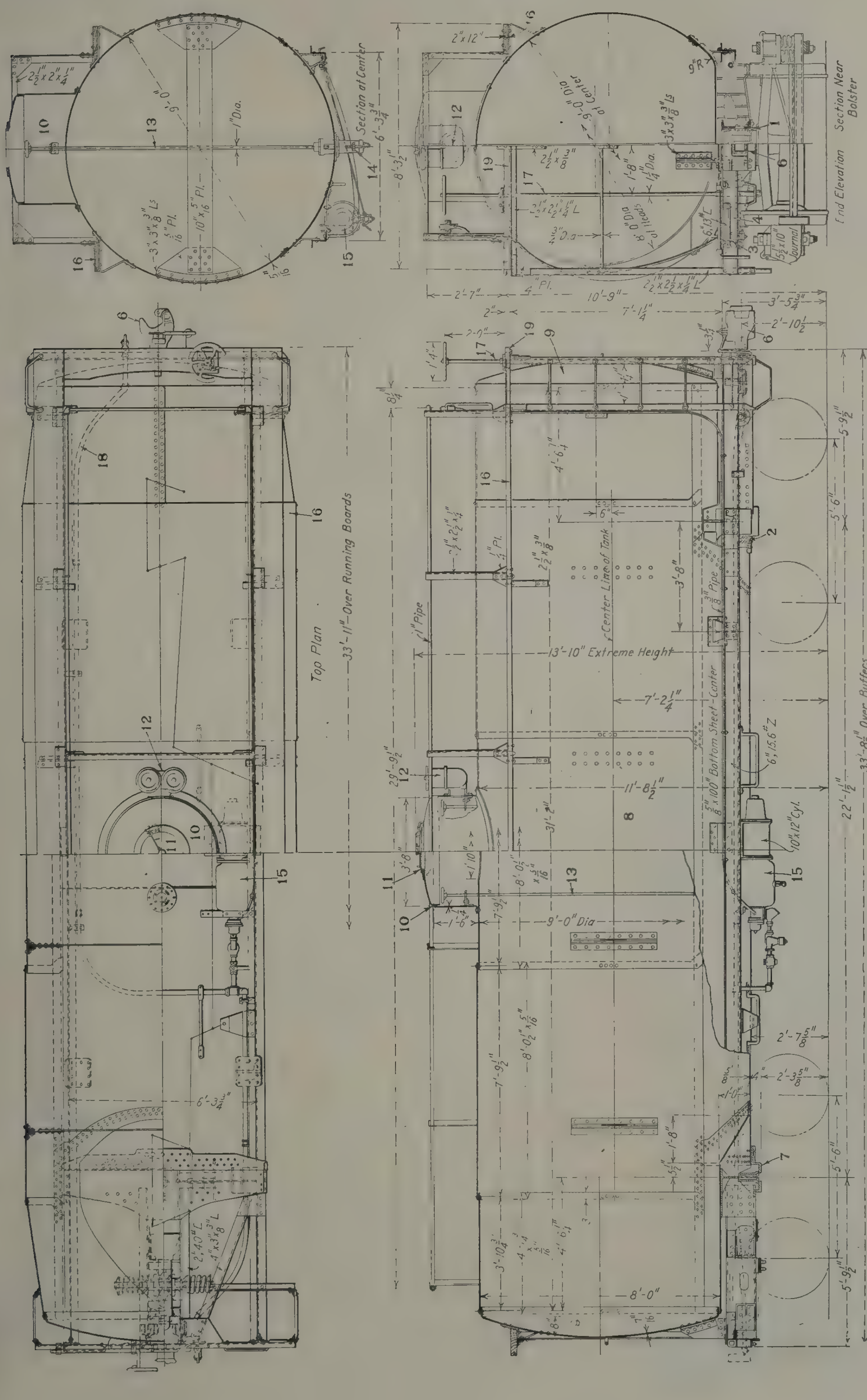


Fig. 173—Steel Tank Car Shown in Fig. 171. Capacity, 14,500 U. S. Gallons. Builder, Chicago Steel Car Company.

See Page 334 for Names of Numbered Parts.

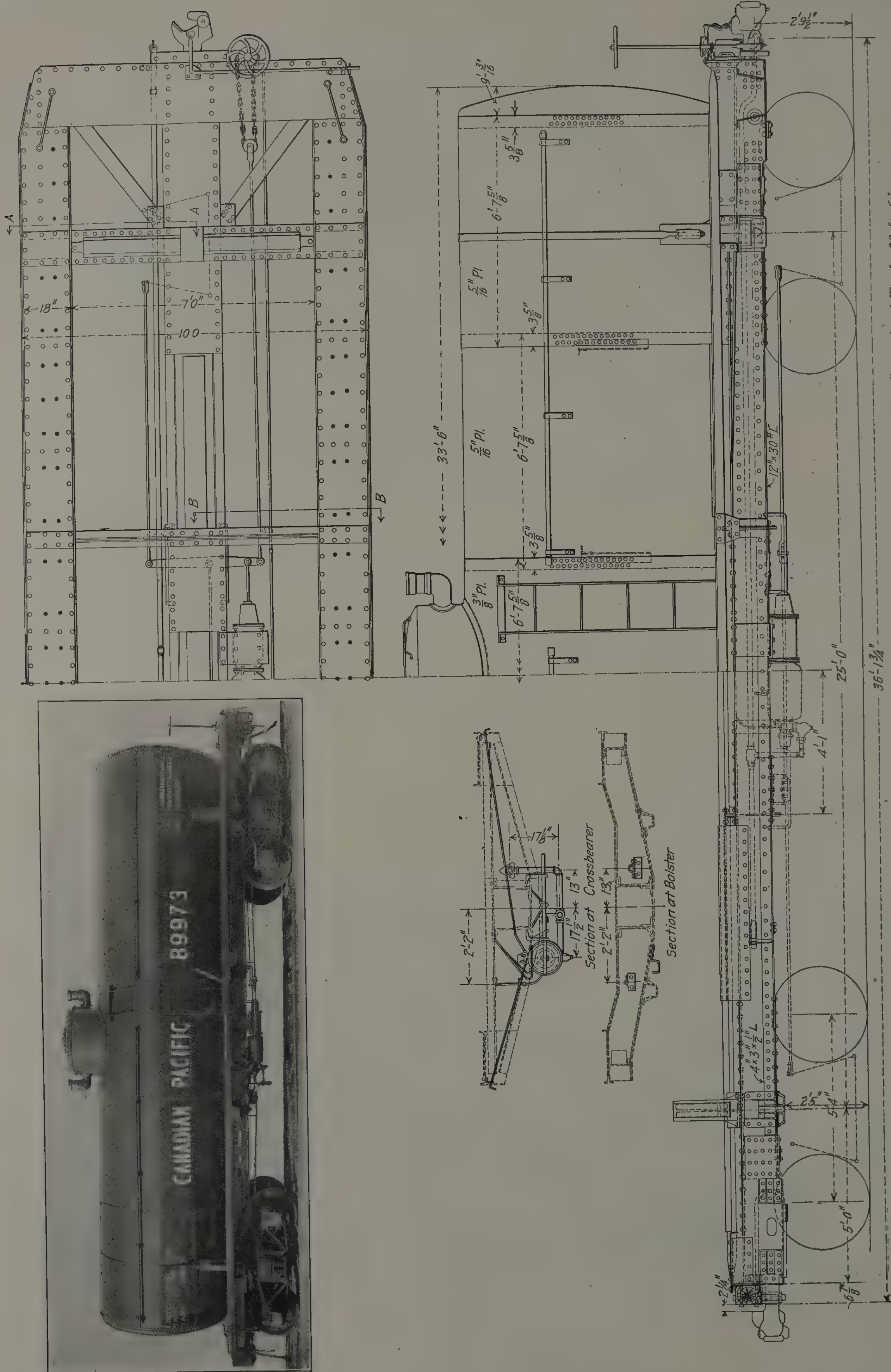


Fig. 174—Steel Frame Tank Car, Capacity 8,000 Imperial Gallons or 80,000 lb.; Weight, 44,900 lb.; Length of Tank, 33 ft. 6 in.
Builder, Canadian Car & Foundry Company.

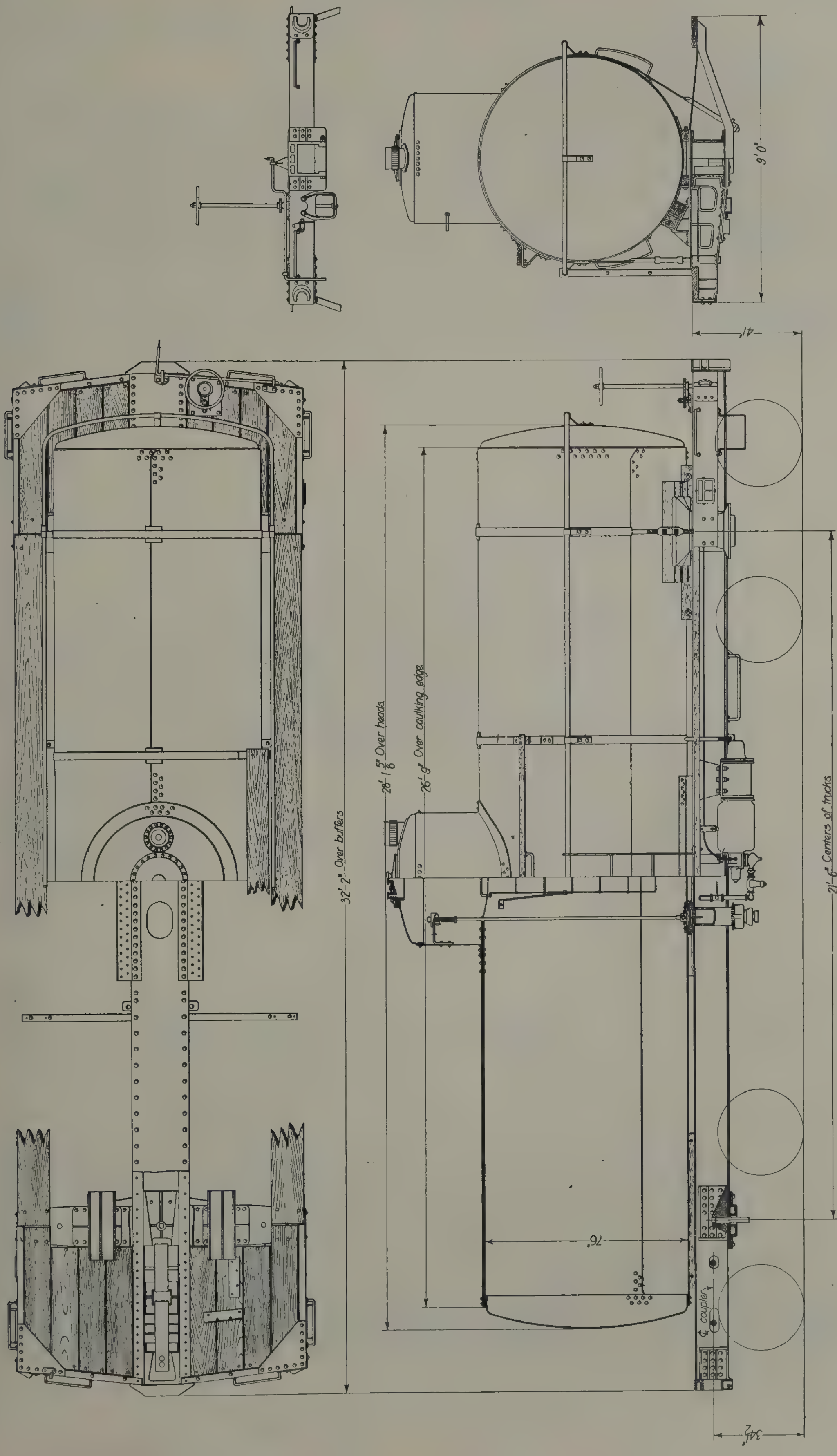


Fig. 175—Steel Frame, Class X-3, Tank Car. Capacity 6,500 U. S. Gallons. Union Tank Line.

Fig. 176—Steel Underframe Car with Wooden Vats for Carrying Pickles in Brine.
Builder, General American Tank Car Corporation.

Fig. 177—Steel Underframe Car with Wooden Tank for Vinegar.
Builder, General American Tank Car Corporation.

Fig. 178—General Service Steel Oil Tank Car. Builder, General American Tank Car Corporation.

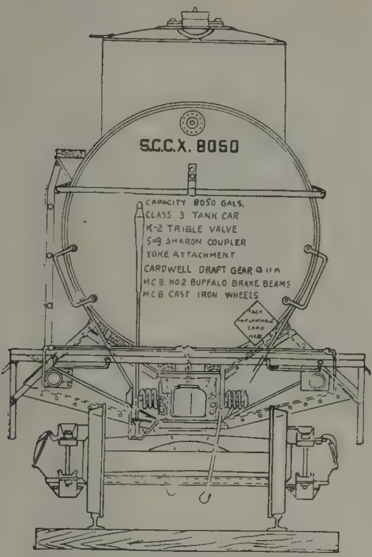


Fig. 179—Steel Tank Car. Designed and Built by The Standard Car Construction Company.

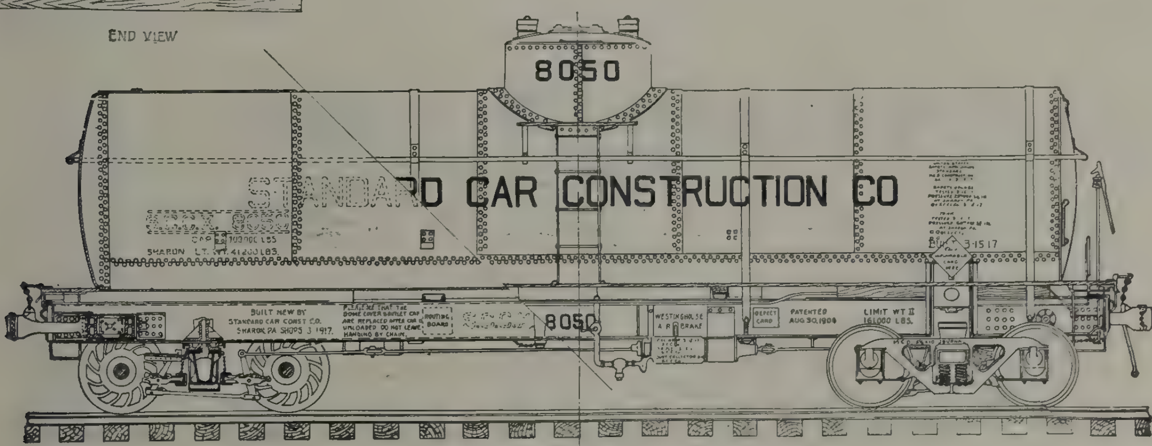


Fig. 180—Steel Tank Car Shown in Fig. 179.

Fig. 181—Steel Tank Car for Dry Powder, Loaded Through Three Domes, Unloaded Through Six Discharge Hoppers. Builder, General American Tank Car Corporation.

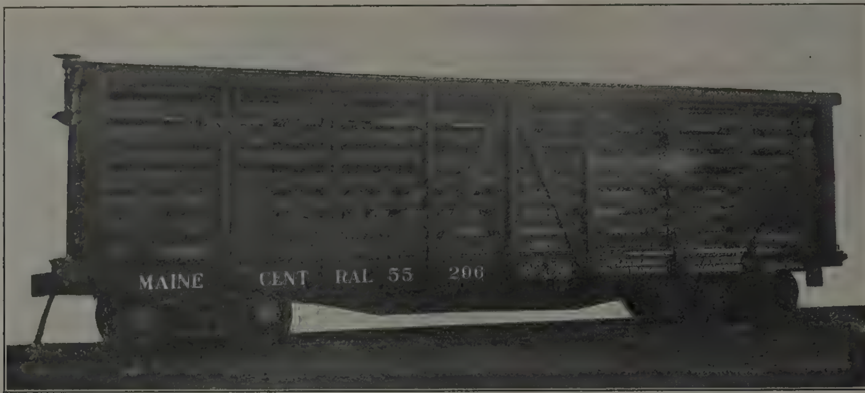


Fig. 182—Steel Underframe 40-Ton Capacity Car with Wood and Lumber Rack. Inside Length, 38 ft. 1 in.; Inside Width, 8 ft. 6 in.; Inside Height, 8 ft. 1 in. Builder, Laconia Car Company.

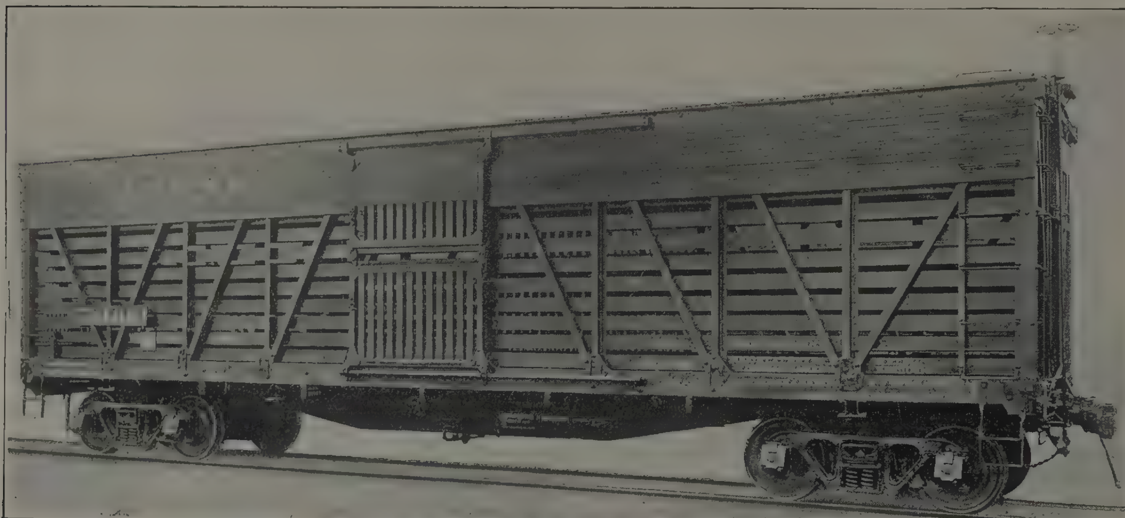


Fig. 183—Steel Frame Stock Car. Capacity, 40-Ton; 2,687 cu. ft.; Weight, 46,000 lb.; Inside Length, 40 ft. Builder, Haskell & Barker Car Company.

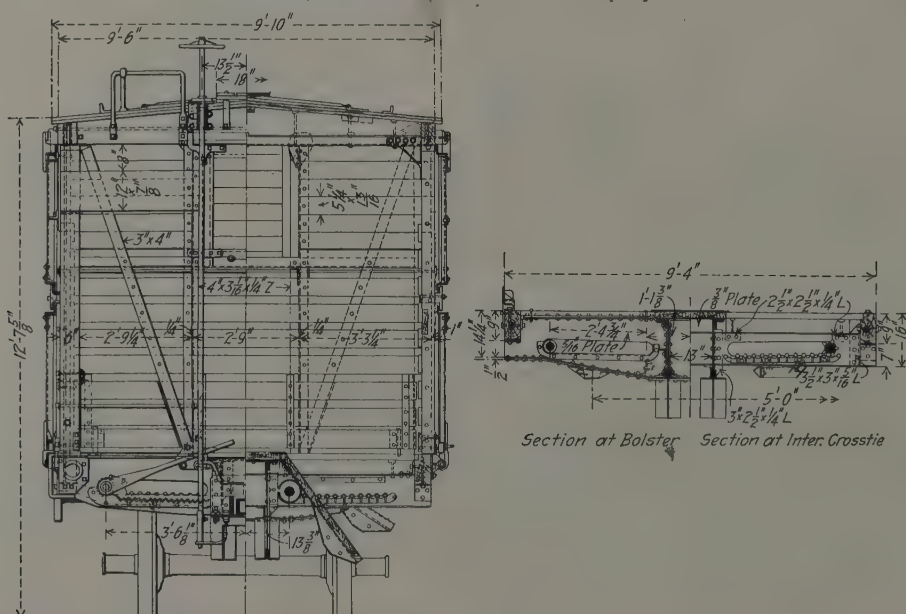


Fig. 184—End Elevation and Cross Sections of Steel Frame 40-Ton Capacity Drop Bottom Stock and General Service Car. National Dump Car Company.

Fig. 185—General Service Stock Car (Side View). Drop Doors Open After Unloading Coal. Builder, National Dump Car Company.
(*See Figs.* 185*A*-185*B*.)

Fig. 185-A—General Service Stock Car (Interior View). Drop Doors Closed for Loading Stock, Coal or Coke, etc. Floor Is Securely Supported.
(*See Figs.* 185 *and* 185*B*.)

Fig. 185-B—General Service Stock Car (Interior View). Drop Doors Open After Unloading Coal.
(*See Figs.* 185-185*A*.)

Fig. 186—Steel Frame, Southern Pacific Stock Car. Capacity, 40-Tons, 2,596 cu. ft.; Weight, 35,500 lb.; Inside Length, 36 ft. 6⅛ in.; Inside Width, 8 ft. 5⅜ in. Builder, The Ralston Steel Car Company.

(*See Figs.* 187-188.)

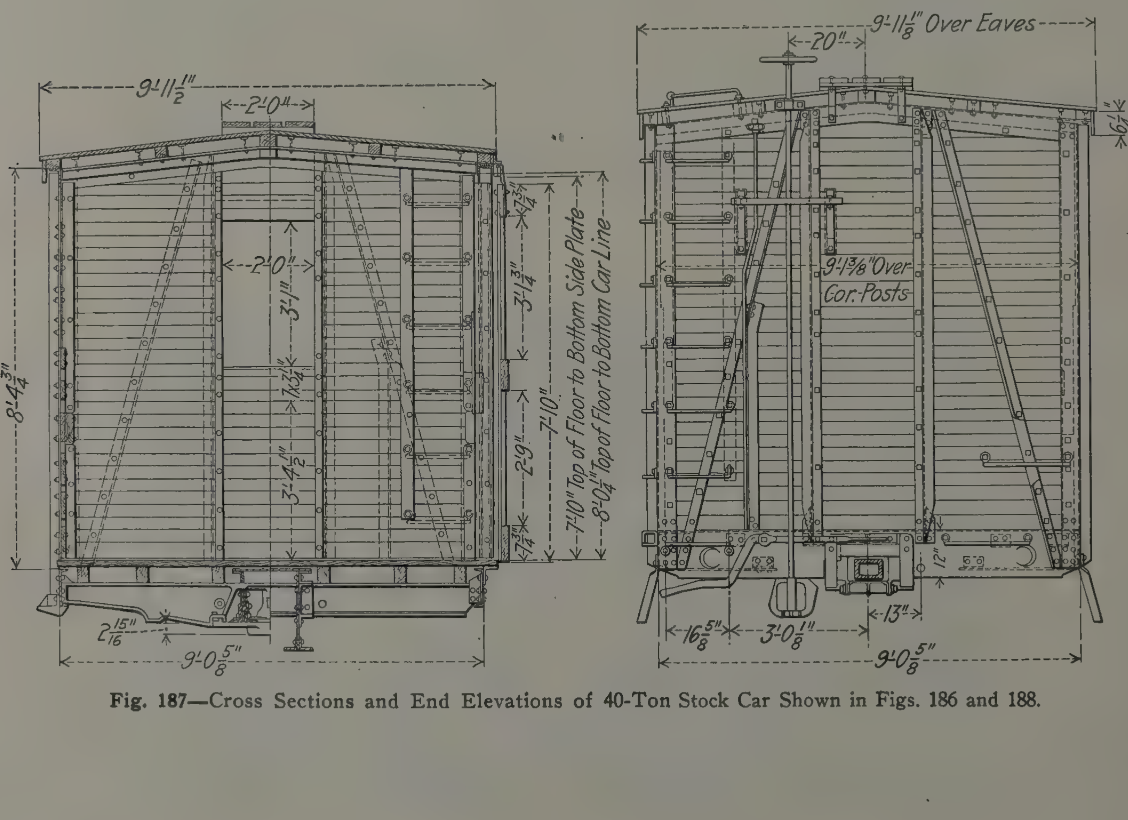


Fig. 187—Cross Sections and End Elevations of 40-Ton Stock Car Shown in Figs. 186 and 188.

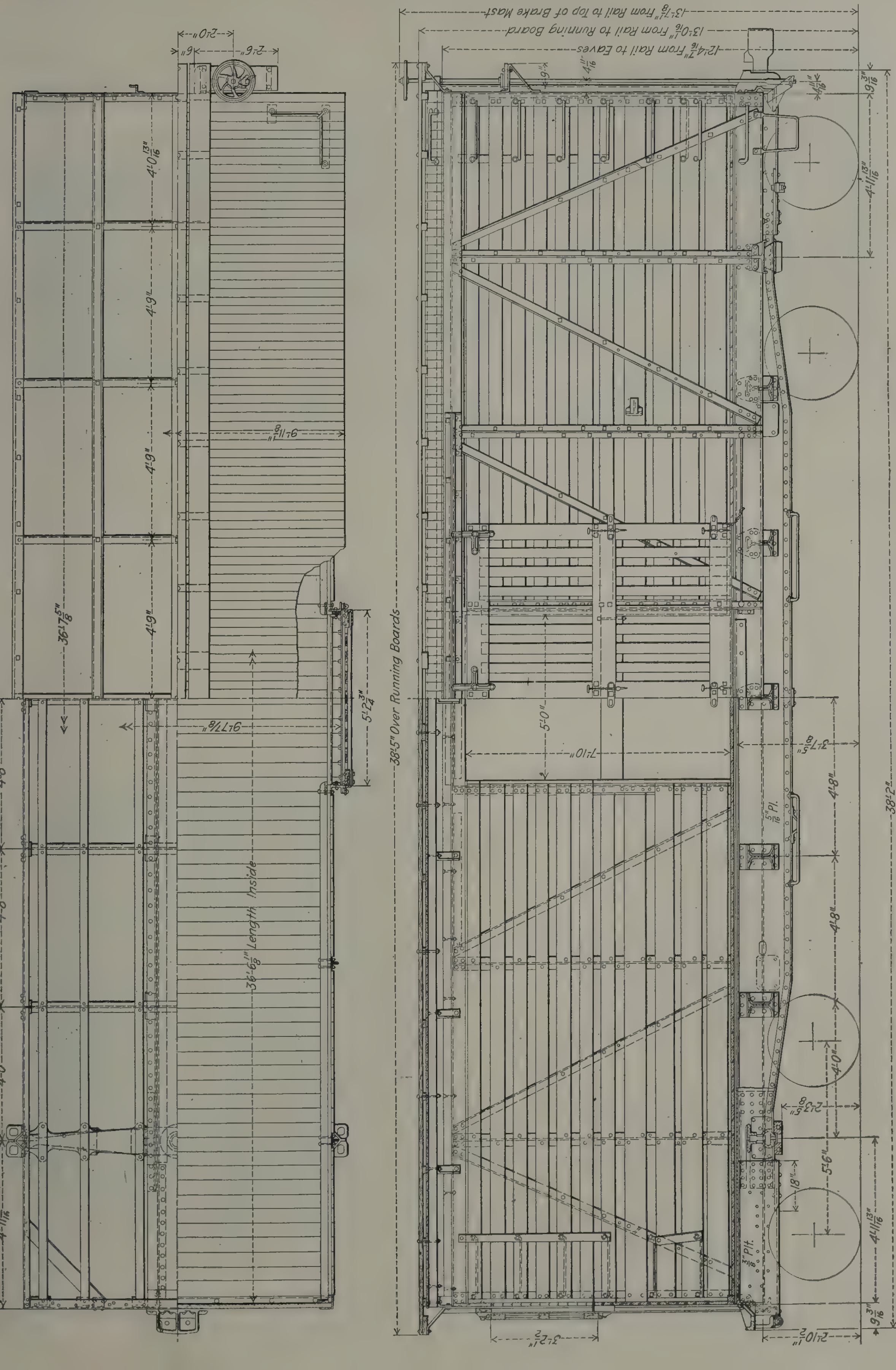


Fig. 188—Plan and Elevation of 40-Ton Stock Car Shown in Figs. 186-187. Builder, The Ralston Steel Car Company.

Fig. 189—Wooden Stock Car, Capacity 40-Ton, 2,420 cu. ft.; Weight, 41,100 lb.; Inside Length, 40 ft. 0 in. Builder, American Car & Foundry Company.

(*See Figs.* 190-192.)

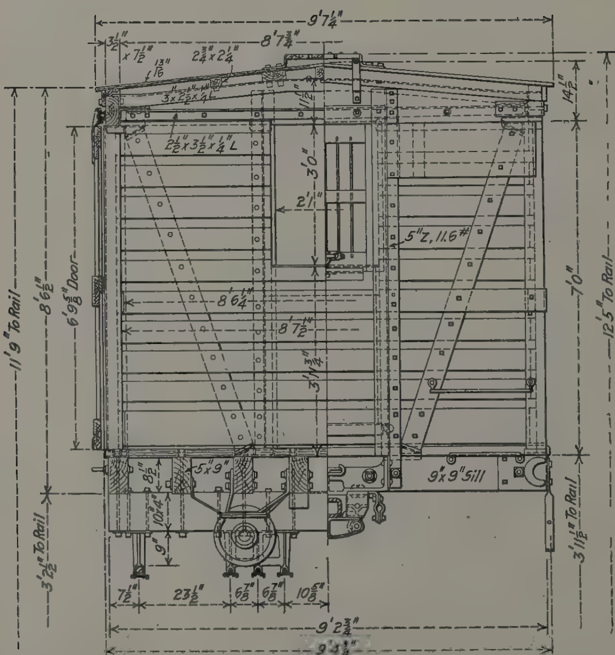


Fig. 190—Half End View and Section of Stock Car Shown in Figs. 189-191-192.

Fig. 191—End View of Stock Car Shown in Figs. 189-190-19

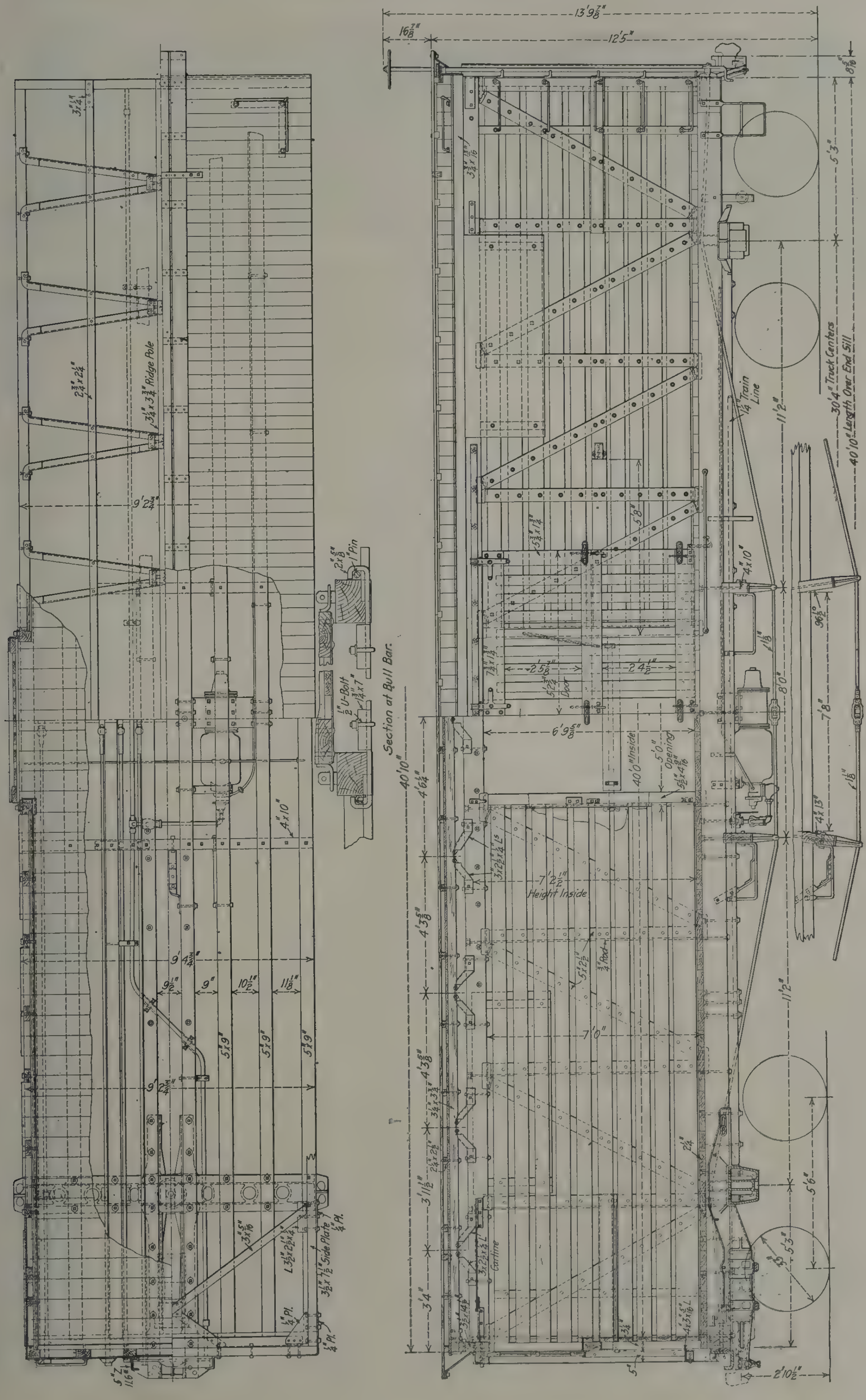


Fig. 192—Plan and Elevation of 40-Ton Wooden Stock Car Shown in Figs. 189-191. Builder, American Car & Foundry Company.

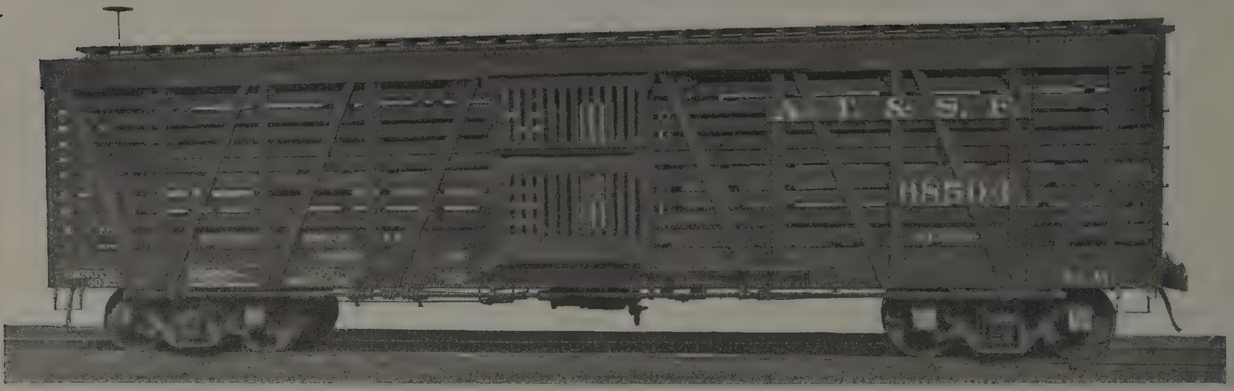


Fig. 193—Steel Frame, Double Deck Stock Car. Capacity, 40 Tons, 2,366 cu. ft.; Weight, 47,700 lb.; Inside Length, 40 ft. 0 in.; Inside Width, 8 ft. 8 in. Atchison, Topeka & Santa Fe Railway.
(*See Figs.* 194-197.)

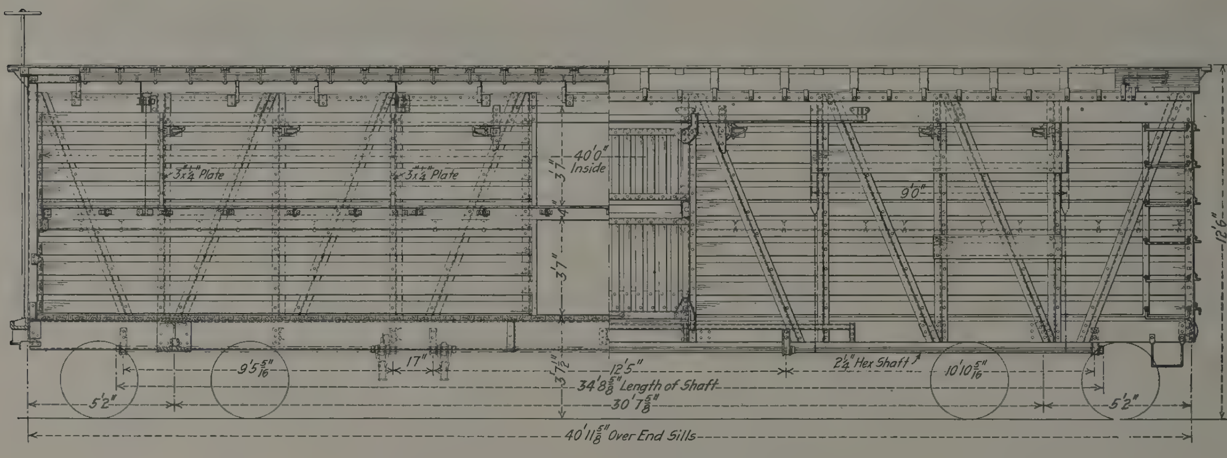


Fig. 194—Side Elevation of Santa Fe Stock Car.

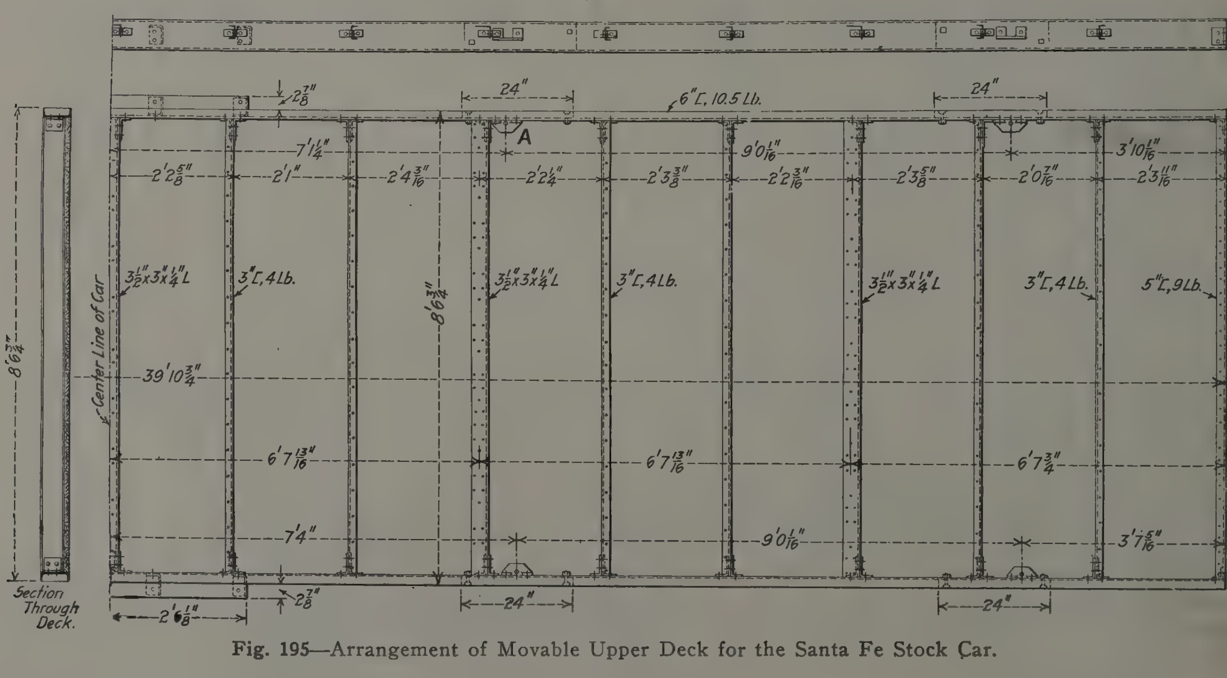


Fig. 195—Arrangement of Movable Upper Deck for the Santa Fe Stock Car.

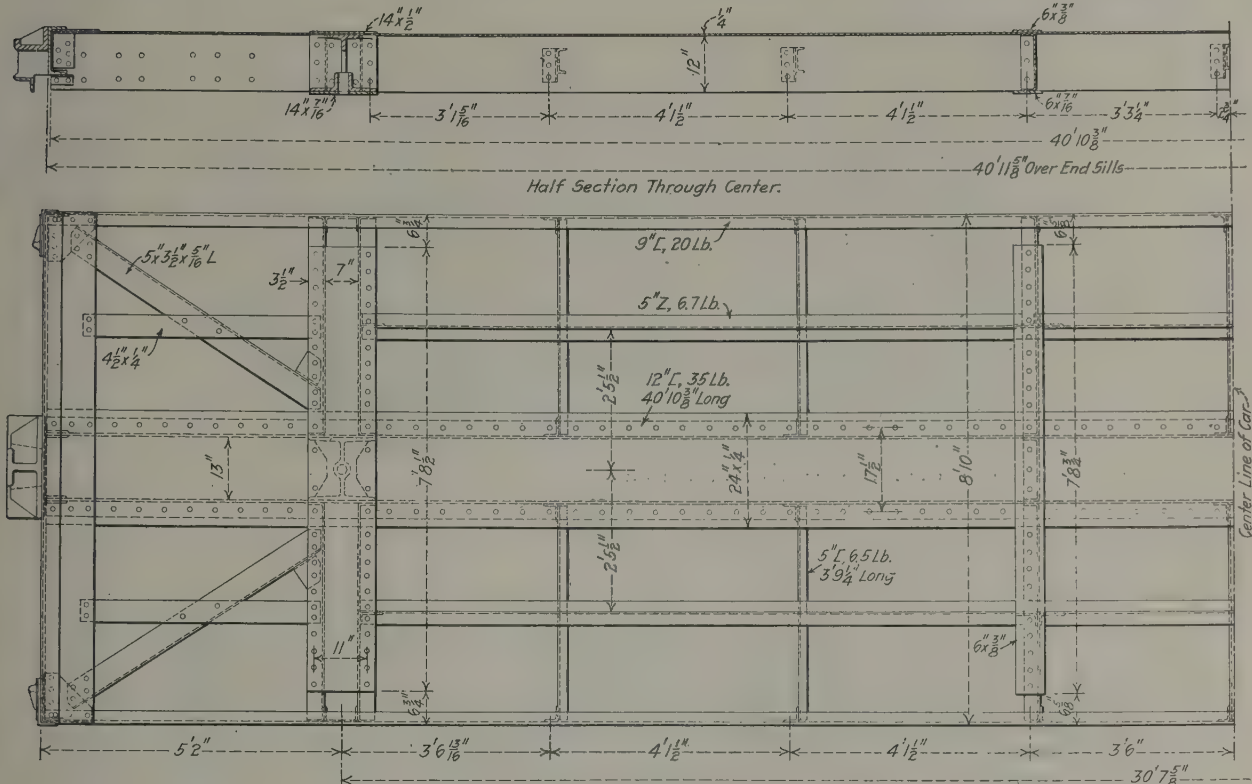


Fig. 196—Steel Underframe for Santa Fe Stock Car.

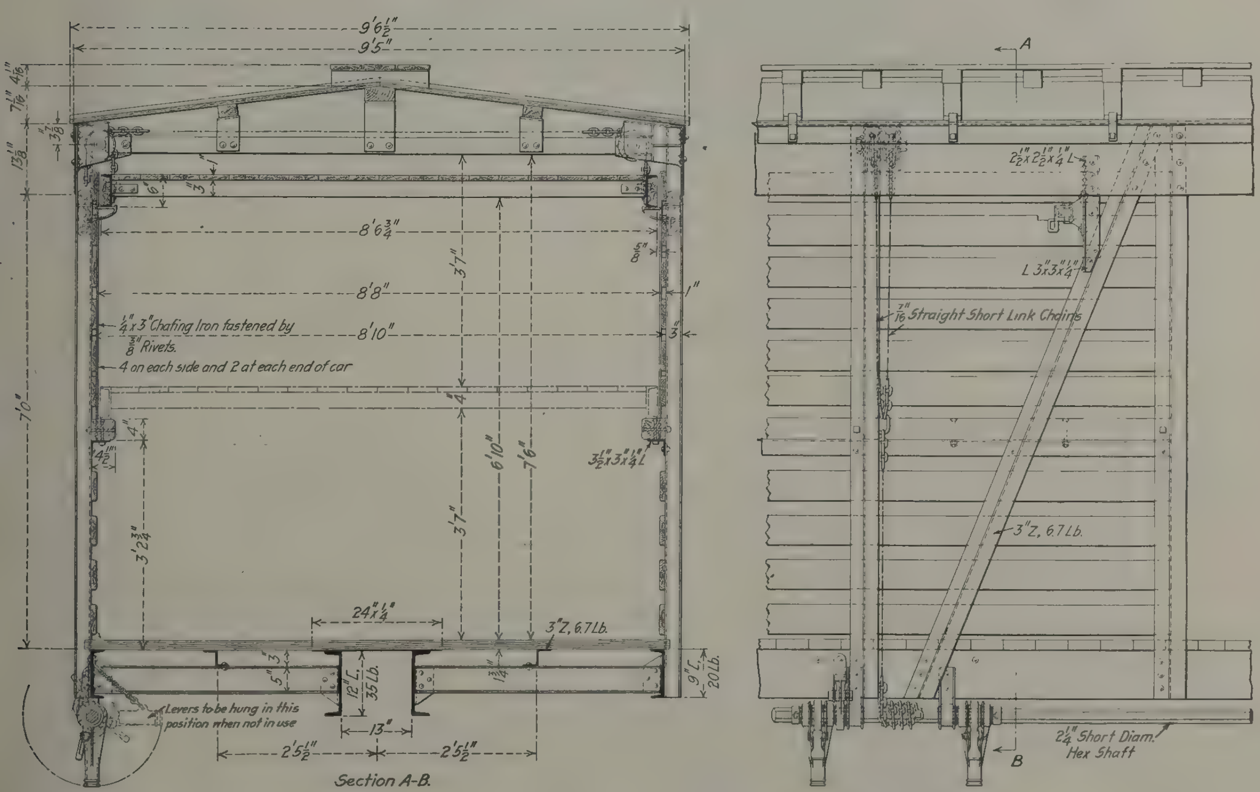


Fig. 197—Sections Showing Door Operating Mechanism of Santa Fe Stock Car.

Fig. 198—Steel Underframe 10-Ton Capacity Poultry Car. Weight, 43,000 lb.; Inside Length, 36 ft.; Number of Coops, 128. Builder, American Car & Foundry Company

Fig. 199—Steel Underframe 30-Ton Capacity Stock Car. Weight, 34,300 lb.; Inside Length, 36 ft.; Inside Width, 8 ft. 5½ in.; Inside Height, 8 ft. 0½ in. Builder, Pressed Steel Car Company.

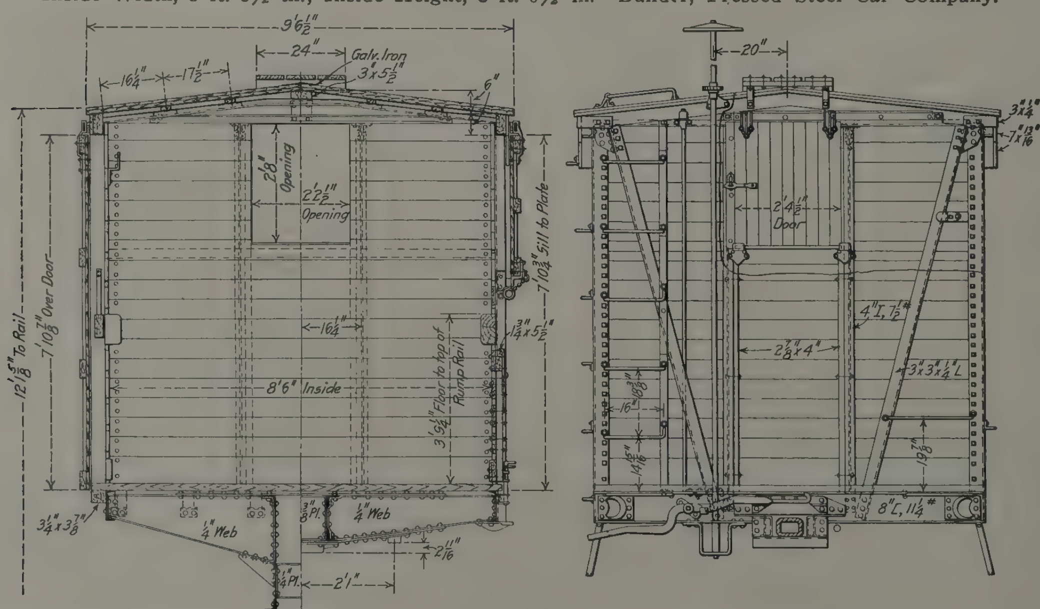


Fig. 200—Cross Sections and End Elevation of Missouri Pacific Steel Frame Stock Car Shown in Fig. 201.

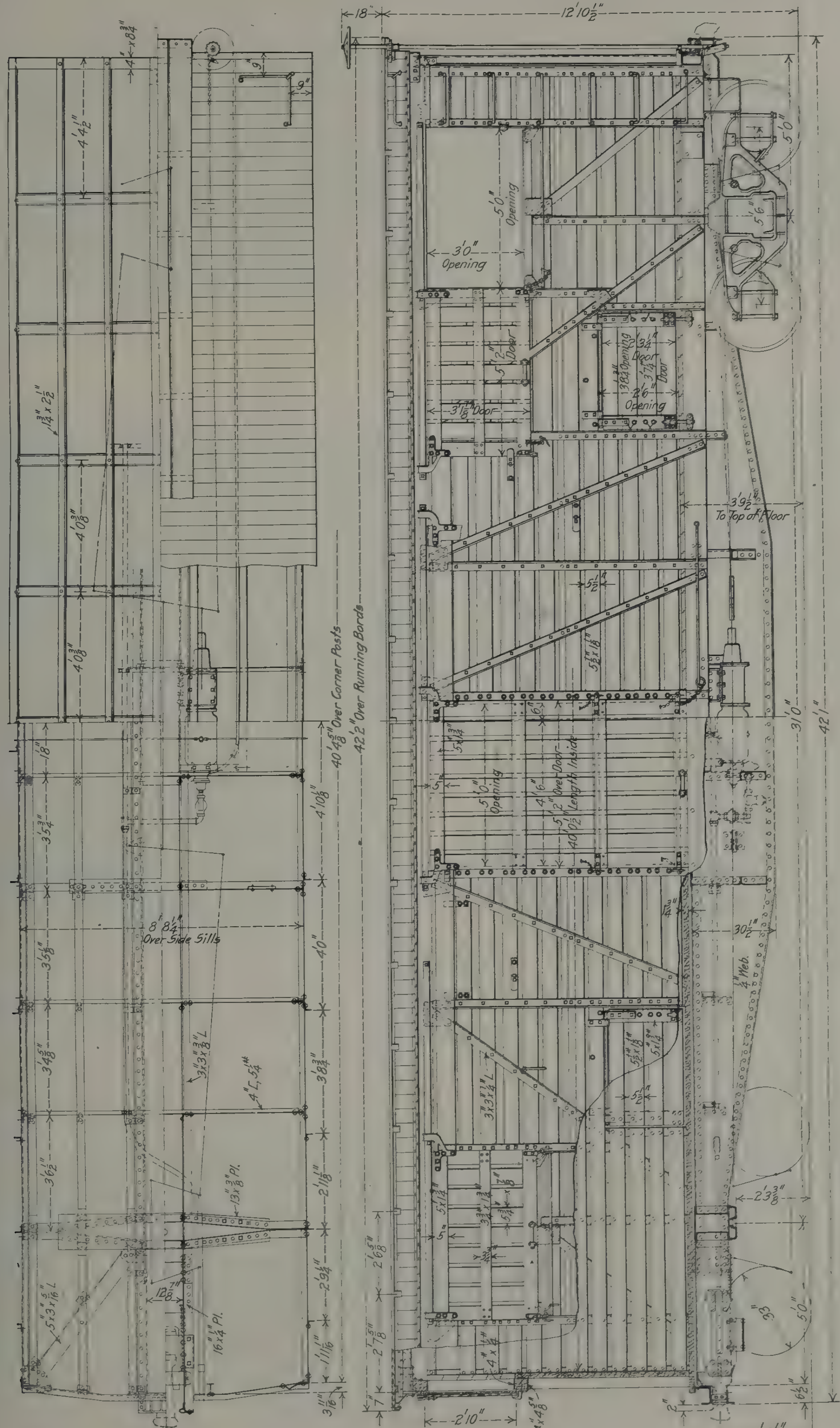


Fig. 201—Missouri Pacific Steel Frame 40-Ton Capacity Stock Car. Builder, American Car & Foundry Company. See also Fig. 200.

Fig. 202—Steel Underframe Express Car for the Transportation of Horses. Builder, The Harlan Works of The Bethlehem Ship Building Corporation, Ltd.

Fig. 203—Interior View of Car Shown in Fig. 205, Showing Stall Partitions Folded.

Fig. 204—Interior View of Car Shown in Fig. 205, Showing Stall Partitions as Arranged when Car is Loaded.

Fig. 205—Steel Express Car for the Transportation of Horses. Weight, 126,000 lb.; Length of Body Outside, 70 ft. Builder, American Car & Foundry Company.

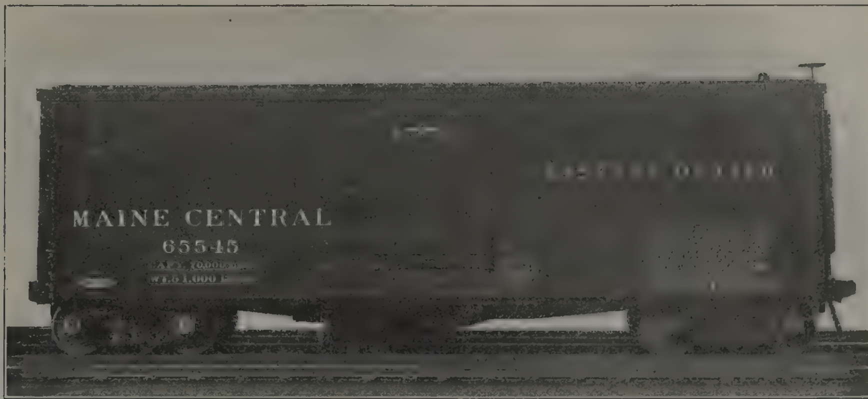


Fig. 206—Steel Underframe 35-Ton Capacity Box Car with Heater Equipment. Weight, 51,000 lb.; Inside Length, 34 ft. 9 in.; Inside Width, 8 ft.; Inside Height, 7 ft. 6 in. Builder, Laconia Car Company.

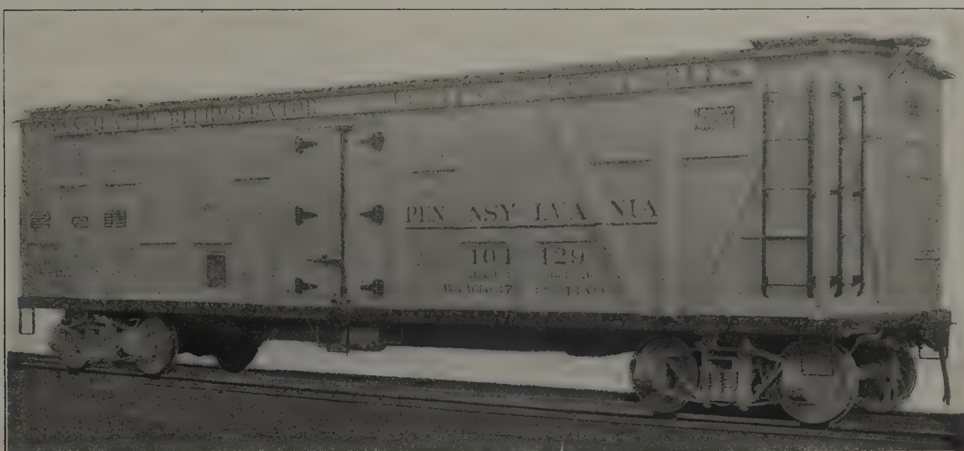


Fig. 207—45-Ton Capacity Ventilated Refrigerator Car. Weight, 60,700 lb.; Inside Length, 32 ft. 11 in.; Inside Width, 8 ft. 4 in.; Inside Height, 7 ft. 4 in. Builder, American Car & Foundry Company

Fig. 208—Steel Underframe 40-Ton Capacity Refrigerator Car. Weight, 55,000 lbs.; Inside Length, 33 ft.; Inside Width, 8 ft. 4 in.; Inside Height, 7 ft. 4 in.

Fig. 209—Steel Underframe 35-Ton Capacity Express Refrigerator Car. Inside Length, 41 ft. 2 in.; Inside Width, 8 ft. 10 in.; Inside Height, 6 ft. 11 in. Builder, Pressed Steel Car Company.
(*See Figs.* 210-211.)

Refrigerator Car Parts—See Figs. 210 and 211.

1 *Center Sill*
2 *Side Sill*
3 *End Sill*
4 *Body Bolster*
5 *Crossbearer*
6 *Sheathing*
7 *Hand Brake Shaft*
8 *Hatch*
9 *Ice Bunker*
10 *Bulkhead*
11 *Insulation*
12 *Brace*
13 *Post*
14 *Floor Stringer*
16 *Floor Grating*
17 *Roof*
18 *Ceiling*
19 *Side Door*
20 *Main Floor*
21 *End Brace*
22 *End Post*
23 *Furring*
24 *Ladder*
25 *Running Board*
26 *Center Plate*

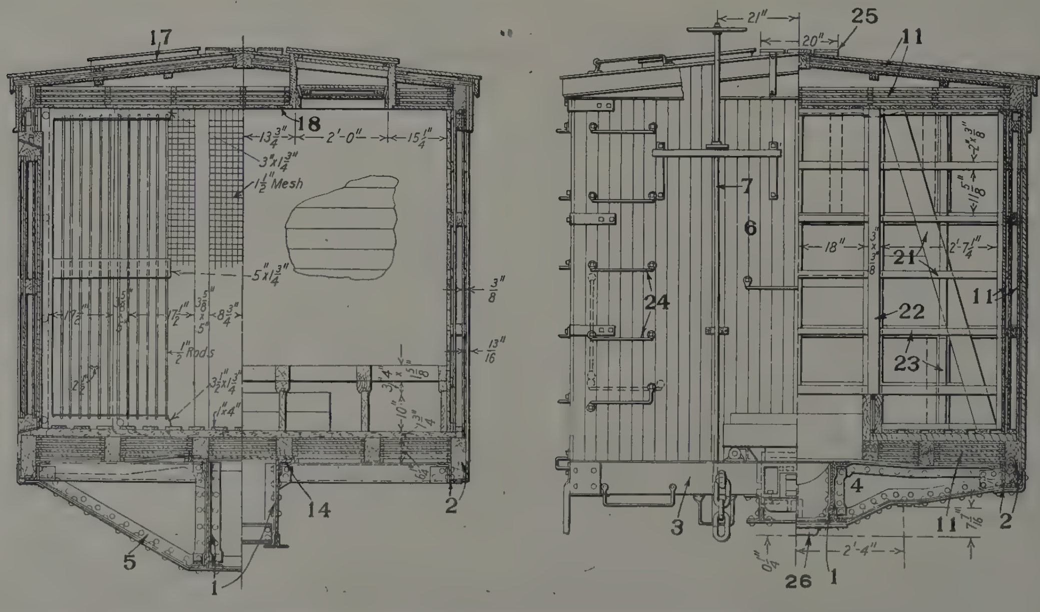


Fig. 210—End Elevation and Cross Sections of Northern Pacific Steel Underframe Refrigerator Car for Express Service. See also Fig. 209 and 211.

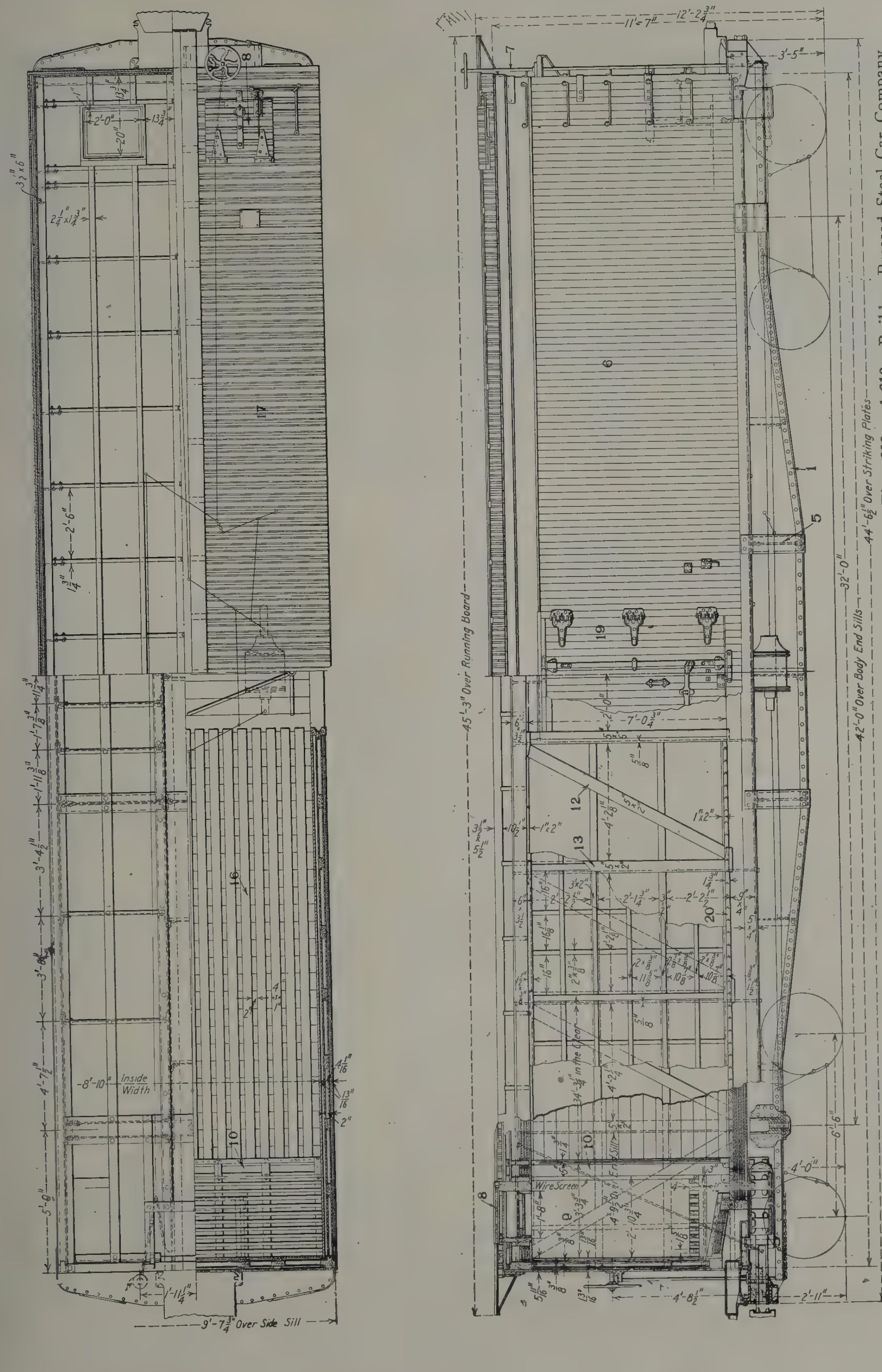


Fig. 211—Northern Pacific Steel Underframe Refrigerator Car for Express Service. See also Figs. 209 and 210. Builder, Pressed Steel Car Company.

See Page 352 for Names of Numbered Parts.

Fig. 212—Steel Frame Refrigerator Car. Capacity, 60,000 lb. of Lading, 10,000 lb. of Ice; Length between Bulkheads, 33 ft. 4⅝ in.; Inside Width, 8 ft. 4½ in.; Inside Height, 7 ft. 8¼ in. Builder, Norfolk & Western Railway.

(See Figs. 213-217.)

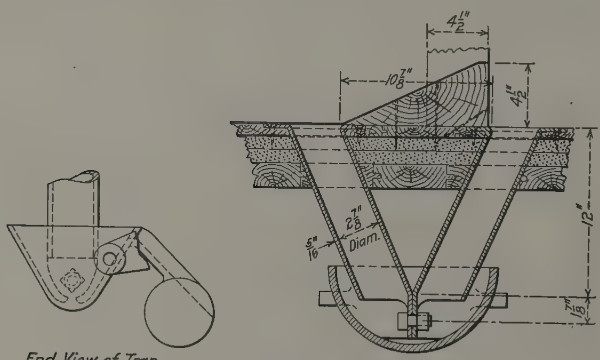


Fig. 213—Drip Trap for Norfolk & Western Refrigerator Car.

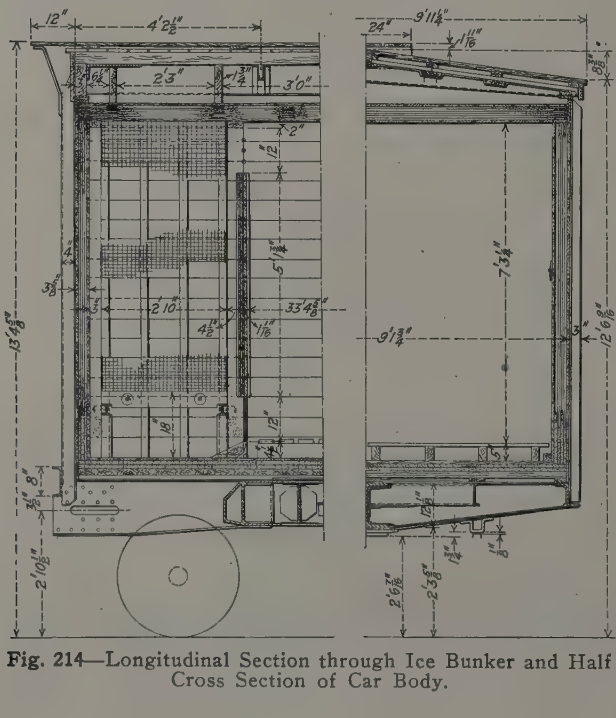


Fig. 214—Longitudinal Section through Ice Bunker and Half Cross Section of Car Body.

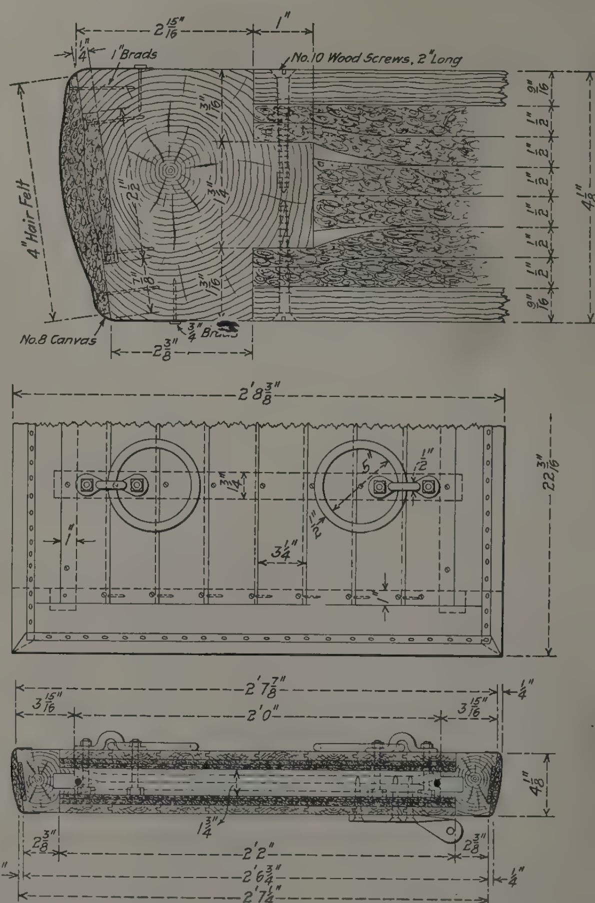


Fig. 215—Details of Hatch Plug.

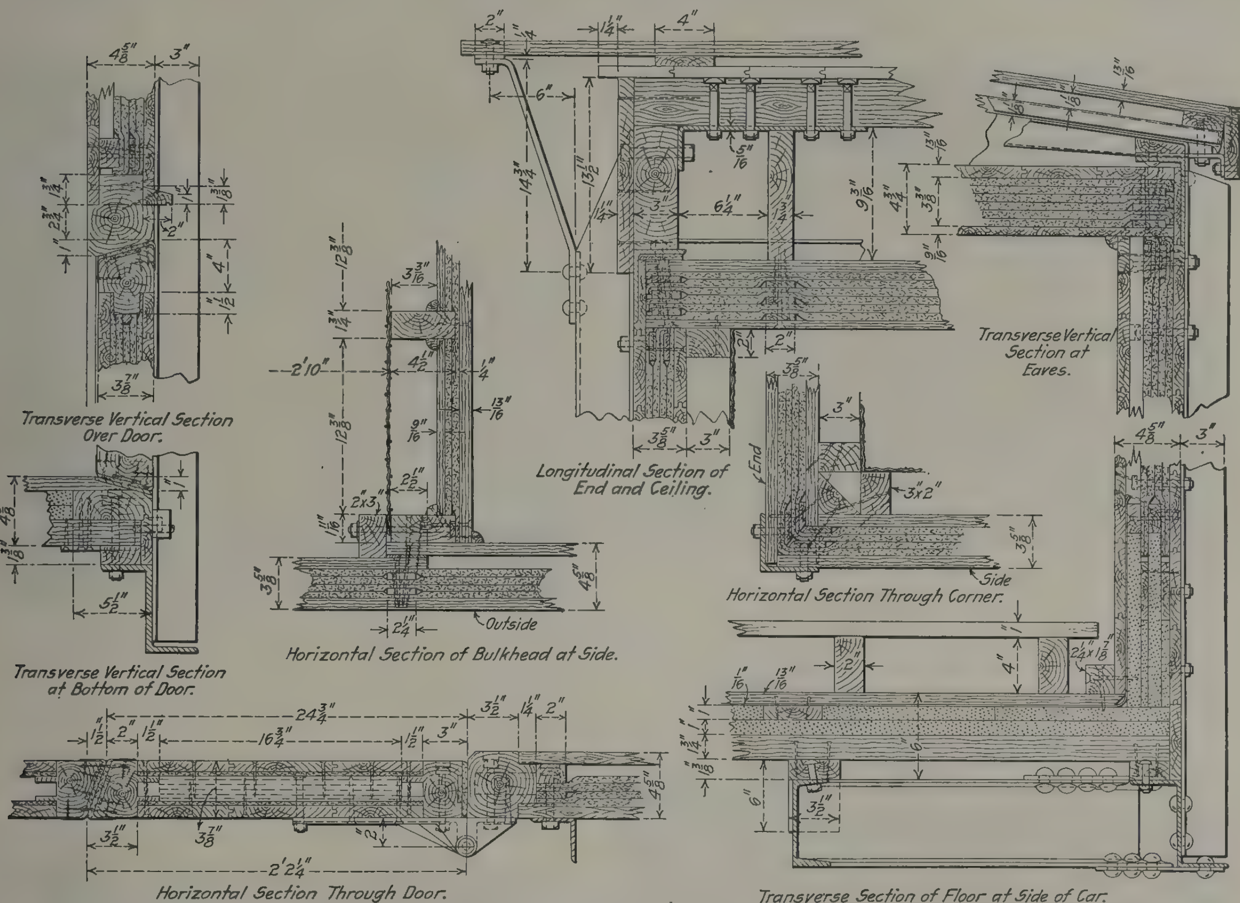


Fig. 216—Details of Insulation and Sheathing Construction. Norfolk & Western Refrigerator Car.

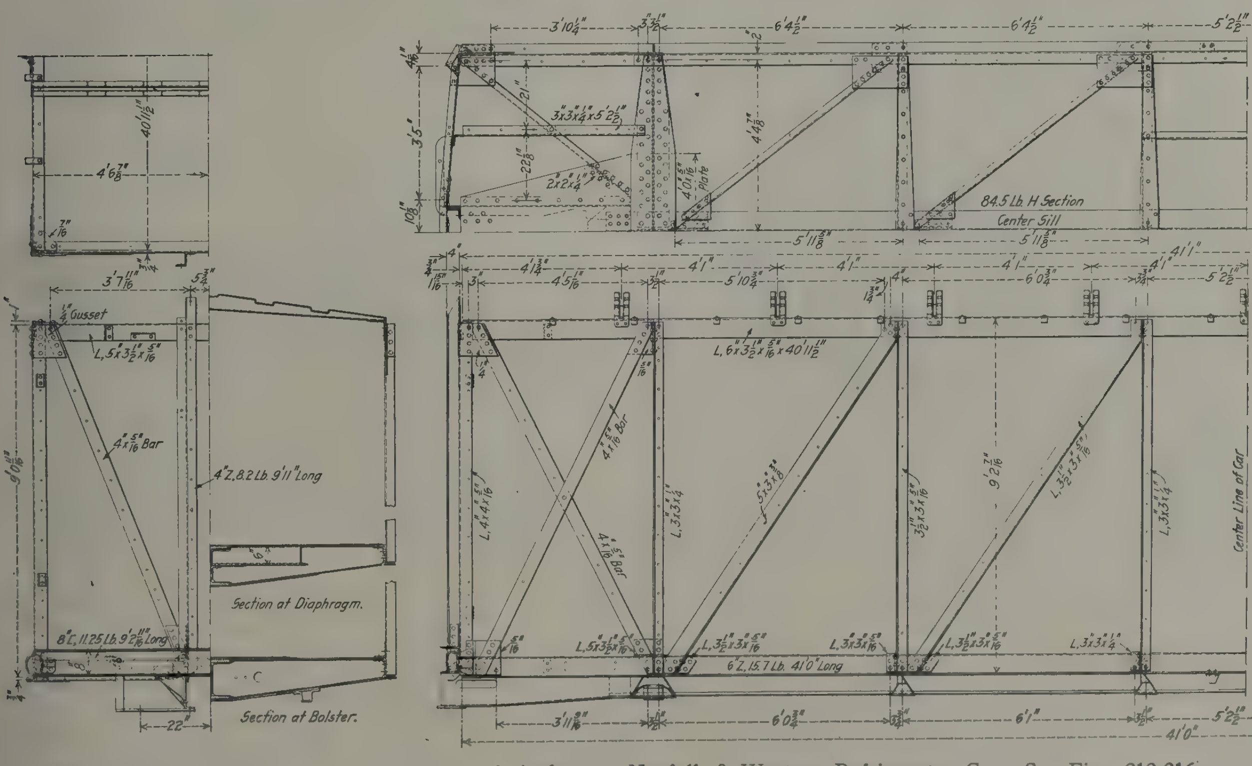


Fig. 217—Arrangement of Steel Body and Underframe. Norfolk & Western Refrigerator Car. See Figs. 212-216.

Fig. 218—Completed Interior.

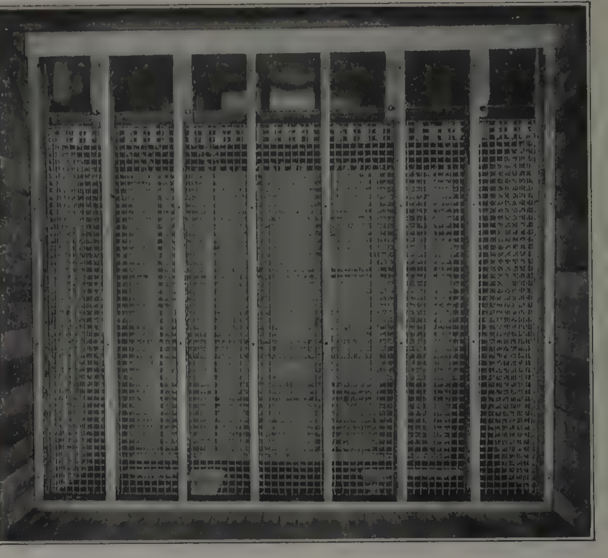


Fig. 219—Ice Bunker before Application of Bulkhead.

Fig. 220—Side Wall Insulation and Method of Sealing Joint at Floor.

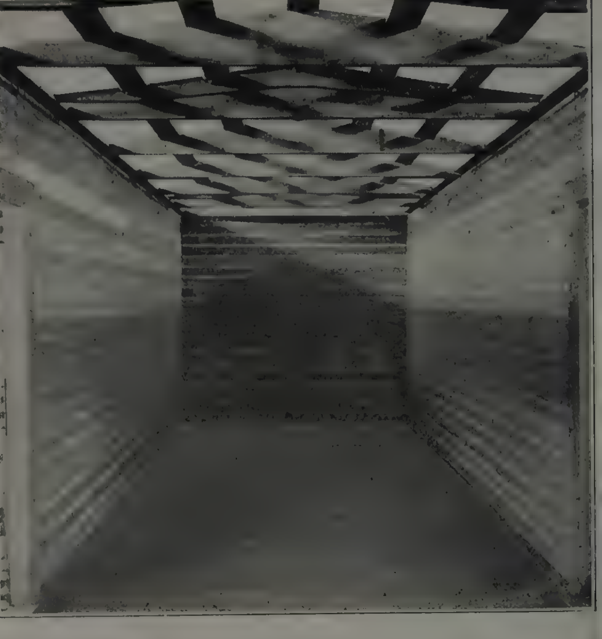


Fig. 221—After Application of Sub-Flooring and Outside Sheathing.

Interior Views of Norfolk & Western Refrigerator Cars Shown in Figs. 212-217.

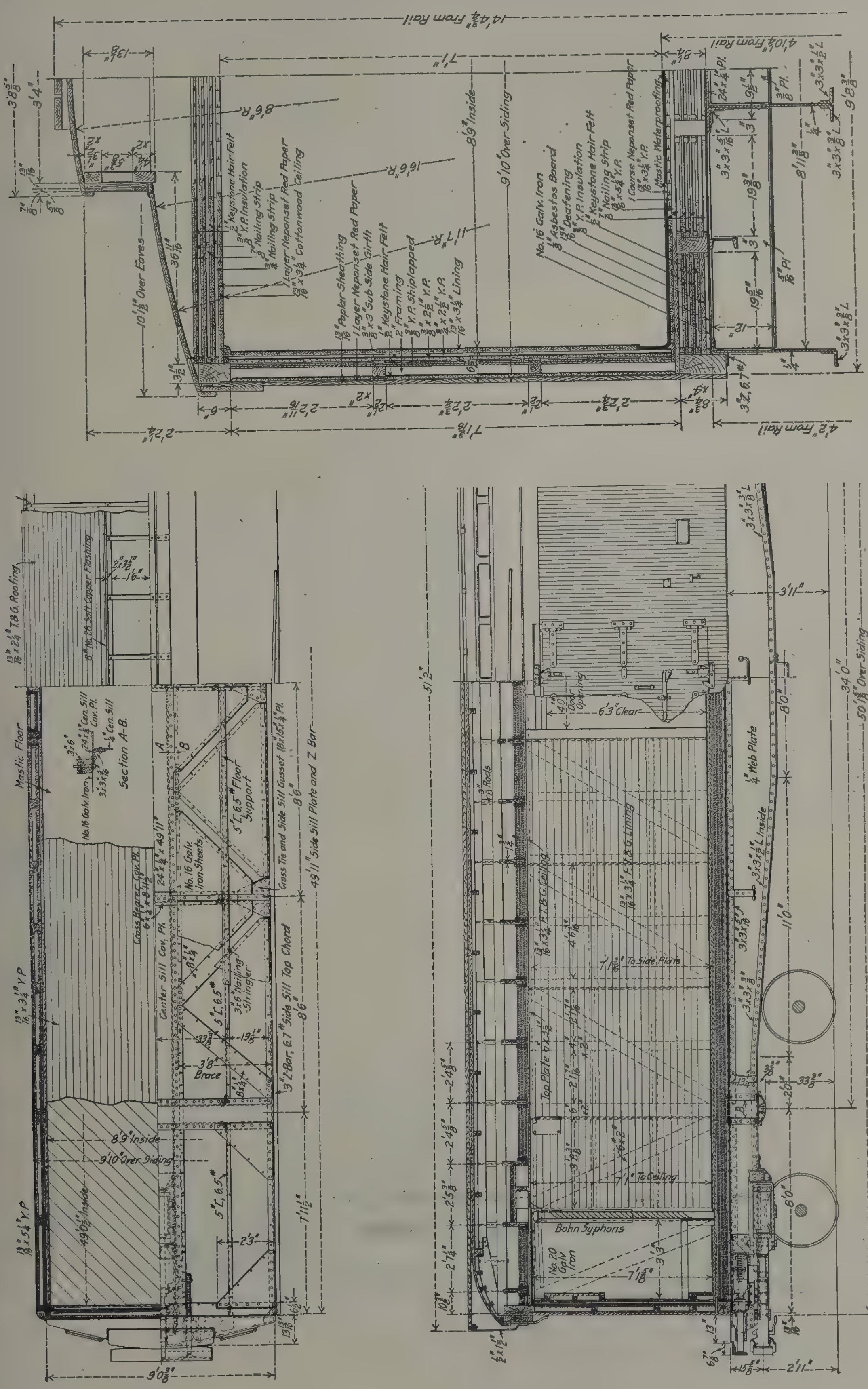


Fig. 222—Wells, Fargo & Co. Steel Underframe 30-Ton Capacity Refrigerator Car for Express Service. Builder, American Car & Foundry Company.

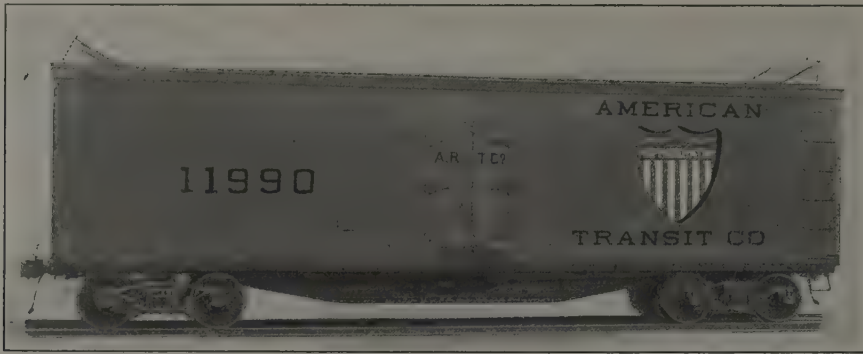


Fig. 223—Steel Underframe 30-Ton Capacity Refrigerator Car. Weight, 49,800 lb.; Inside Length, **32 ft.** 10 in.; Inside Width, 8 ft. 3⅝ in.; Inside Height, 7 ft. 6 in. Builder, American Car & Foundry Company. *(See Figs. 224 and 226.)*

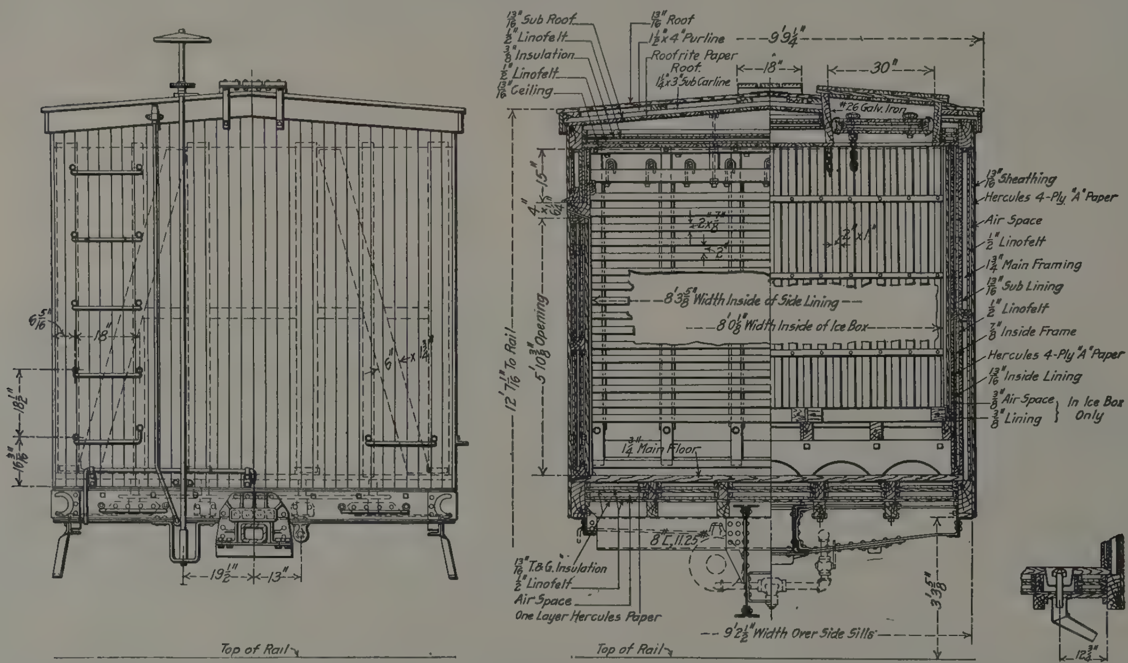


Fig. 224—End Elevation and Cross Sections of American Refrigerator Transit Company Steel Underframe Refrigerator Car Shown in Figs. 223 and 226.

Fig. 225—Steel Underframe 30-Ton Capacity Refrigerator Car. Weight, 47,400 lb.; Inside Length, 33 ft. 2 in.; Inside Width, 8 ft. 2 in.; Inside Height, 7 ft. 6 in. Builder, Marsh Refrigerator Service Company.

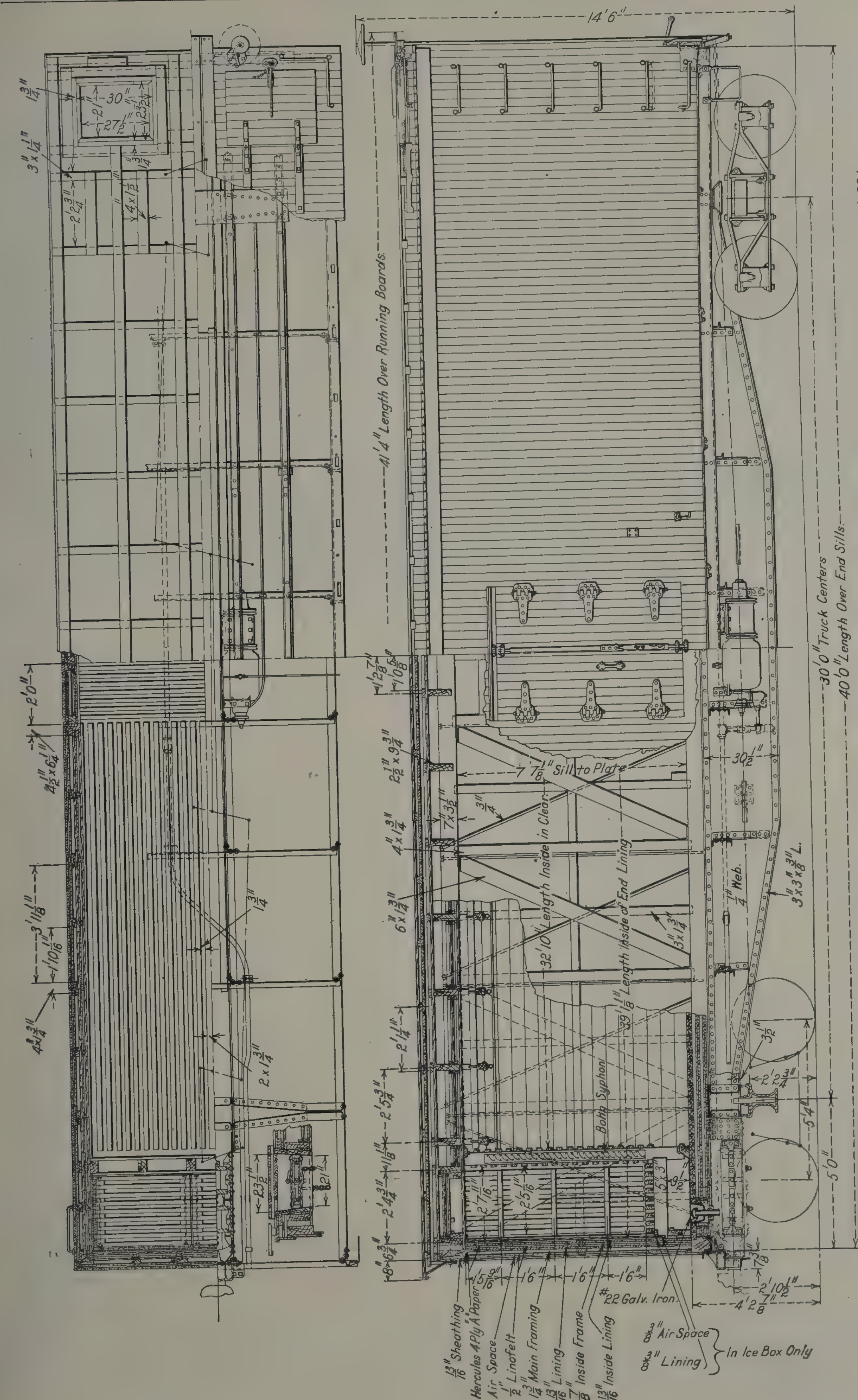


Fig. 226—American Refrigerator Transit Company Steel Underframe 30-Ton Capacity Refrigerator Car Shown in Figs. 223 and 224. Builder, American Car & Foundry Company.

Fig. 227—Wooden Refrigerator Car with Collapsible Bulkheads. Capacity, 30 Tons; Weight, 52,000 lb.; Length between Bulkheads, 33 ft. 2¼ in.; Inside Width, 8 ft. 2¾ in. Builder, American Car & Foundry Company.

(See Figs. 228-230.)

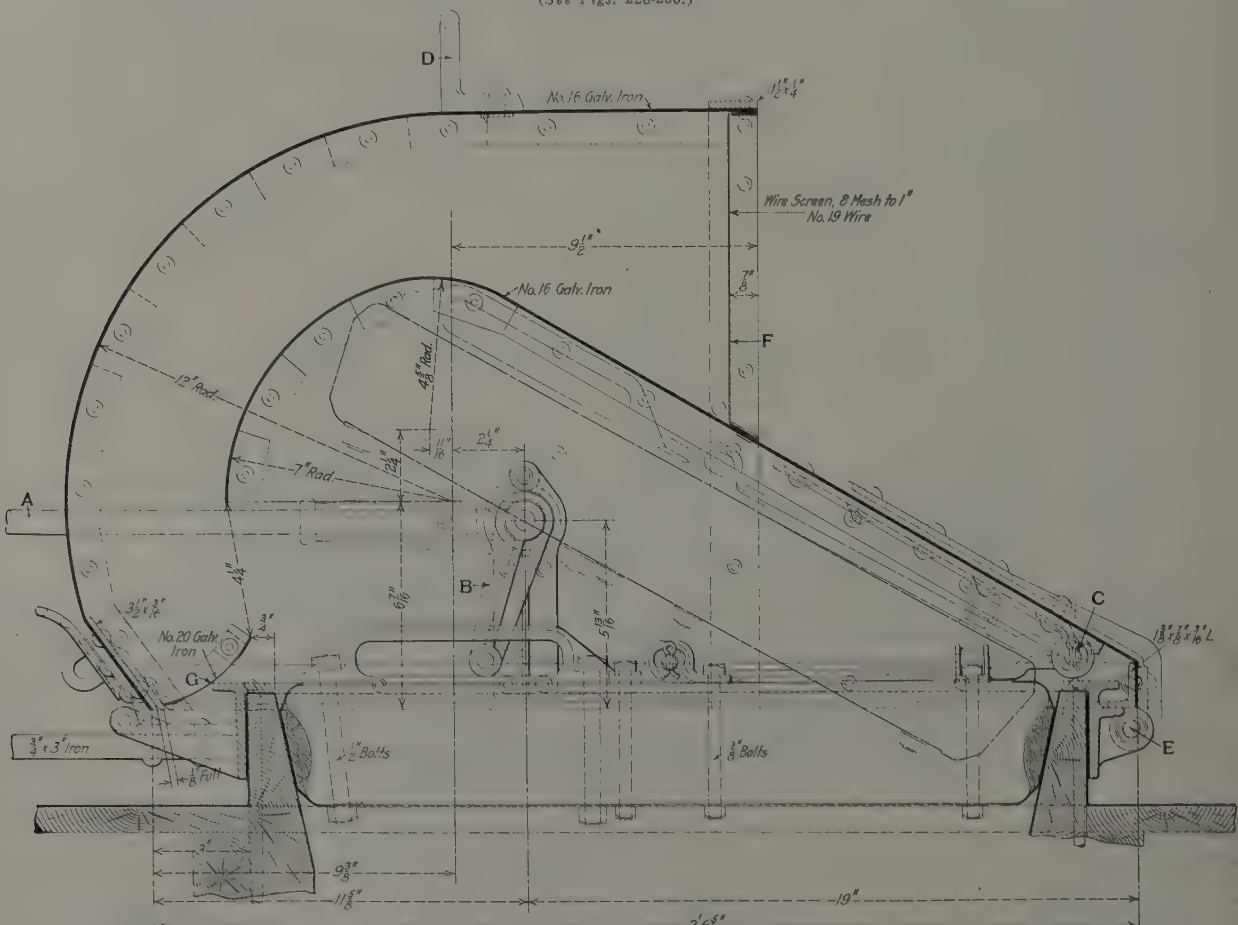


Fig. 228—Santa Fe Refrigerator Car Ventilator.

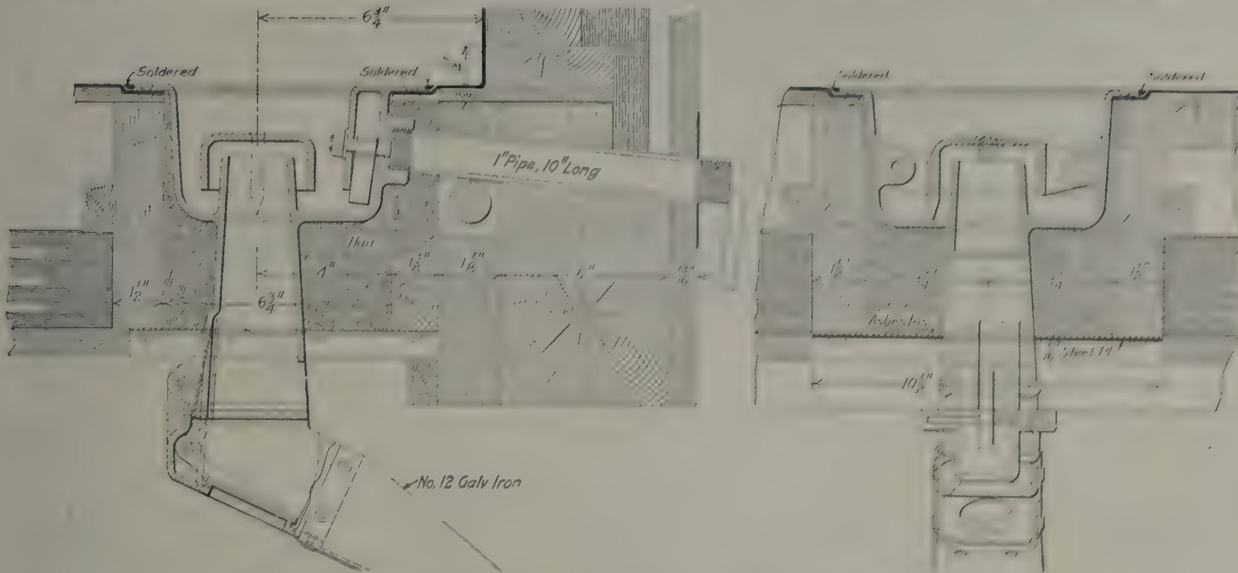


Fig. 229—Malleable Iron Double Trap and Drain. Santa Fe Refrigerator Car.

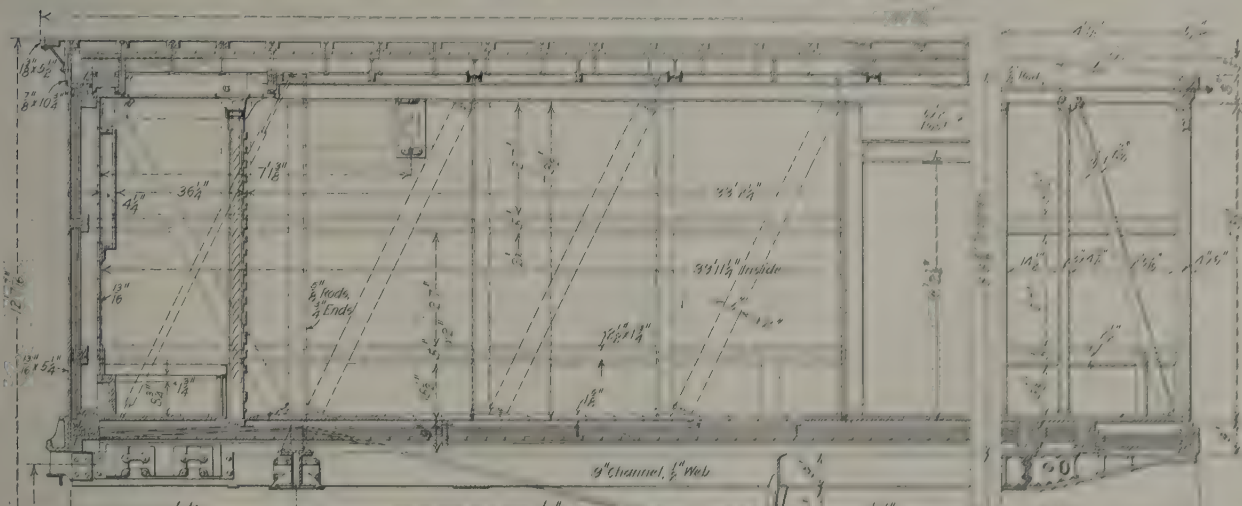


Fig. 230—Plan and Elevation, Santa Fe Refrigerator Car Shown in Figs. 227-229.

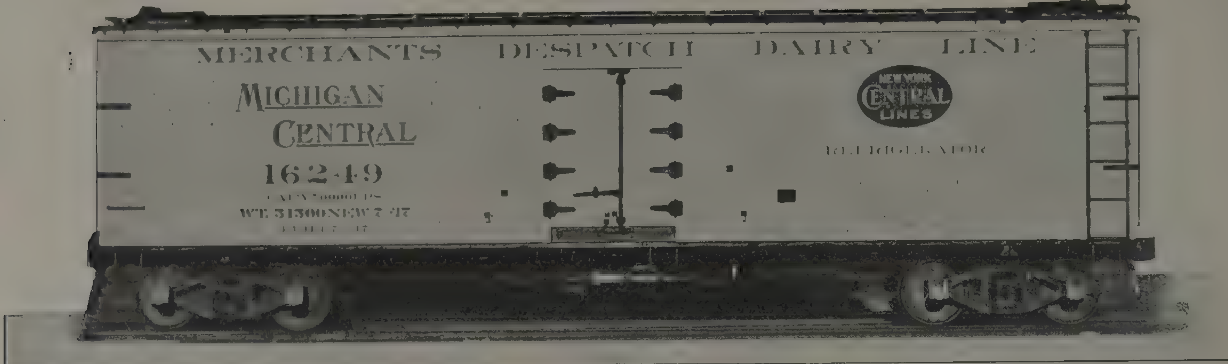


Fig. 231—Steel Underframe Refrigerator Car. Capacity, 70,000 lb., 2,026 cu. ft.; Inside Length, 40 ft. 5⅜ in.; Inside Width, 8 ft. 4⅞ in.; Weight, 51,500 lb. Builder, Merchants Despatch Transportation Company.

(See Figs. 232-234.)

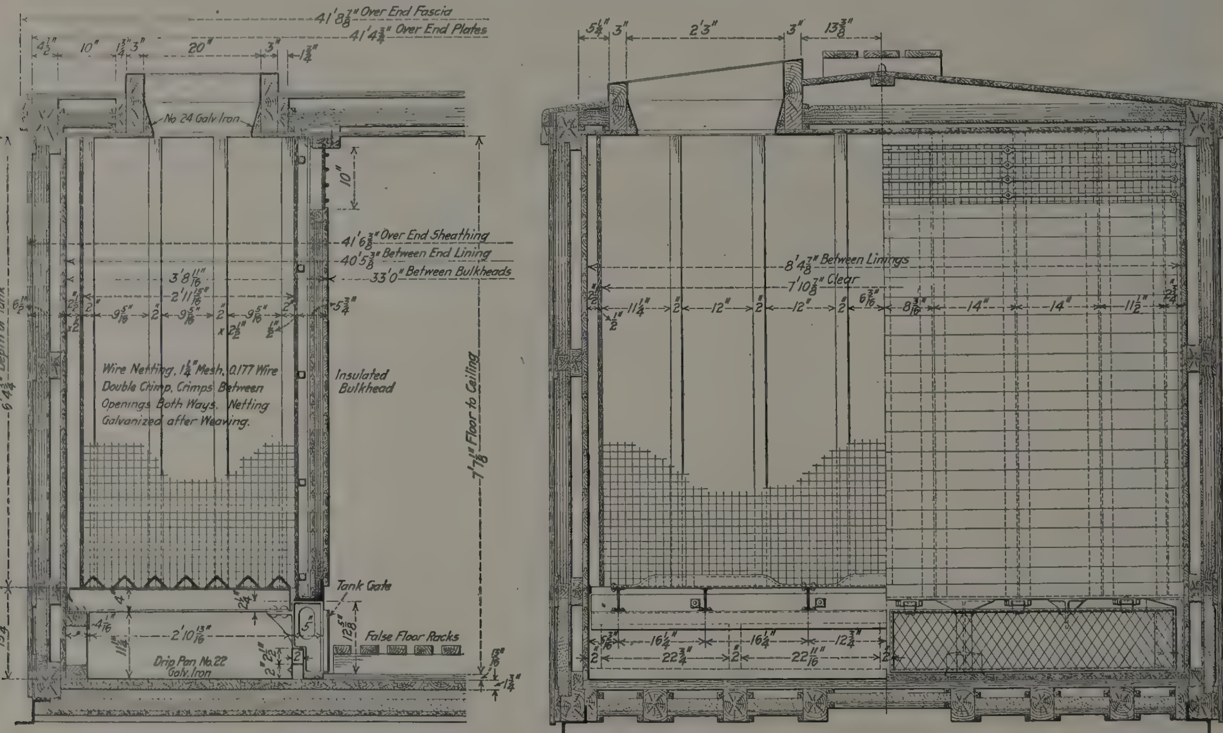


Fig. 232—Ice Bunkers. Michigan Central Refrigerator Car.

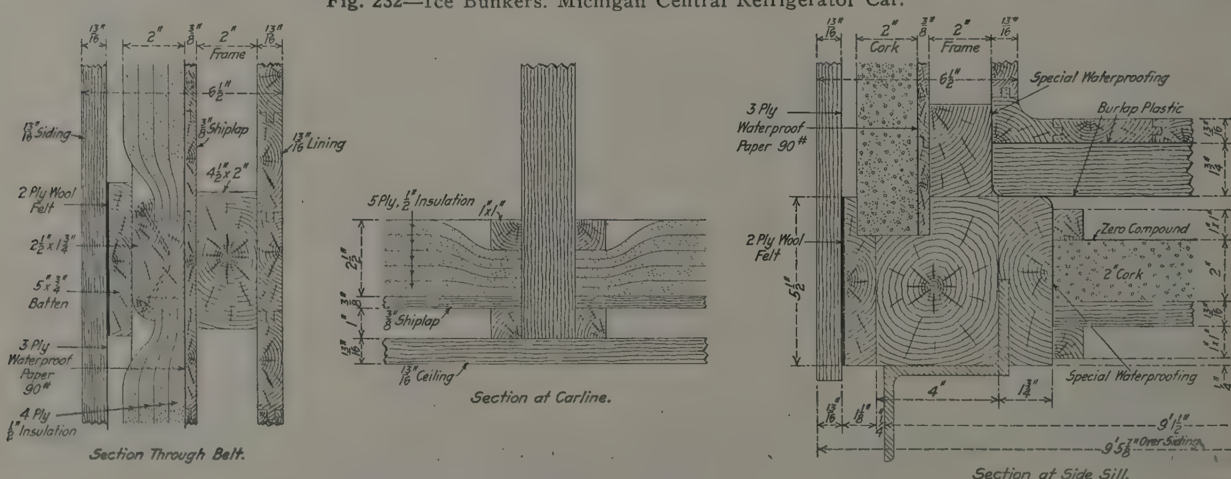


Fig. 233—Sections Showing Application of Insulation.

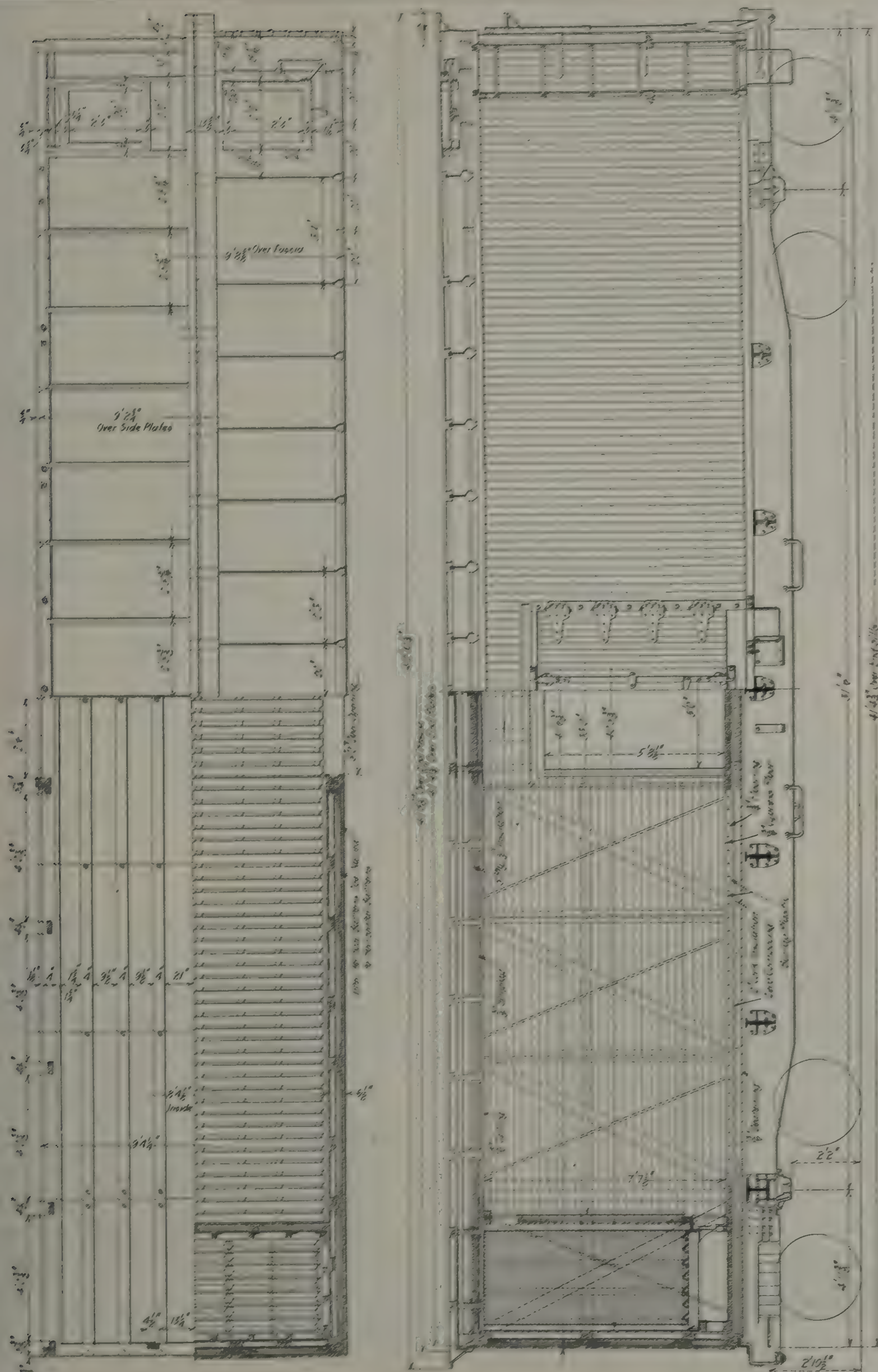


Fig. 234—Plan and Elevation. Michigan Central Refrigerator Car Shown in Figs. 231-233. Builder, Merchants Despatch Transportation Company.

Fig. 235—Steel Underframe Ventilated Refrigerator Car. Capacity 60,000 lb.; 2,077 cu. ft.; Inside Length, 35 ft. 1 in.; Inside Width, 8 ft. 2½ in.; Inside Height, 7 ft. 3 in.; Weight, 40,000 lb. Builder, Marsh Refrigerator Service Company.

Fig. 236—Steel Underframe 30-Ton Capacity Ventilated Box Car. Weight, 39,700 lb.; Inside Length, 36 ft.; Inside Width, 8 ft. 6 in.; Inside Height, 8 ft. Builder, American Car & Foundry Company.

Fig. 237—End View of Heater and Refrigerator Car Shown in Fig. 238-240.

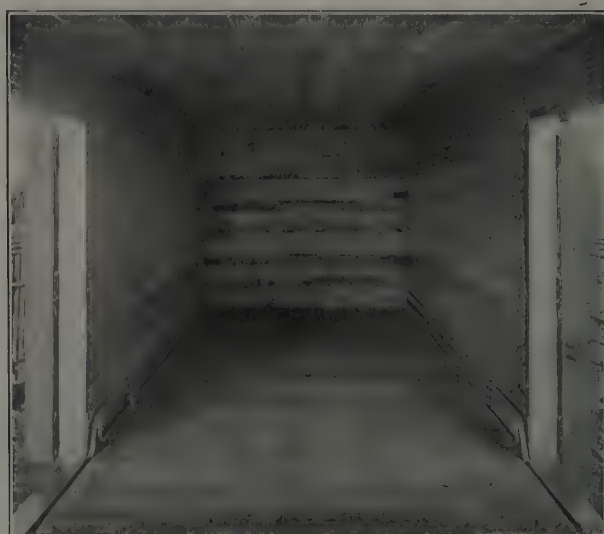


Fig. 238—Interior of Car Shown in Figs. 237-239-240.

Fig. 239—Automatic Heater and Refrigerator Car. Builder, Marsh Refrigerator Service Company.

(See Figs. 237-238-240.)

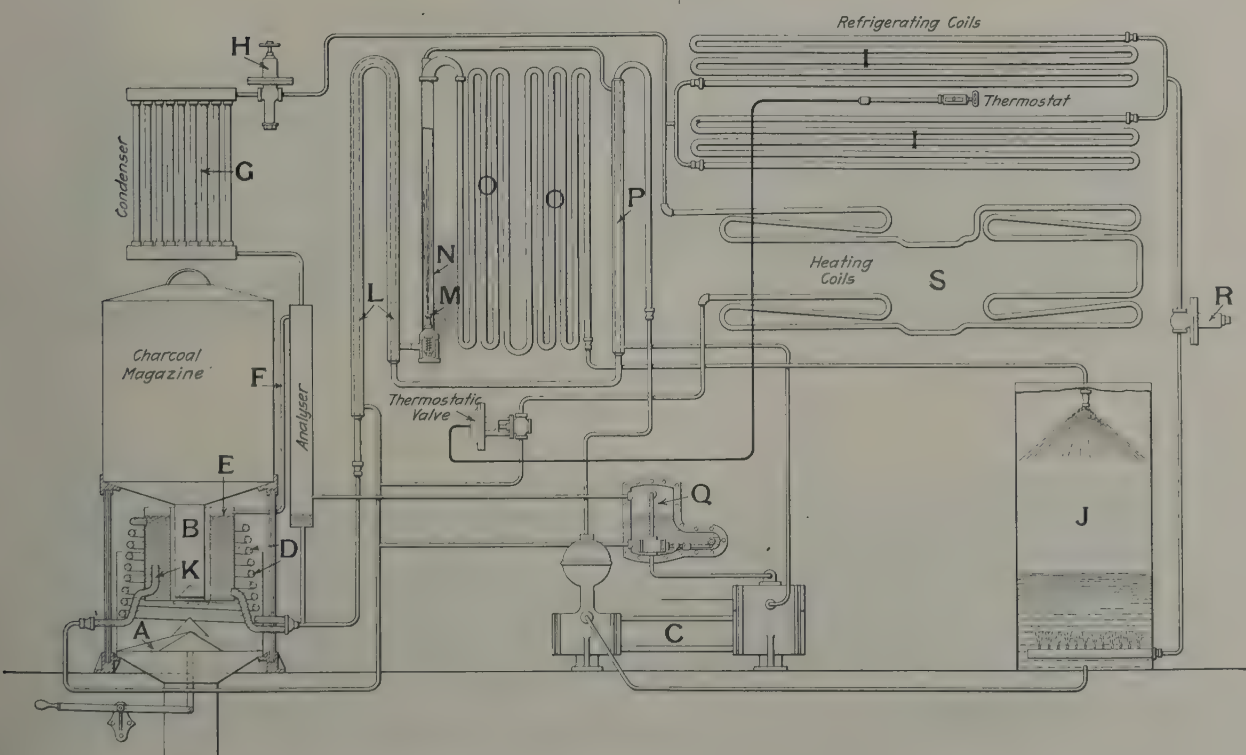


Fig. 240—Diagram of Automatic Refrigerator System in Car Shown in Figs. 237-239.

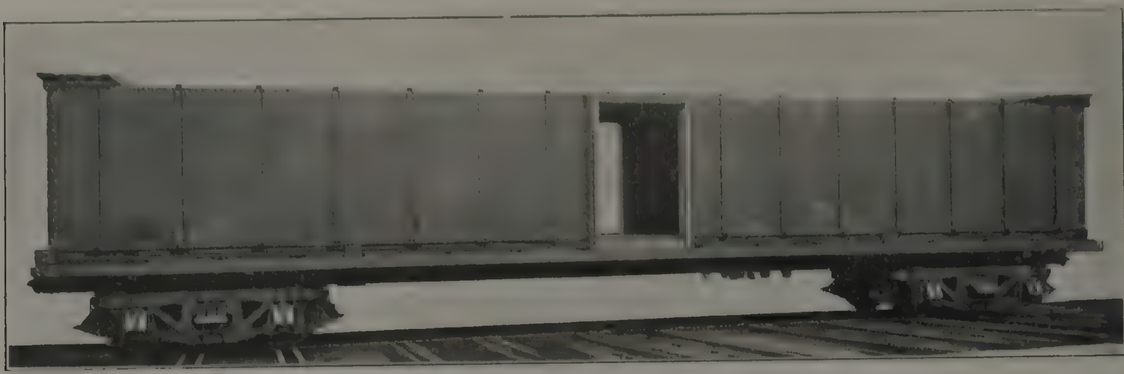


Fig. 241—Inner Shell of Pennsylvania Refrigerator Car before Insulation is Applied.
(*See Figs.* 242-244.)

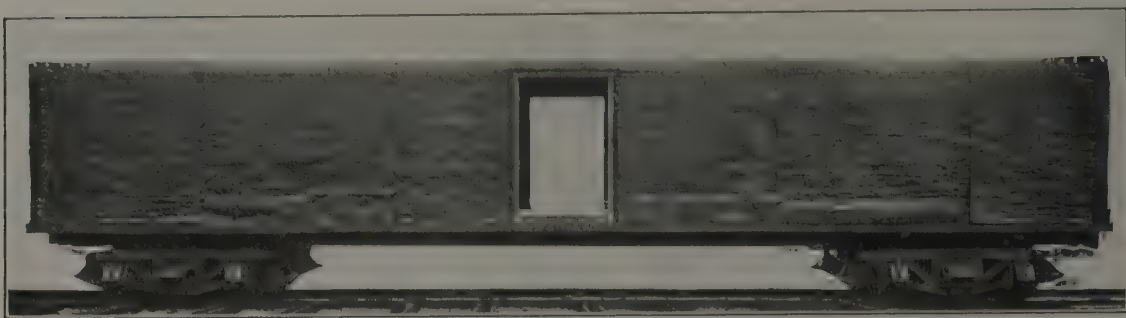


Fig. 242—Insulation Partly Applied.
(*See Figs.* 241-243-244.)

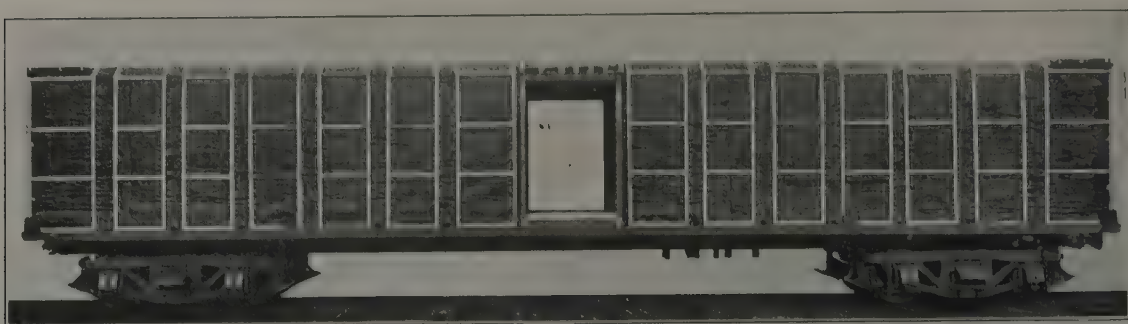


Fig. 243—Insulation Complete.
(*See Figs.* 241-242-244.)

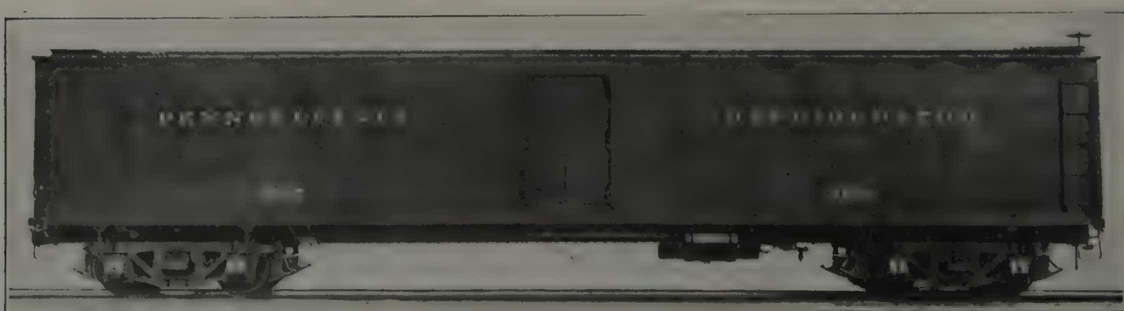


Fig. 244—All-Steel Refrigerator Car for Milk Shipment. Pennsylvania Railroad.
(*See Figs.* 241-243.)

Fig. 245—Car for transportation of Live Fish for Illinois State Fish Commission.
Builder, The McGuire-Cummings Manufacturing Company.

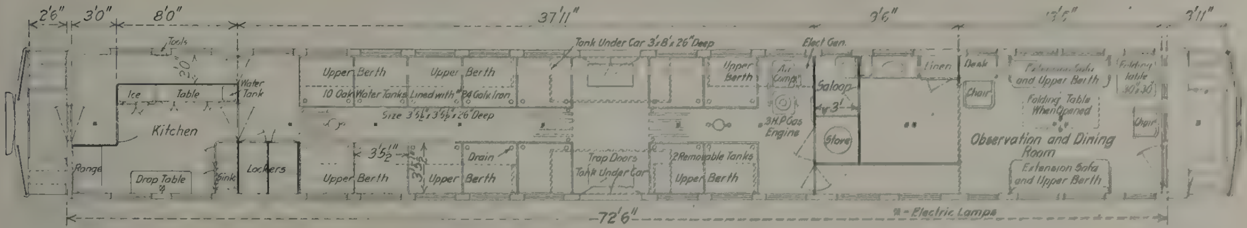


Fig. 246—Floor Plan of Illinois State Fish Car.

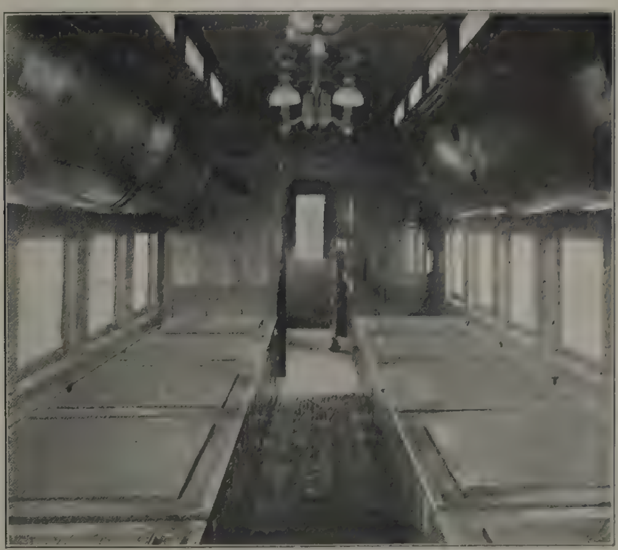


Fig. 247—Interior of Illinois State Fish Car.

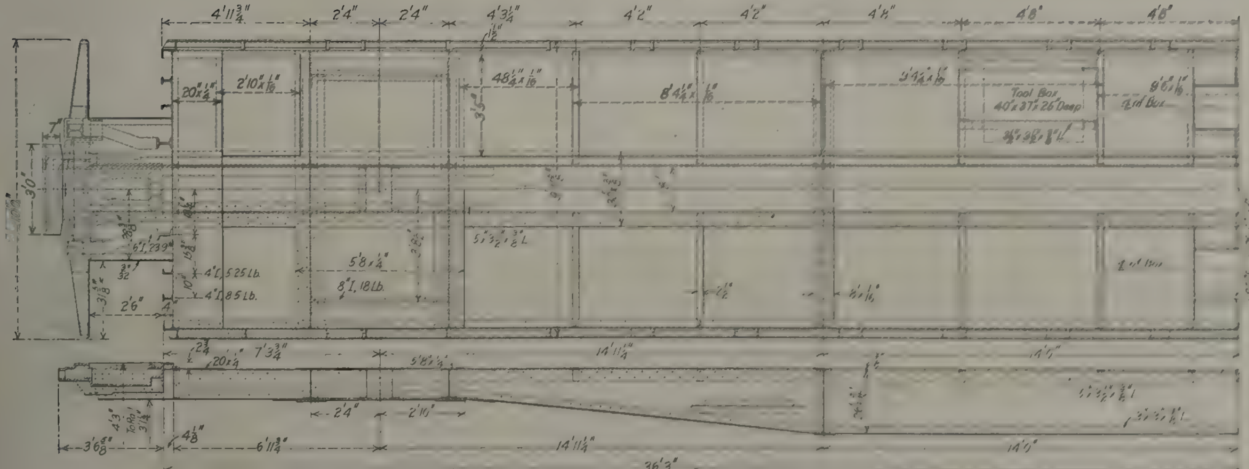


Fig. 248—Arrangement of Underframe. Illinois State Fish Car.

Fig. 249—All-Steel Eight-Wheel Caboose. Weight, 38,000 lb. Interior Shown in Fig. 118.
Builder, Pennsylvania Railroad.
(*See Figs.* 250-255.)

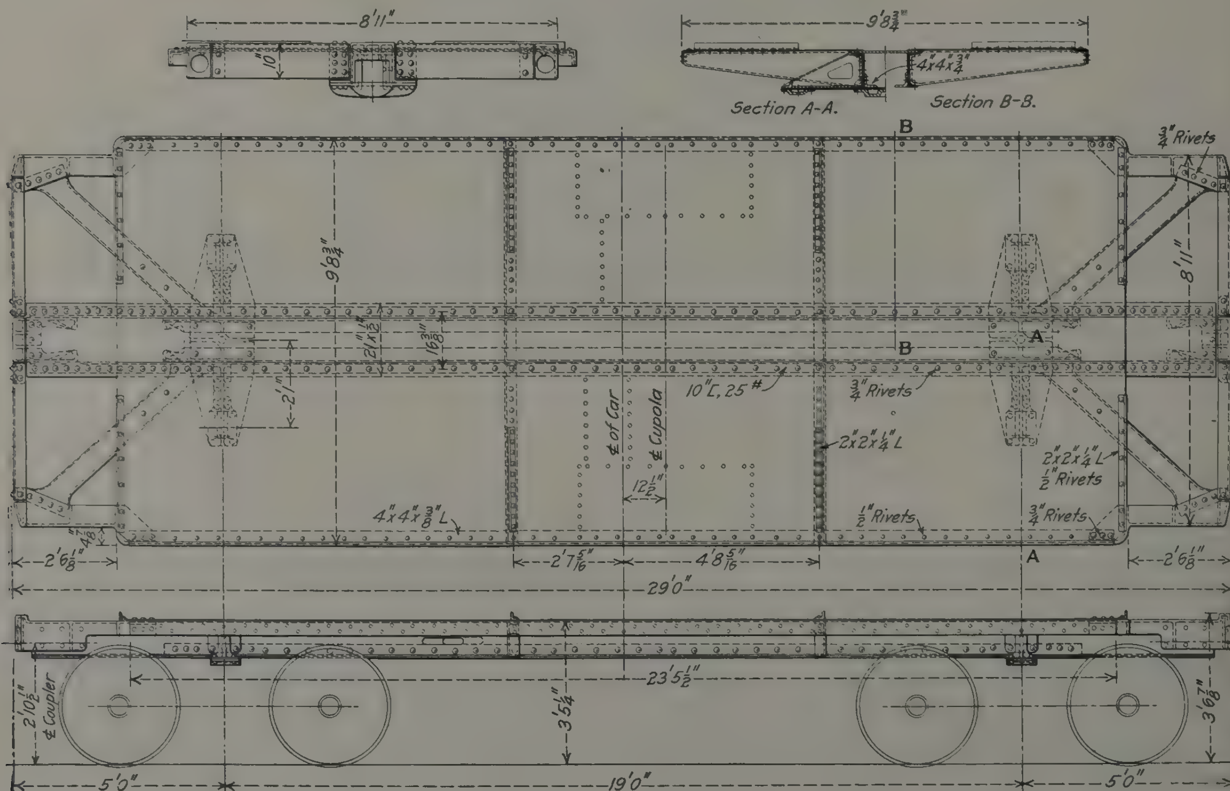


Fig. 250—Arrangement of the Underframe of the Pennsylvania Railroad Steel Caboose.

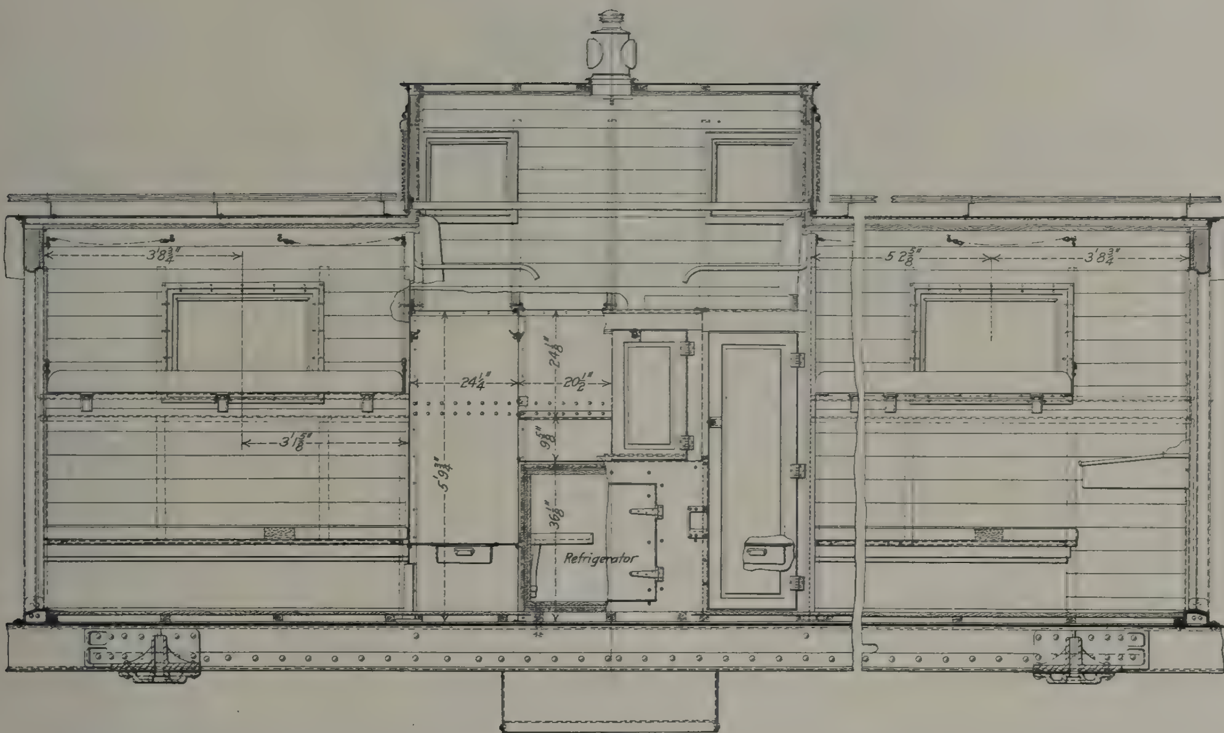


Fig. 251—Longitudinal Section Through Pennsylvania Railroad Steel Caboose Shown in Figs. 249, 250 and 252.

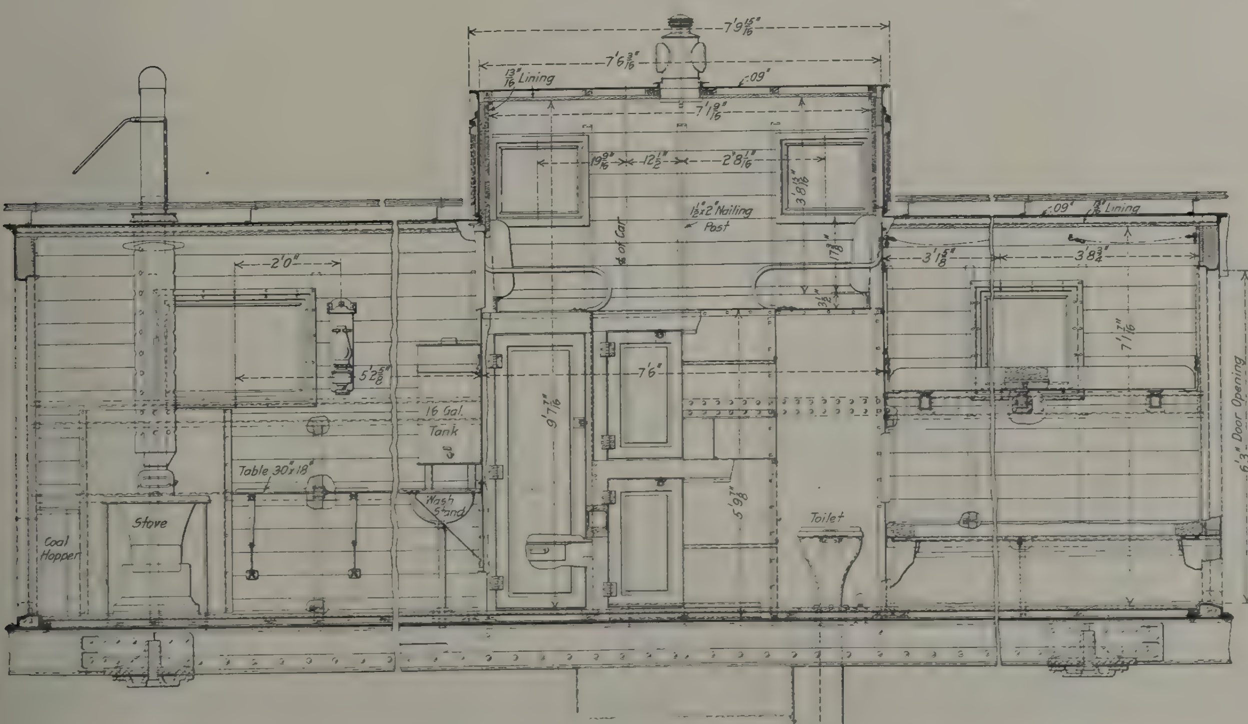


Fig. 252—Longitudinal Section Through Pennsylvania Railroad Steel Caboose Shown in Figs. 249-251 and 254-255.

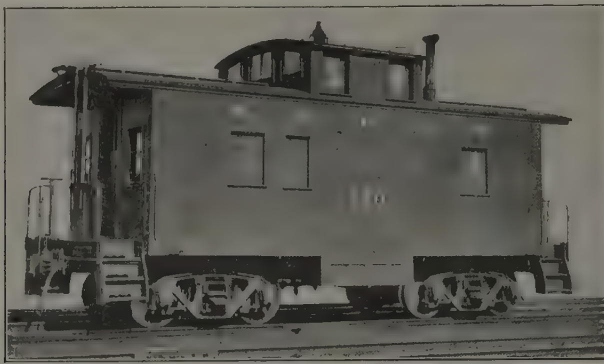


Fig. 253—Steel Frame, Eight-Wheel Caboose. Weight, 37,900 lb. Builder, Buffalo, Rochester & Pittsburgh.
(See Fig. 256.)

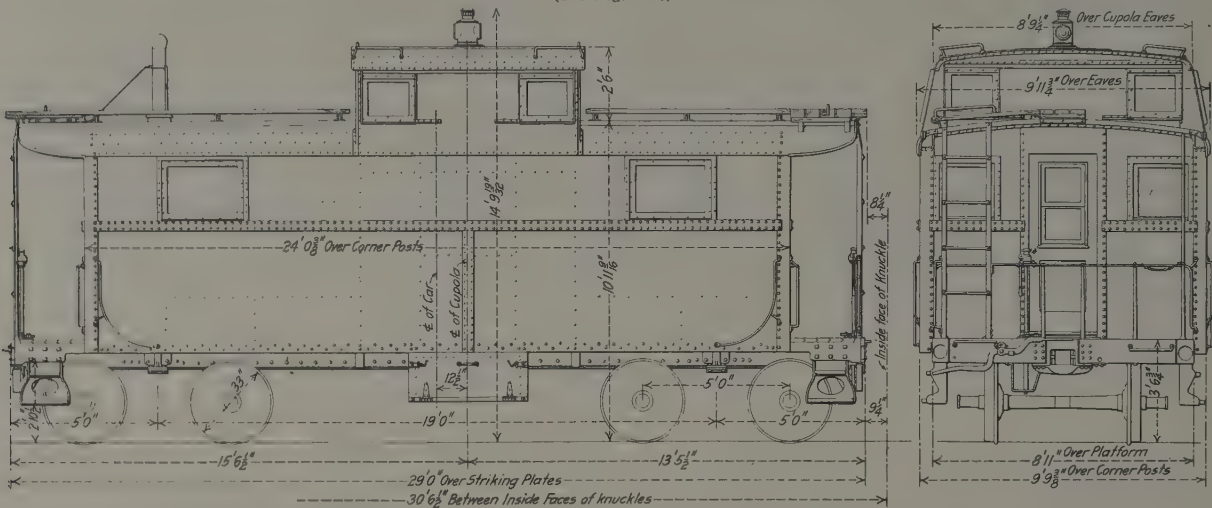


Fig. 254—Elevations of Pennsylvania Railroad Steel Caboose Shown in Figs. 249-253 and 255.

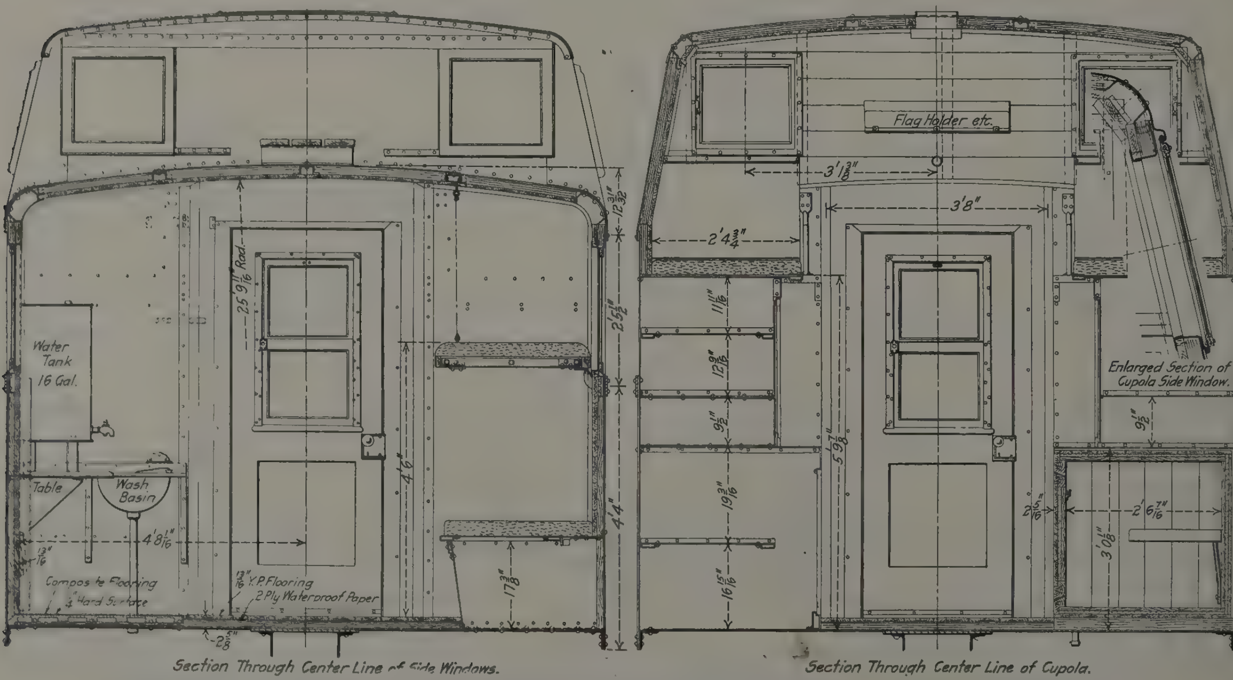


Fig. 255—Cross Sections of Pennsylvania Railroad Steel Caboose Shown in Figs. 249-252 and 254.

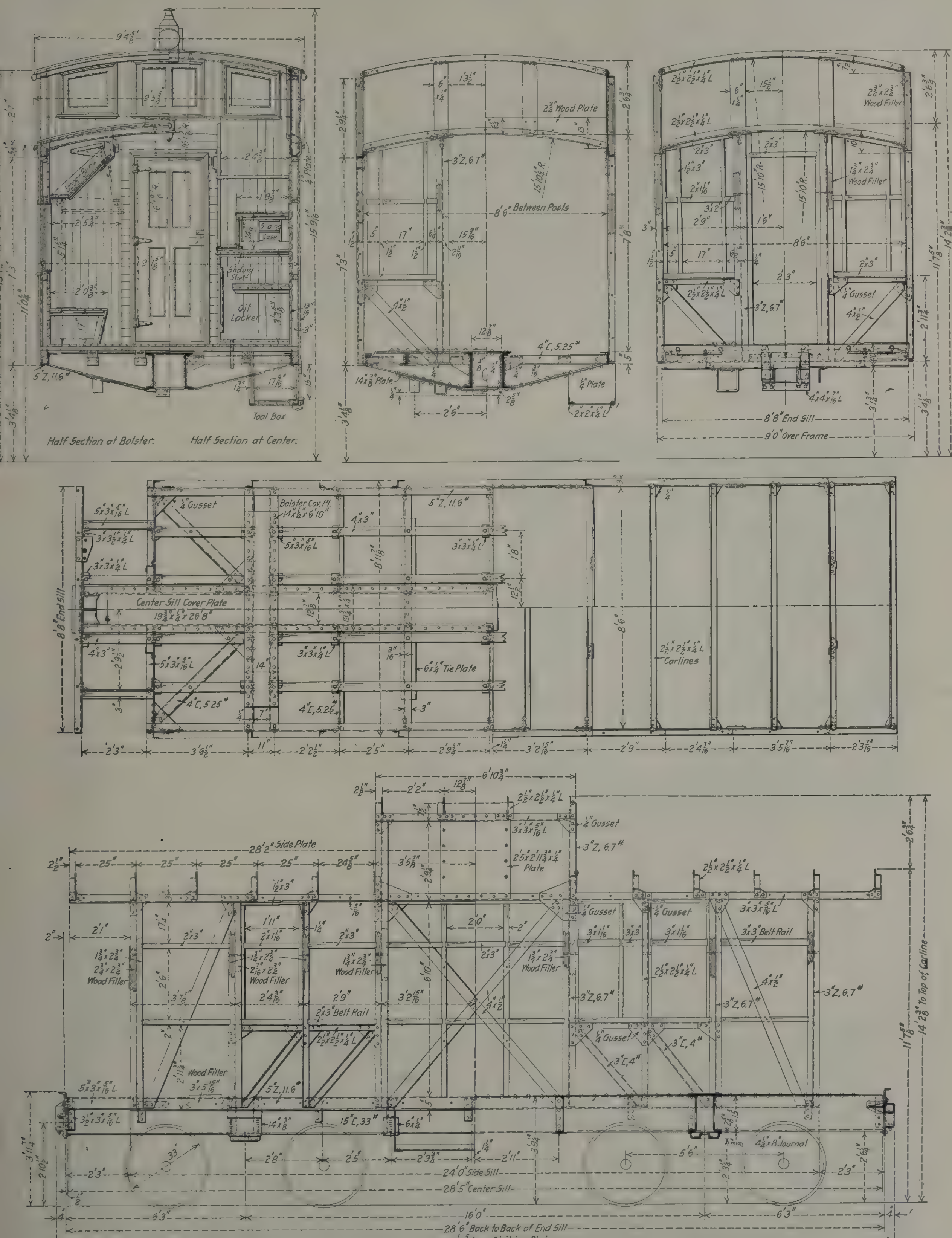


Fig. 256—Buffalo, Rochester & Pittsburgh Steel Frame Eight-Wheel Caboose.

(*See Fig. 253.*)

Fig. 257—Steel Underframe Eight-Wheel Caboose. Builder, American Car & Foundry Company.
(*See Fig.* 260.)

Fig. 258—Interior View of Caboose Shown in Figs. 257 and 260.

Parts of Caboose or Cabin Cars. See Fig. 260.

1 *Center Sill*
2 *Center Nailing Sill*
3 *Intermediate Sill*
4 *Side Sill*
5 *Body Bolster*
6 *Side Step*
7 *Platform Railing*
8 *Brake Wheel*
9 *Side Grab Iron*
10 *End Grab Iron*
11 *Side Fascia*
12 *Side Brace*
13 *Side Brace*
14 *Sill and Plate Tie Rod*
15 *Side Plate*
16 *Platform End Sill*
17 *Running Board*
18 *Carline*
19 *Cupola Hand Rail*
20 *Smoke Jack*
21 *Cupola Signal Lamp*
22 *Cupola*
23 *End Ladder*
24 *Bunk or Seat*
25 *Cupola Inside Step*
26 *Sheathing*
27 *Lining*
28 *Cross Tie or Needlebeam*
29 *Striking Casting*
30 *Cupboard*
31 *Center Plate*
32 *Center Pin*
33 *Truss Rod*
34 *Truss Rod Strut or Queen Post*
35 *Main Roof*
36 *Corner Post*
37 *End or Door Post*
38 *End Door*
39 *Side Window*
40 *Window Sill*

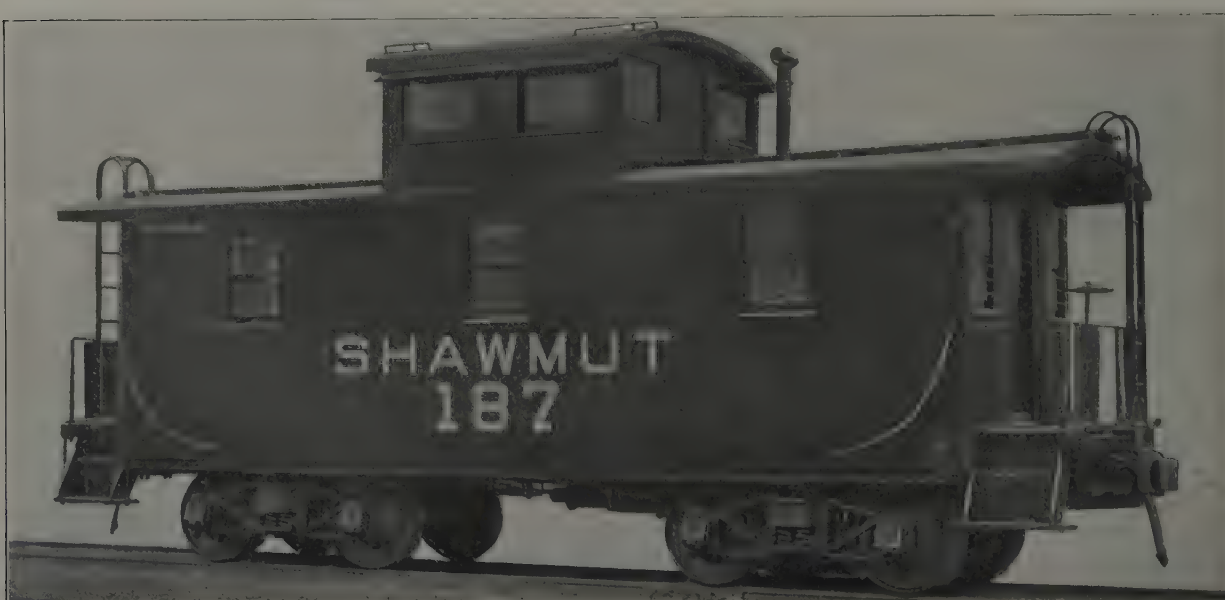


Fig. 259—Steel Underframe Eight-Wheel Caboose. Weight, 36,000 lb. Builder, Russel Car & Snow Plow Company.

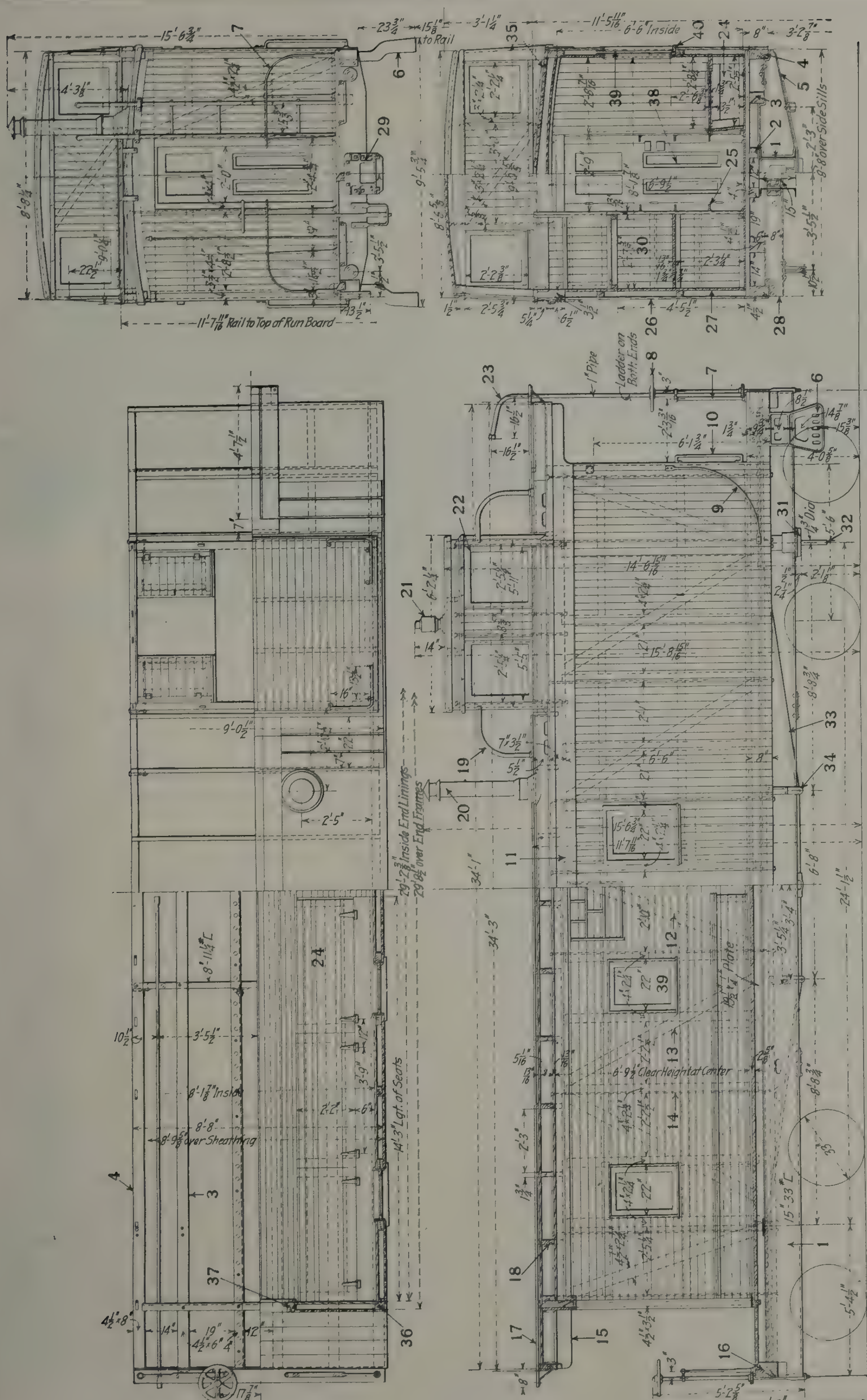


Fig. 260.—Missouri Pacific Steel Underframe Eight-Wheel Caboose Shown in Figs. 257 and 258. Builder, American Car & Foundry Company.

See Page 372 for Names of Numbered Parts.

Fig. 261—Steel Frame Single Sheathed Caboose. With Specially Constructed Underframe for Use in Heavy Pusher Service. Nashville, Chattanooga & St. Louis Railway.

(*See Figs.* 262-266.)

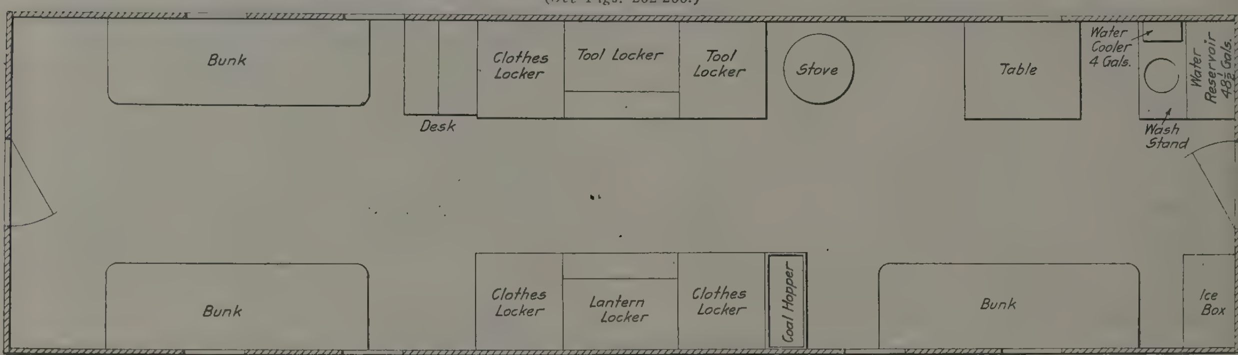


Fig. 262—Floor Plan of Caboose Car Shown in Figs. 261-267.

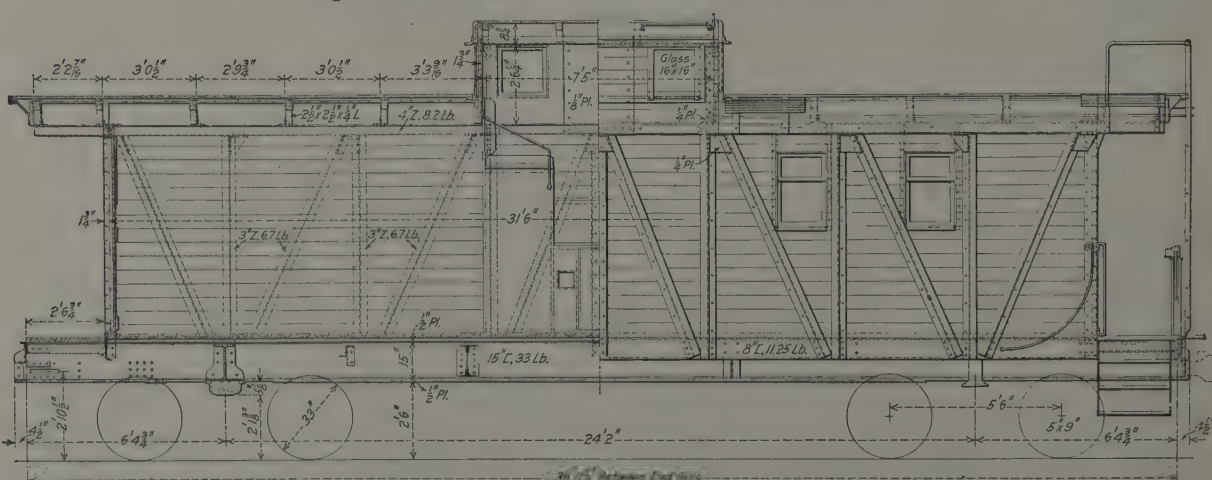


Fig. 263—Side Elevation of Caboose Car Shown in Figs. 261-267.

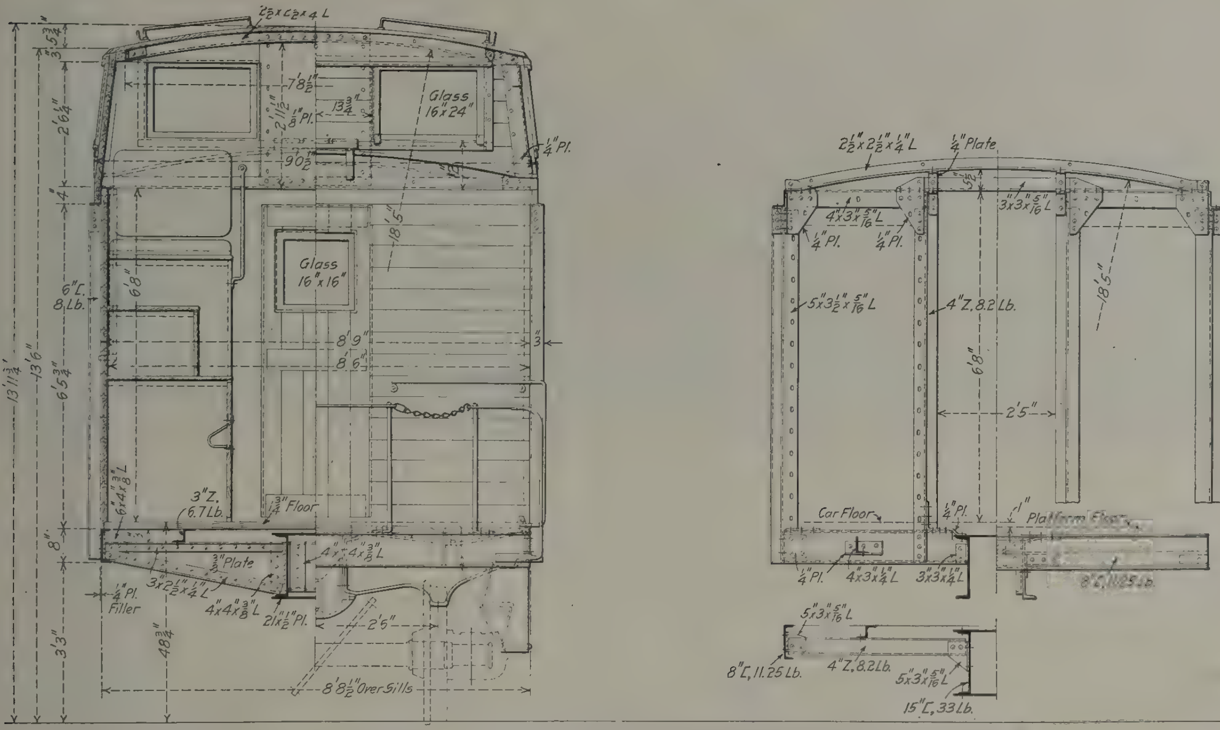


Fig. 264—Cross Section and Half End View of Caboose Car Shown in Figs. 261-267.

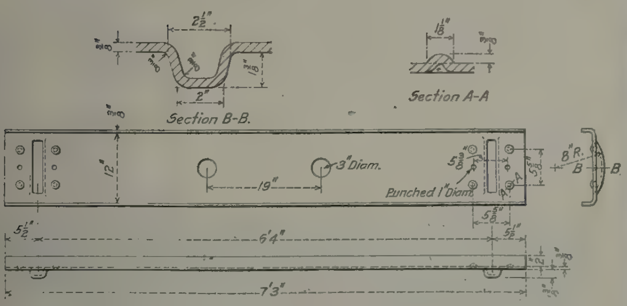


Fig. 265—Sullivan Spring Plank for Trucks of Caboose Car.

Fig. 266—Interior—N. C. & St. L. Caboose Car.

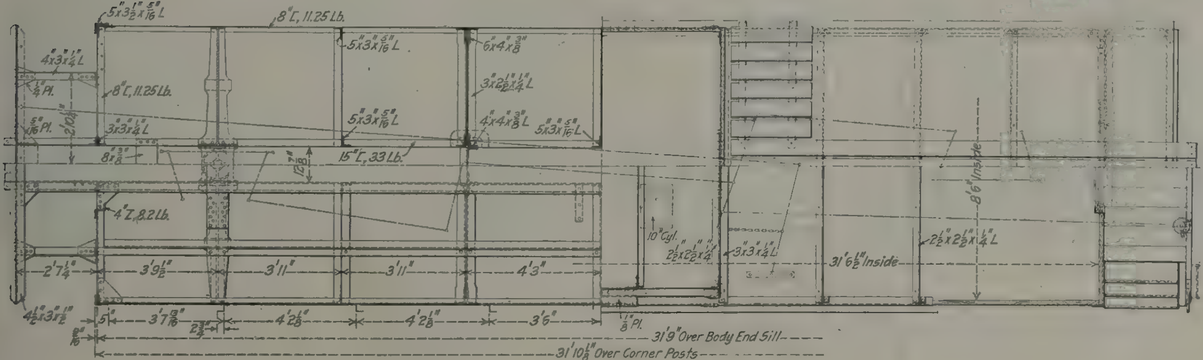


Fig. 267—Plan of Caboose Car Shown in Figs. 261-266.

Fig. 268—Steel Baggage and Postal Car. Weight, 144,700 lb.; Length Over End Sills, 70 ft. 10 in. Interior Shown in Fig. 271. Builder, The Harlan Works of The Bethlehem Ship Building Corporation, Ltd.
(*See Figs.* 269 *and* 271-274.)

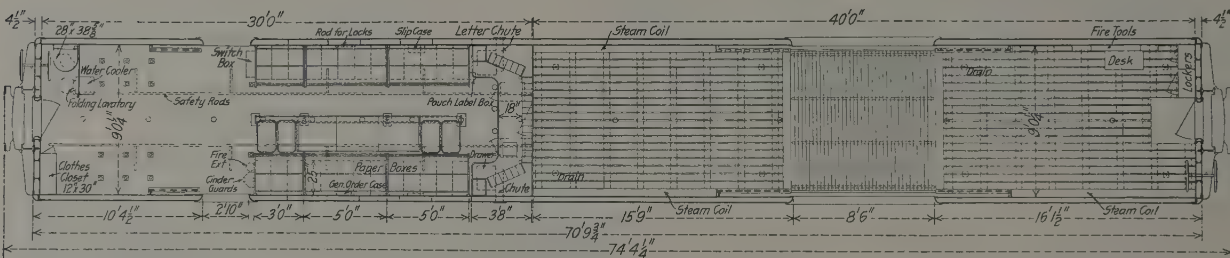


Fig. 269—Floor Plan of Central Railroad of New Jersey Baggage and Postal Car Shown in Figs. 268 and 271.

Fig. 270—Interior View of Missouri Pacific Steel Baggage and Postal Car. Builder, American Car & Foundry Company.

Fig. 271—Interior View of Mail Compartment of the Steel Baggage and Postal Car Shown in Figs. 268-269 and 272-274.

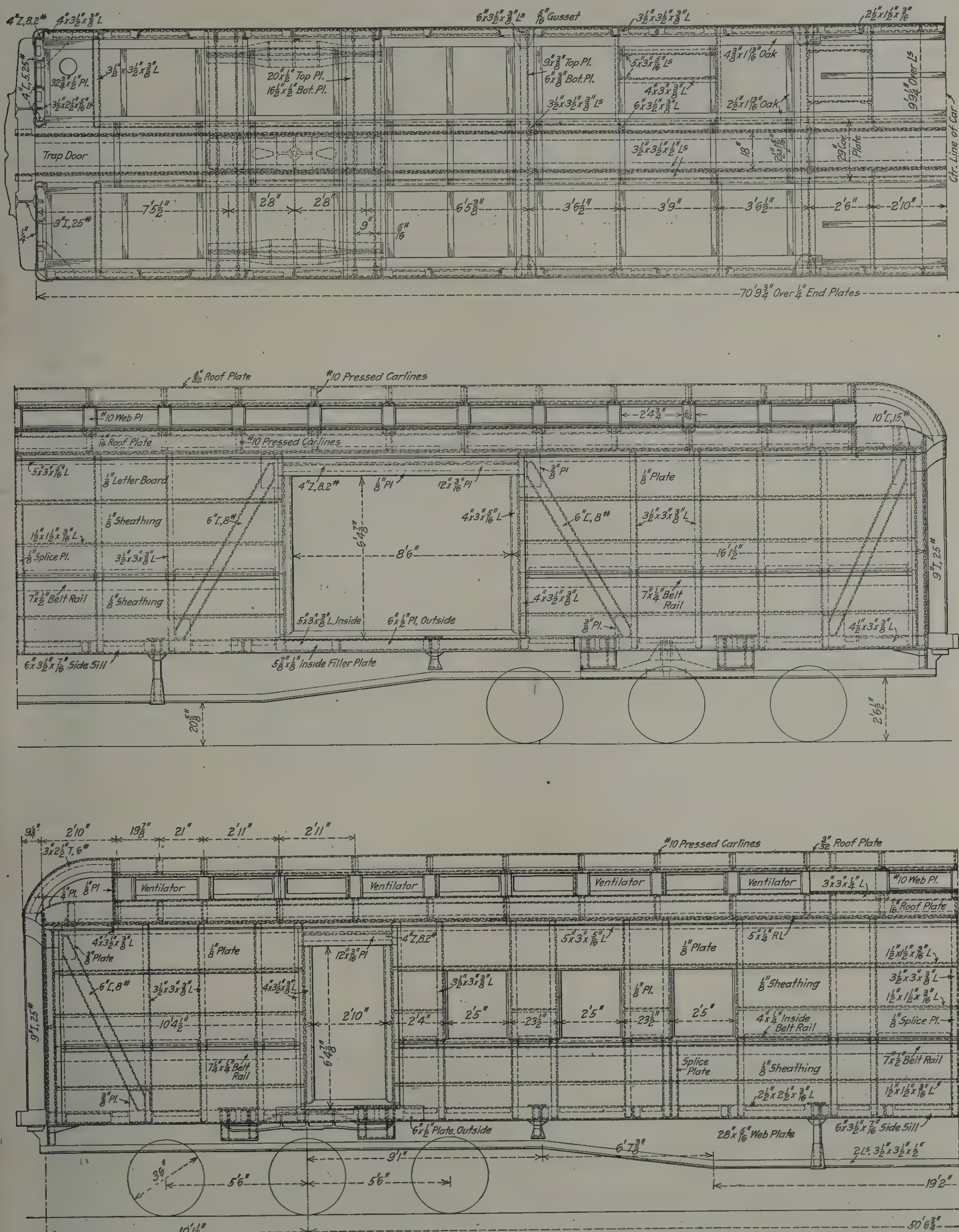


Fig. 272—Central Railroad of New Jersey Steel Baggage and Postal Car Shown in Figs. 268-269 and 271-274. Builder, The Harlan Works of the Bethlehem Ship Building Corporation, Ltd.

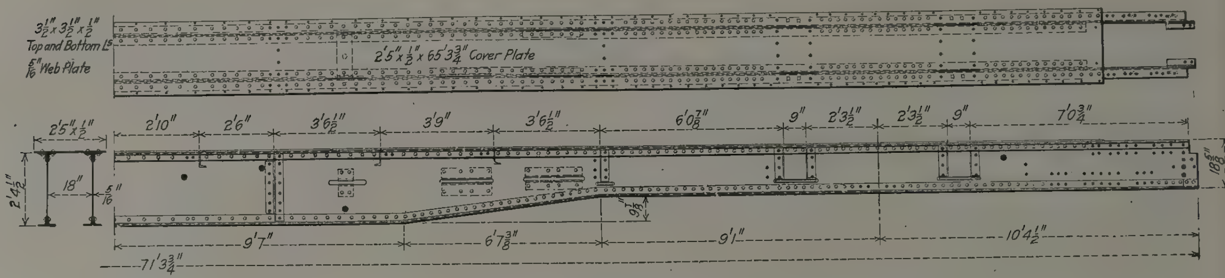


Fig. 273—Center Sill Construction of Central Railroad of New Jersey Steel Baggage and Postal Car.
(See Figs. 268-269 and 271-274.)

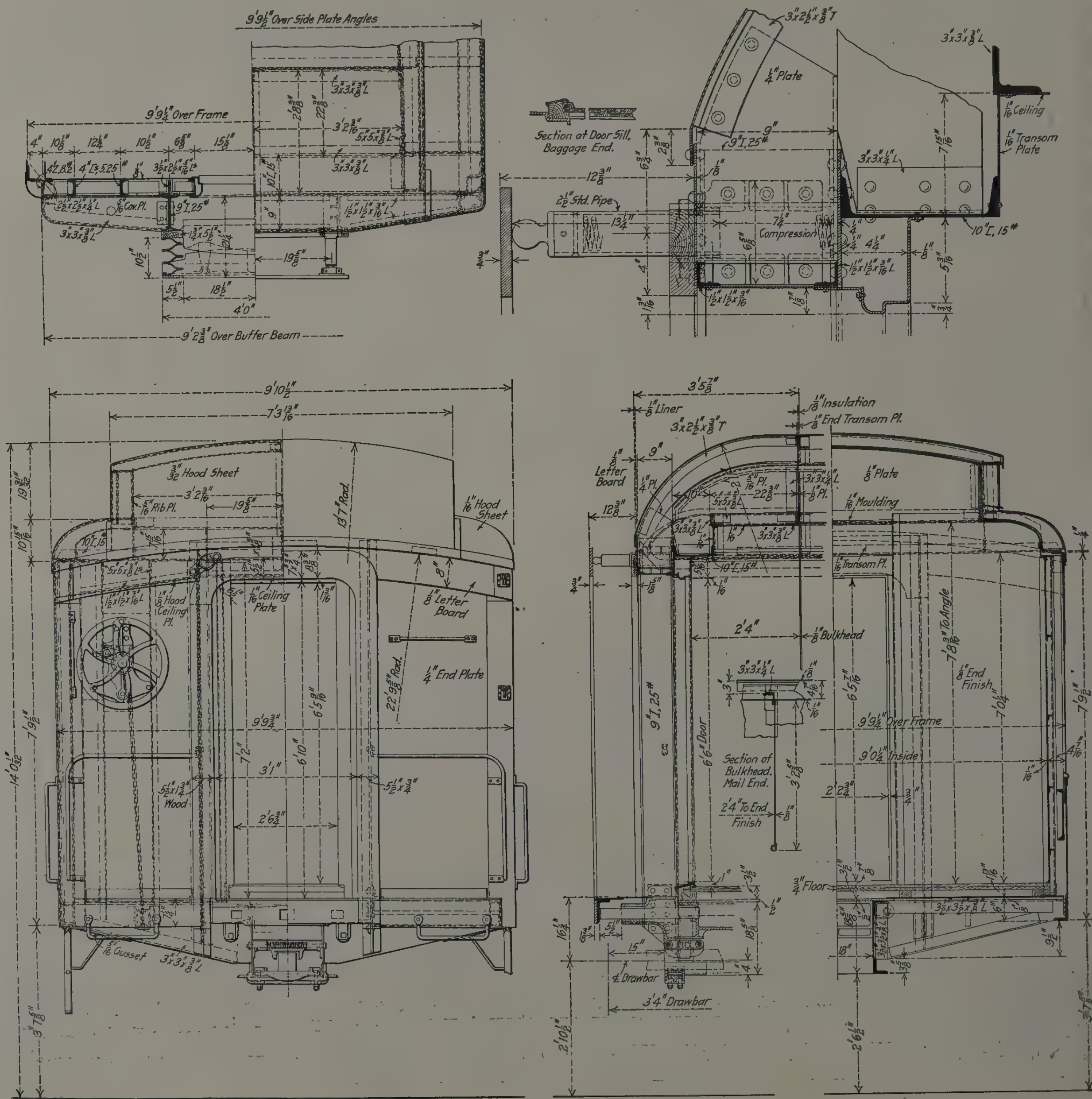


Fig. 274—End Construction of Central Railroad of New Jersey Steel Baggage and Postal Car.
(See Figs. 268-273.)

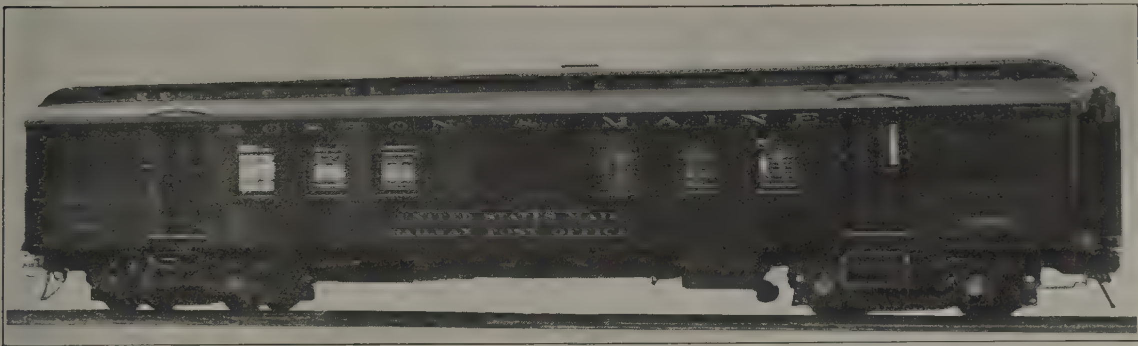


Fig. 275—All-Steel Mail Car for Boston & Maine. Length, 60 ft. 0 in. Builder, Osgood-Bradley Car Company.
(*See Figs. 276-277.*)

Fig. 276—Interior of Boston & Maine Mail Car Shown in Figs. 275-277.

Fig. 277—Interior of Boston & Maine Mail Car Shown in Figs. 275-276.

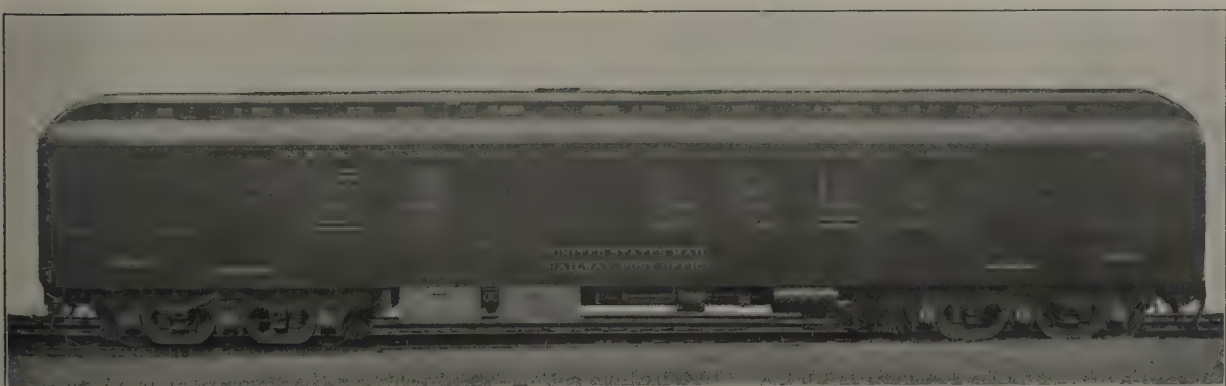


Fig. 278—Steel Postal Car. Weight, 133,800 lb.; Length Over Buffers, 64 ft. 5 in. Builder, Laconia Car Company.

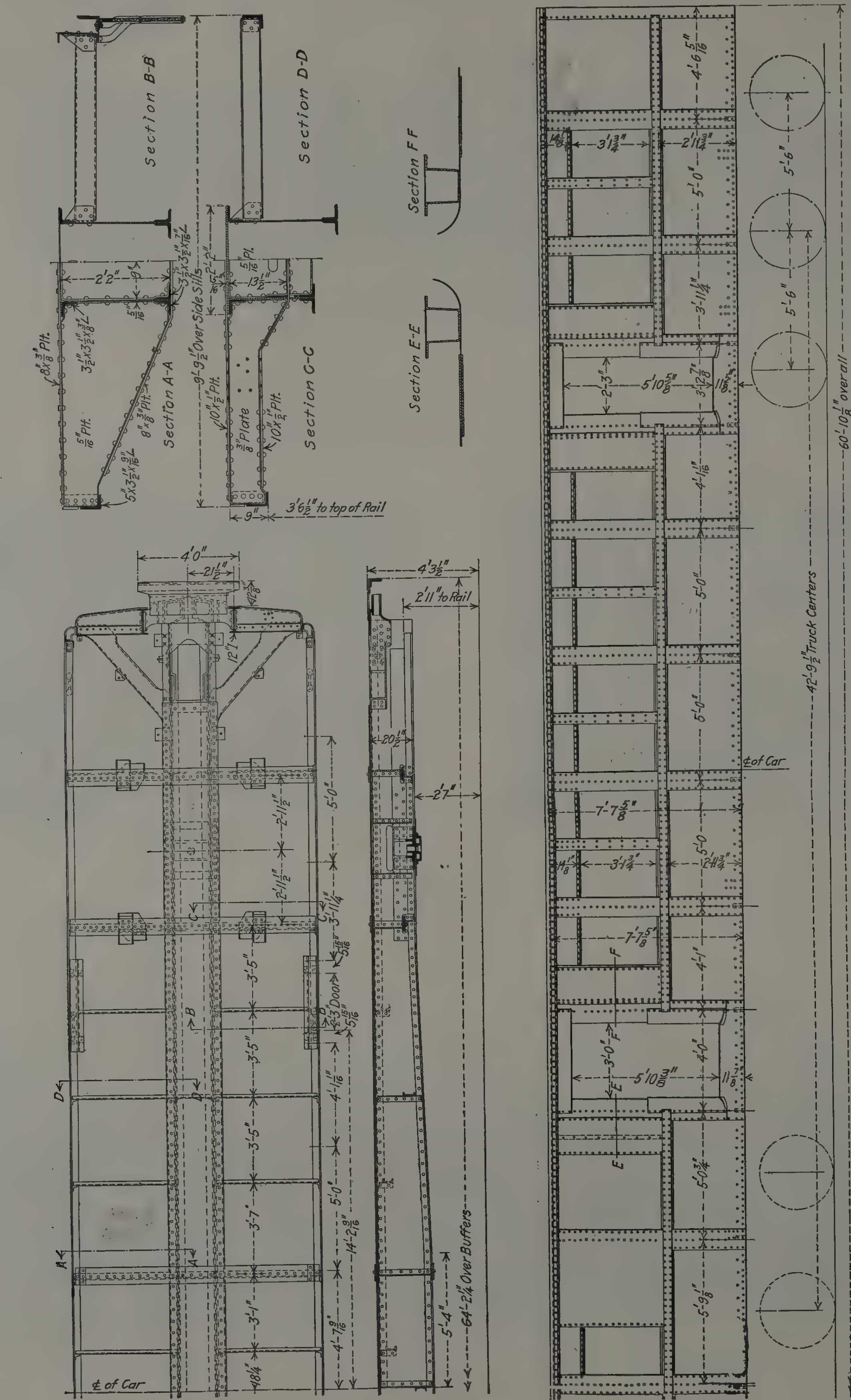


Fig. 279—Chesapeake & Ohio Steel Postal Car. See also Fig. 280. Builder, Pressed Steel Car Company.

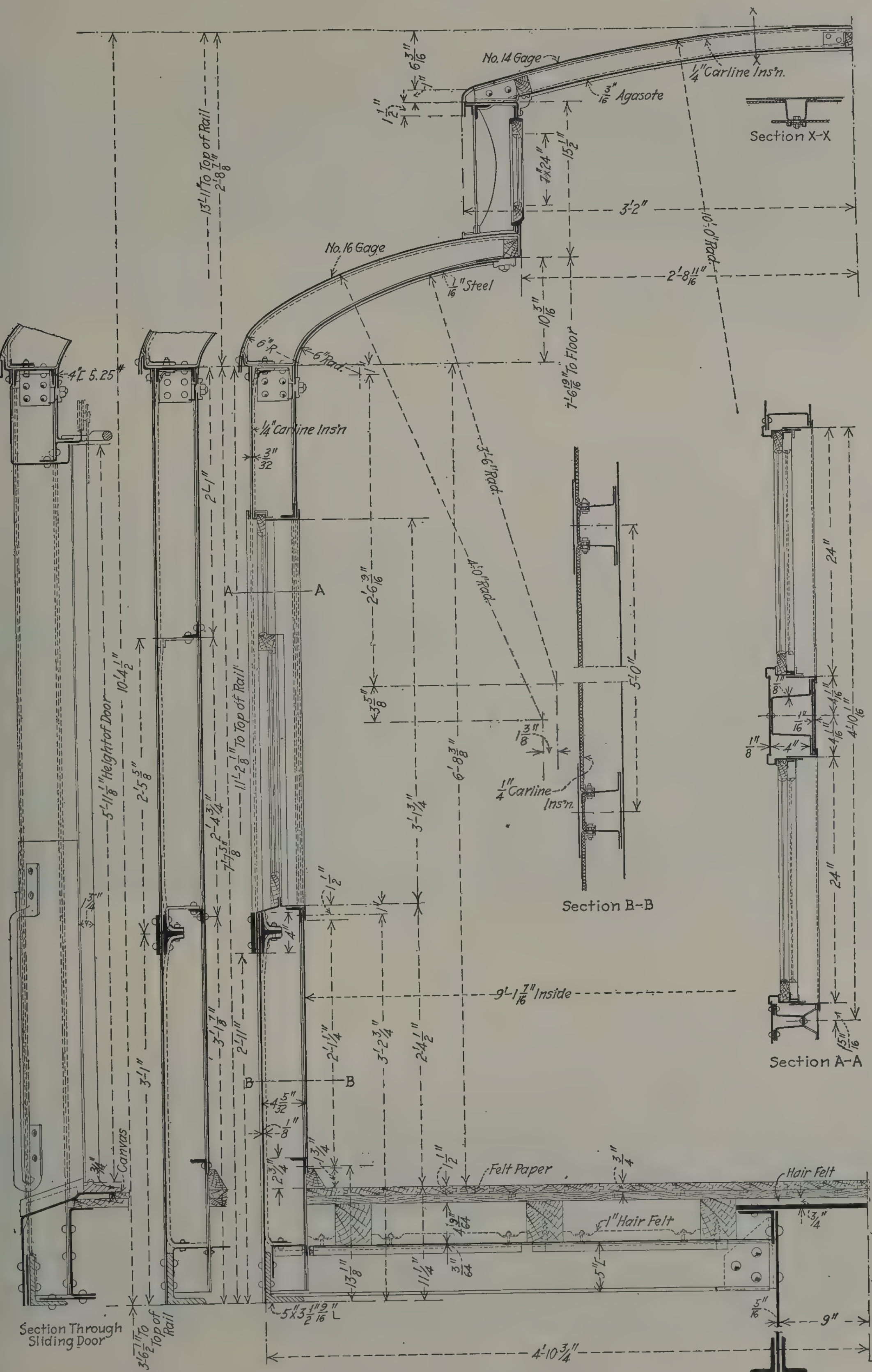


Fig. 280—Cross Sections of Chesapeake & Ohio Steel Postal Car Shown in Fig. 279.

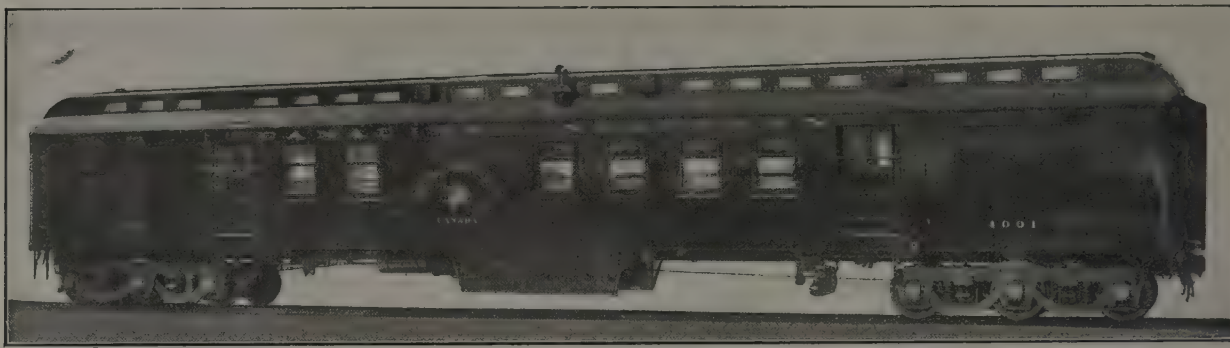


Fig. 281—Steel Frame Postal Car for Canadian Northern Railway. Weight, 137,400 lb.; Length 72 ft. 6 in.

Fig. 282—All-Steel Special Ventilated Baggage Car. Weight 110,440 lb.; Inside Length, 60 ft. 0 in.
Builder, The Barney & Smith Company.

Fig. 283—Steel Baggage and Express Car. Weight, 106,000 lb.; Length Over End Sills, 69 ft.
Builder, The Pullman Company.
(*See Fig.* 284.)

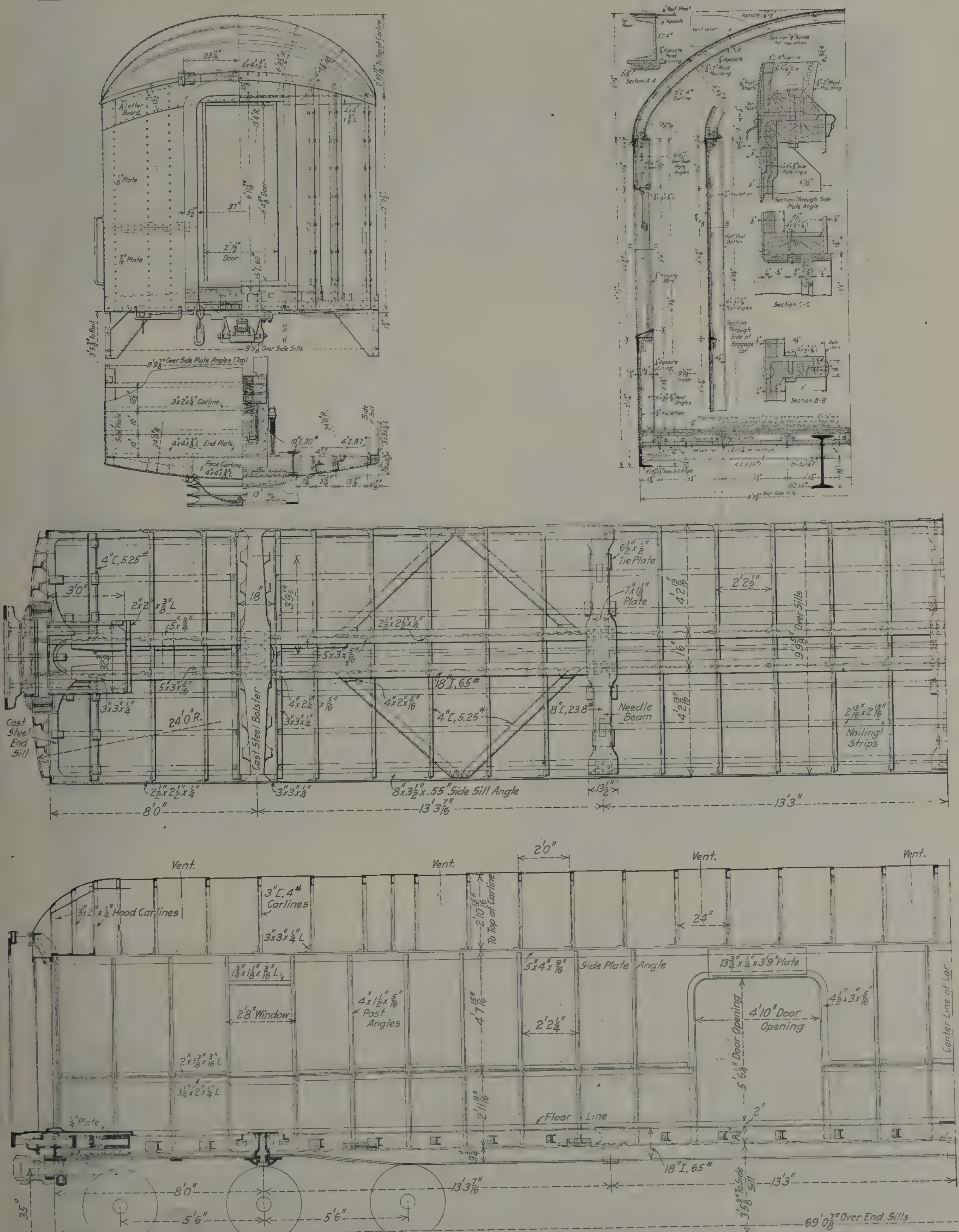


Fig. 284—Union Pacific Steel Baggage Car. Builder, The Pullman Company.
(See Fig. 283.)

Fig. 285—Steel Underframe Express Car. Length Over End Sills, 70 ft. 9⅝ in.
Builder, Osgood-Bradley Car Company.
(*See Fig. 286.*)

Fig. 286—Interior of Baggage Car. Shown in Fig. 285.

Fig. 287—Interior of Baggage Car. Shown in Fig. 288.

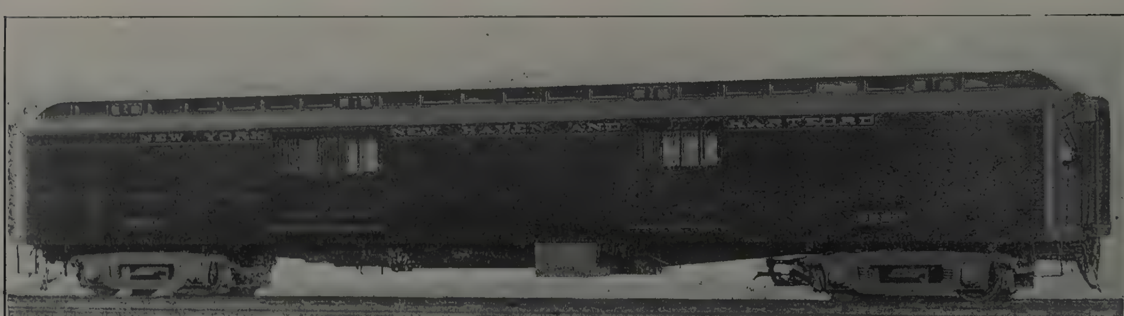


Fig. 288—All-Steel Baggage Car. Length Over End Sills, 73 ft. 3⅝ in.
Builder, Osgood-Bradley Car Company.

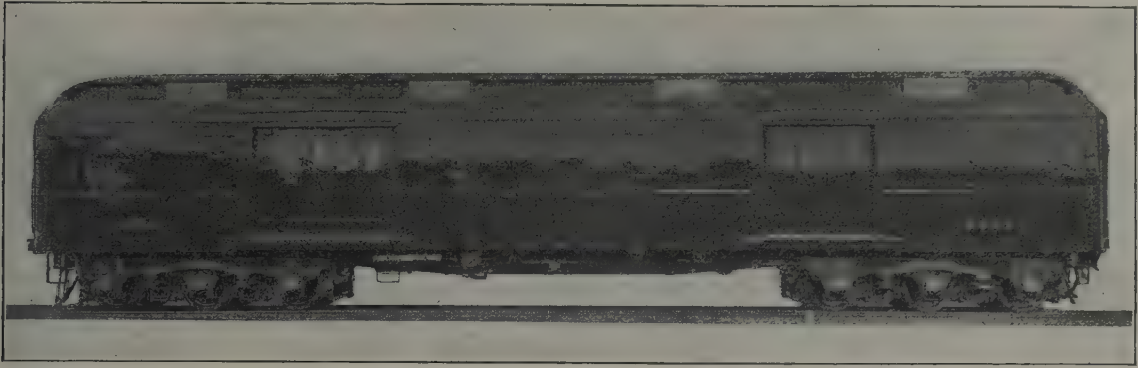


Fig. 289—Steel Baggage Car. Weight, 123,300 lb.; Weight of Trucks, 46,000 lb.; Length Over Buffers, 64 ft. 7¾ in. Builder, The Barney & Smith Car Company.

Fig. 290—Interior View of Steel Baggage Car Shown in Fig. 289.

Fig. 291—Interior View of Steel Express Car Shown in Fig. 292.

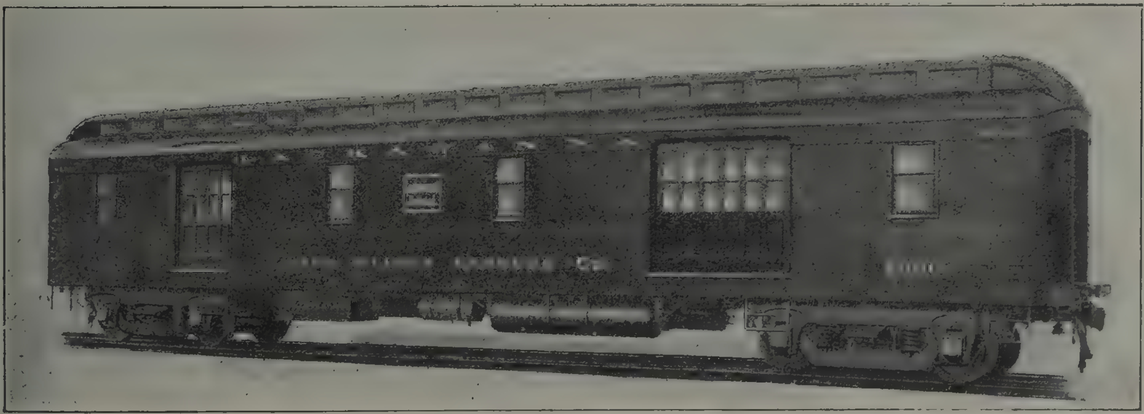


Fig. 292—Steel Express Car. Weight, 94,300 lb.; Length Over End Sills, 60 ft. 9 in. Builder, American Car & Foundry Company.

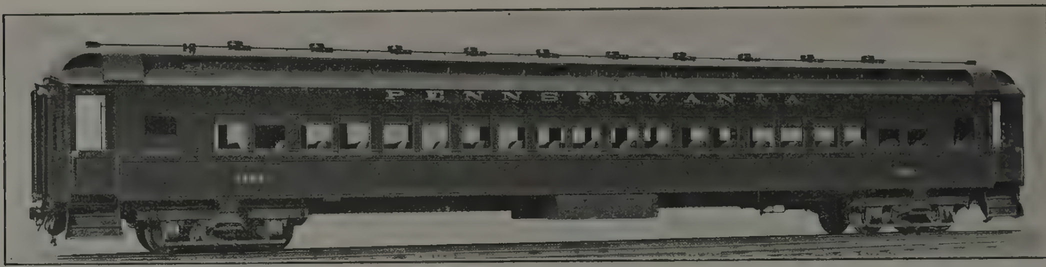


Fig. 293—Steel Vestibuled Day Coach. Weight, 116,000 lb.; Length Over Body, 70 ft. 5¾ in. Builder, Pressed Steel Car Company.
(*See Fig.* 294.)

Fig. 294—Interior View of Pennsylvania Steel Day Coach, Shown in Fig. 293.

Fig. 295—Interior of All-Steel Coach. Shown in Fig. 296.

Fig. 296—All-Steel Passenger Coach for the Delaware & Hudson. Weight, 146,200 lb.; Inside Length, 71 ft. 11⅞ in. Builder, Barney & Smith Car Company.

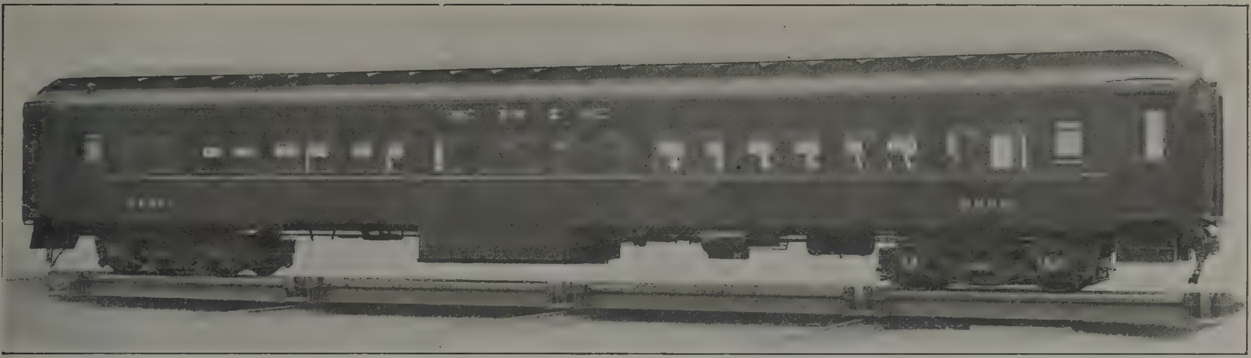


Fig. 297—All-Steel Coach for Through Line Service. Designed by L. B. Stillwell, Consulting Engineer. Builder, The Pressed Steel Car Company.
(*See Figs.* 298-301.)

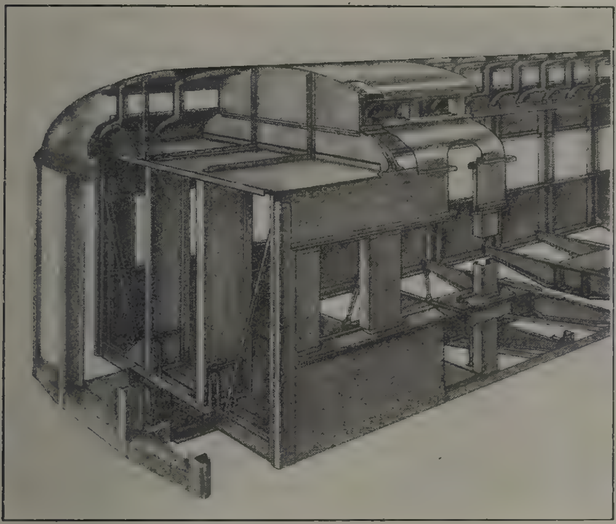


Fig. 298—Anti-Collision Bulkhead for Steel Coach. Shown in Figs. 297-301.

Fig. 299—Interior of Erie Coach Shown in Figs. 297-301.

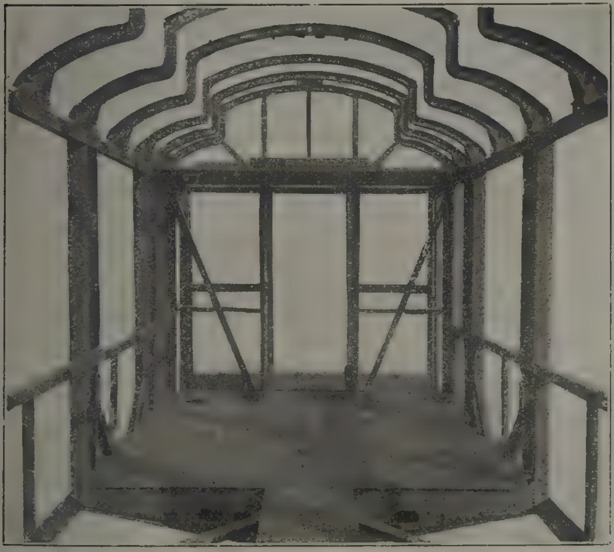


Fig. 300—End Framing of Erie Coach Showing Body Bolster and Underframe Stiffener.
(*See Figs.* 297-301.)

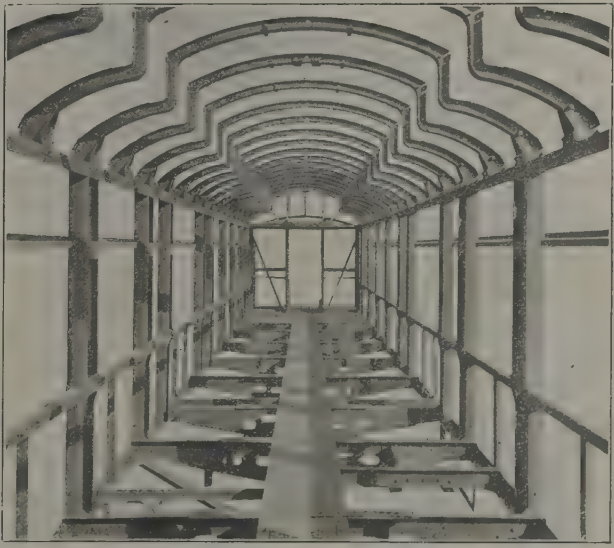


Fig. 301—Framing at End of Erie Coach Shown in Figs. 297-300.

Fig. 302—Steel Vestibuled Day Coach. Weight, 115,800 lb.; Length Over End Sills, 63 ft.; Length Over Buffers, 72 ft. 2 in.; Seating Capacity, 78.
Builder, The Harlan Works of the Bethlehem Ship Building Corp., Ltd.

(*See Figs.* 303-304.)

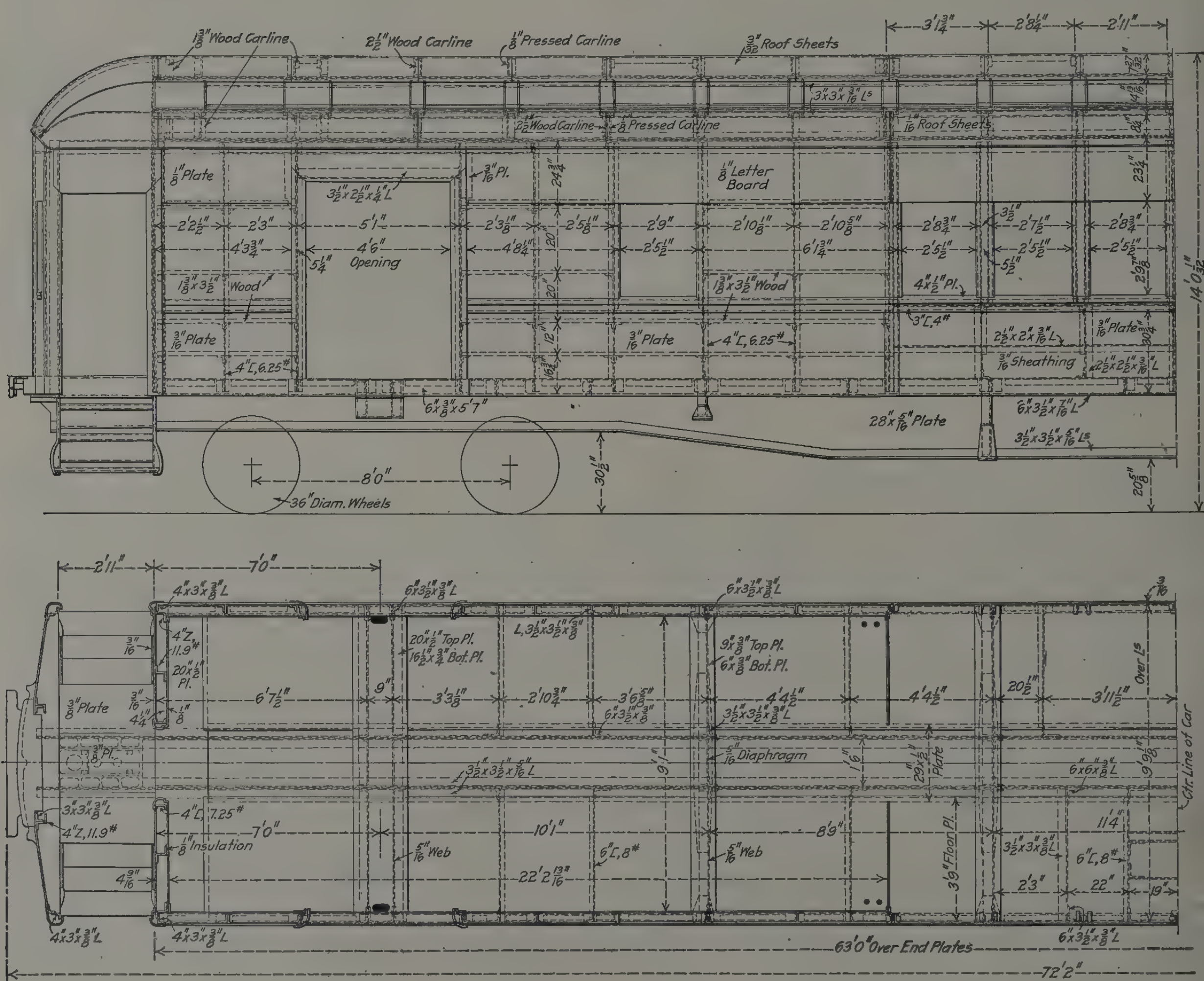


Fig. 303—Framing of Central Railroad of New Jersey Steel Combination Car and Day Coach Shown in Figs. **302 and 304.**

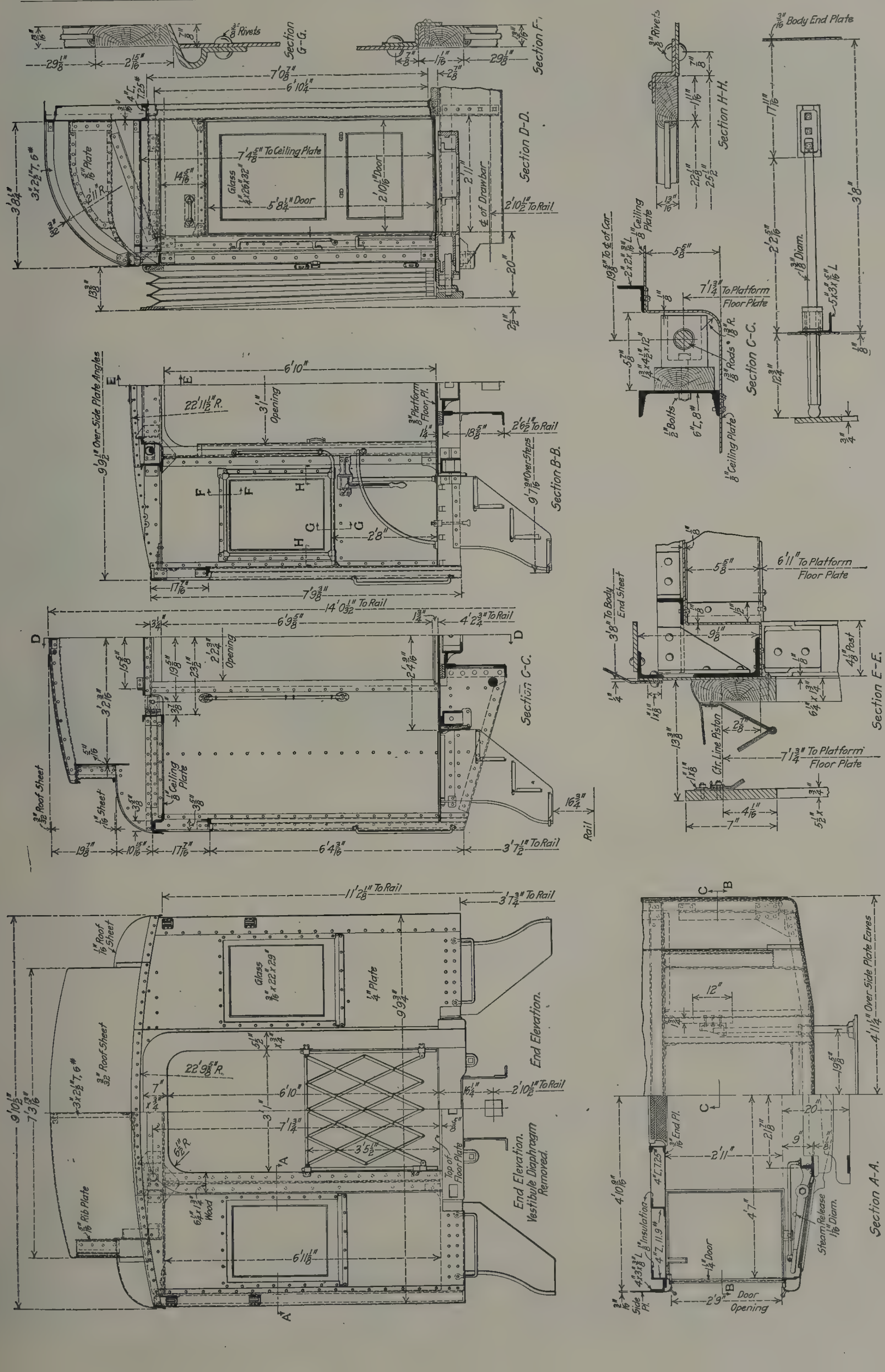


Fig. 304—End Arrangement of Central Railroad of New Jersey Steel Day Coach Shown in Figs. 302-303.

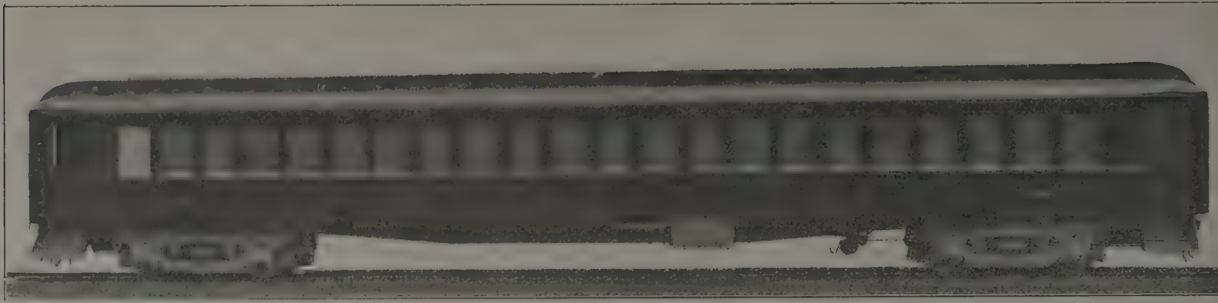
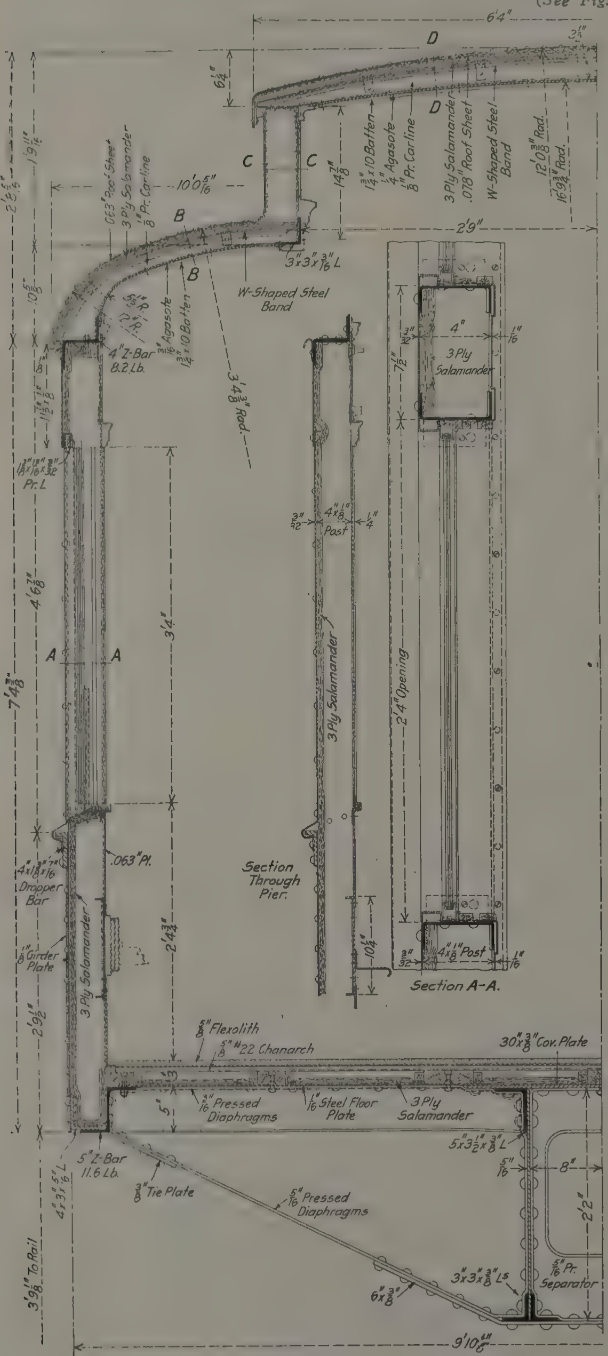


Fig. 305—All-Steel Passenger Coach for Boston & Maine. Weight, 118,500 lb.; Seating Capacity 88; Length Over End Sills, 70 ft. 3½ in. Builder, The Pullman Company.

(*See Figs.* 306-309.)

Fig. 306—Interior of Boston & Maine Coach.



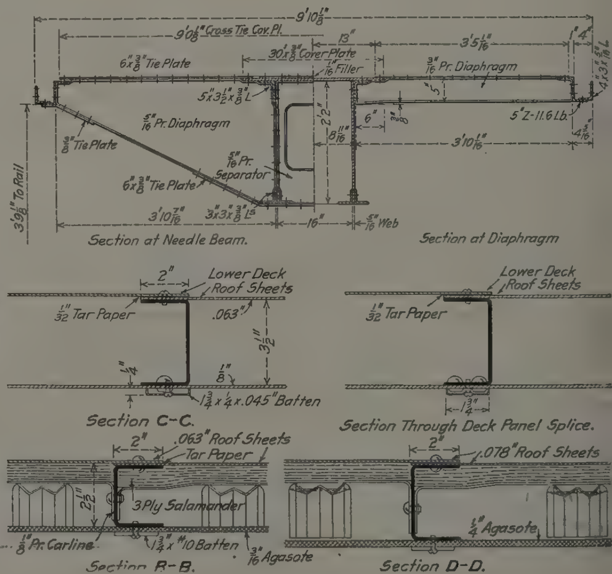


Fig. 307—Cross Sections of Boston & Maine Coach Shown in Figs. 305-309.

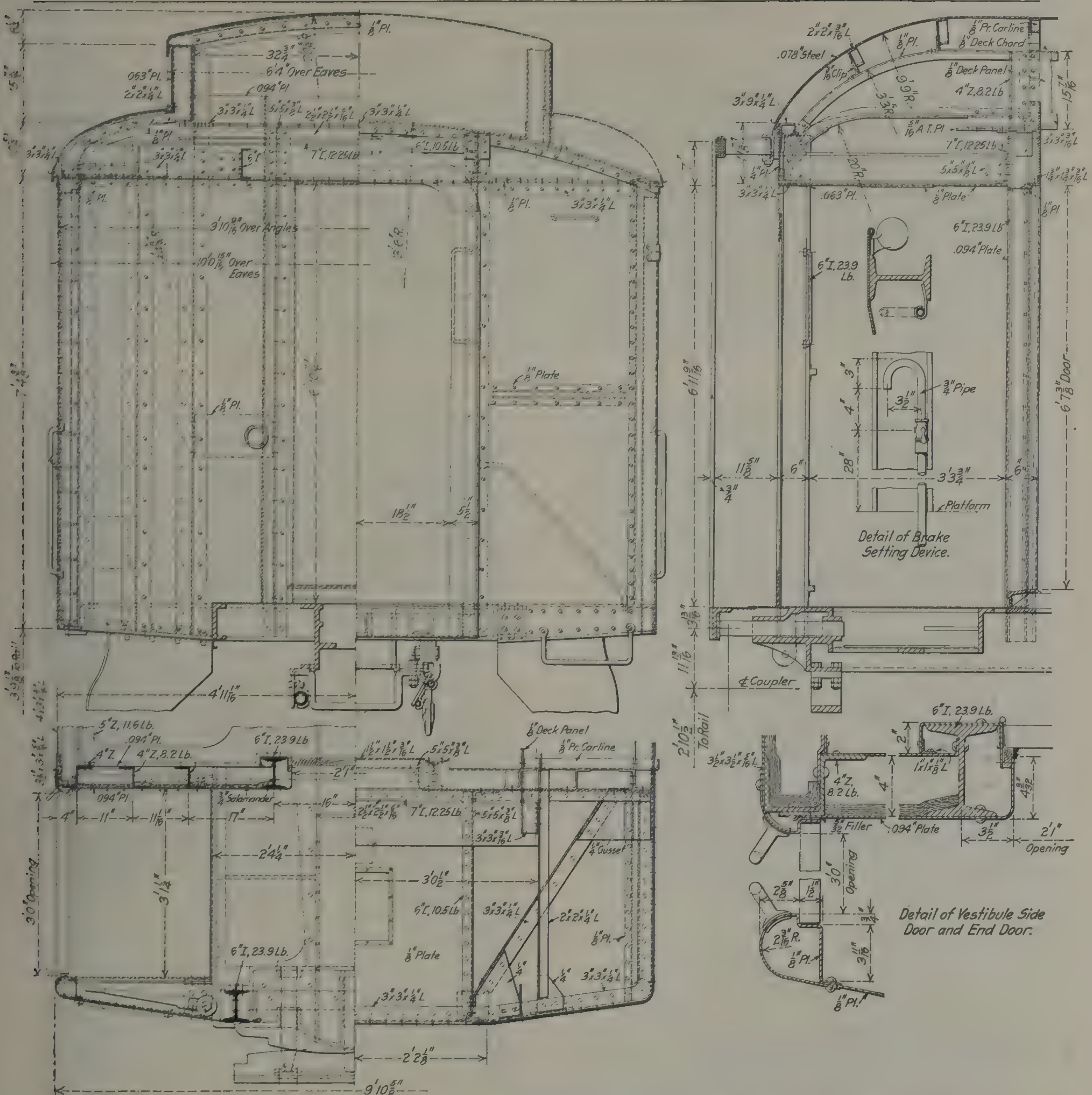


Fig. 308—End Construction of Boston & Maine Coach Shown in Figs. 305-309.

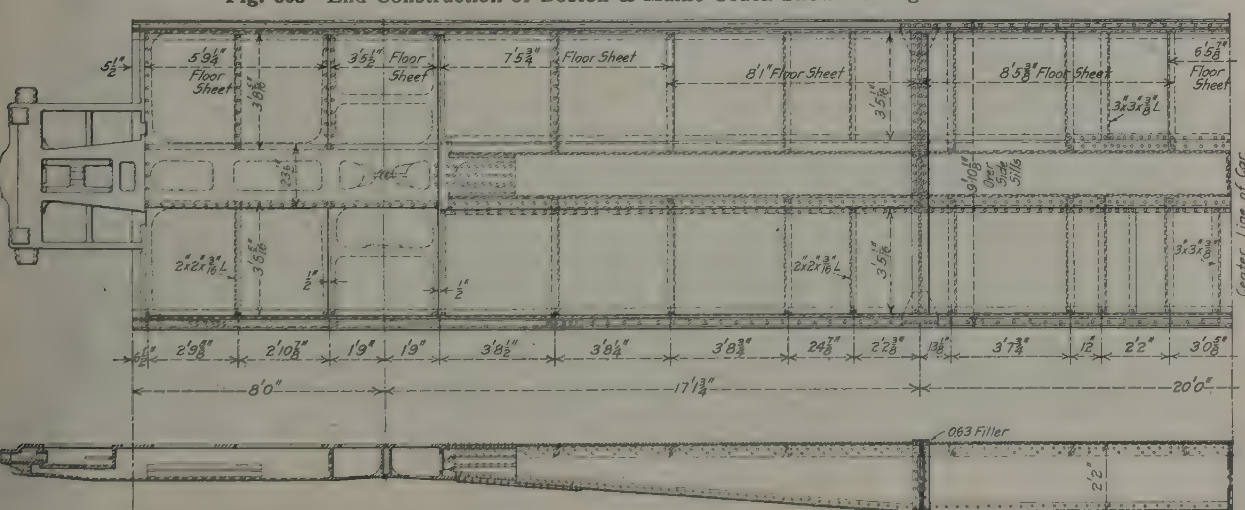


Fig. 309—Steel Underframe for Boston & Maine Coach Shown in Figs. 305-308.

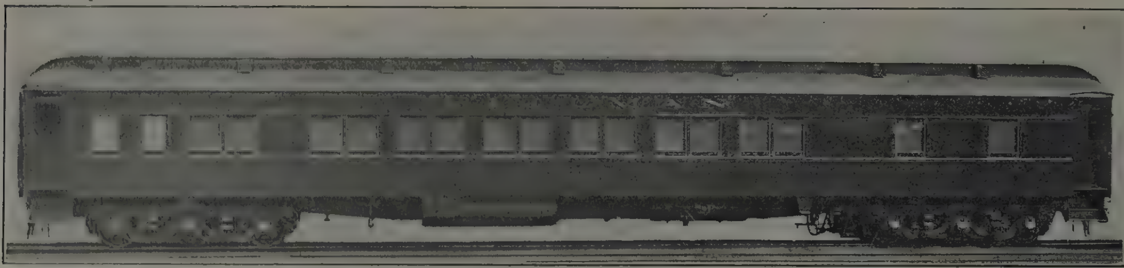


Fig. 310—All-Steel Parlor Car. Builder, The Pullman Company.
(*See Fig.* 311.)

Fig. 311—Interior of Pullman Parlor Car Shown in Fig. 310.

Fig. 312—Interior of Compartment Observation Car Shown in Fig. 313.

Fig. 313—Steel Frame Compartment Observation Car for Canadian Northern. Builder, Canadian Car & Foundry Company.
See Fig. 312.)

Fig. 314—Steel Vestibuled Chair Car. Length Over End Sills, 70 ft.; Length Over Buffers, 78 ft. 4 in.; Seating Capacity, 68. Builder, American Car & Foundry Company.

Fig. 315—Interior of Missouri Pacific Café-Parlor Car.
Builder, American Car & Foundry Company.

Fig. 316—Interior View of Missouri Pacific Steel Chair Car Shown in Fig. 314.

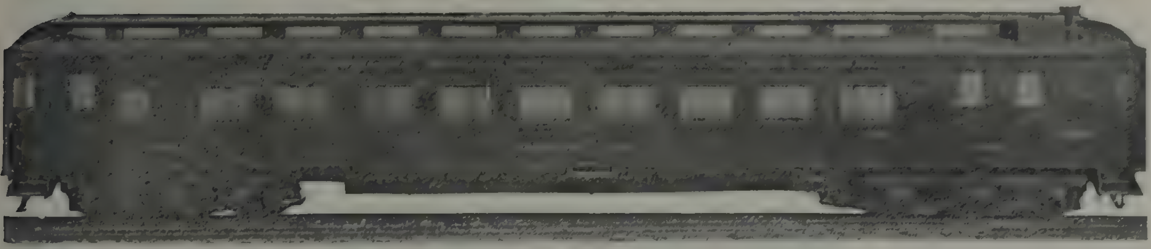


Fig. 317—Steel Vestibuled Parlor Car. Weight, 135,600 lb.; Length Over Buffers, 80 ft. 4¾ in. Builder, The Barney & Smith Car Company.

Fig. 318—Steel Vestibuled Dining Car. Interior Views Are Shown in Figs. 319 and 320. Builder, American Car & Foundry Company.

Fig. 319—Entrance from Dining Room to Pantry and Corridor.

Fig. 320—Kitchen, Looking Toward Pantry.

Interior Views of St. Louis-San Francisco Dining Car Shown in Fig. 318.

Fig. 321—Steel Vestibuled Dining Car. Weight, 155,000 lb.; Length Over End Sills, 74 ft. 8 in. Builder, American Car & Foundry Company.

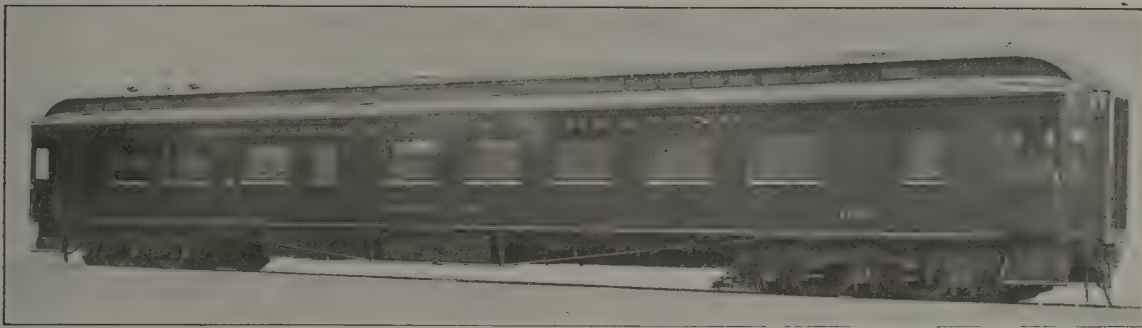


Fig. 322—Vestibuled Dining Car with Steel Frame and Ends. Weight, Complete, 175,000 lb.; Weight of Trucks, 49,600 lb. Builder, The Harlan Works of The Bethlehem Shipbuilding Corporation, Ltd.

Fig. 323—Interior View of Northern Pacific Dining Car. Builder, The Barney & Smith Car Company.

Fig. 324—Interior View of Philadelphia & Reading Dining Car, Shown in Fig. 322.

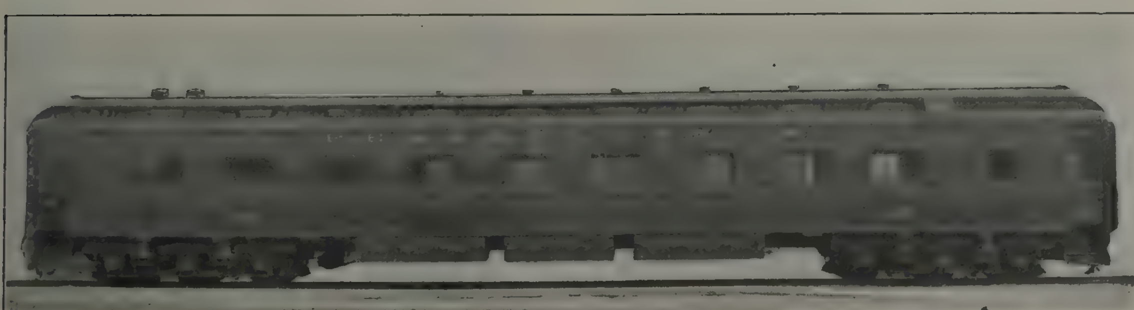


Fig. 325—Steel Vestibuled Dining Car. Weight, 155,000 lb.; Length Over End Sills, 72 ft. Pennsylvania Railroad.

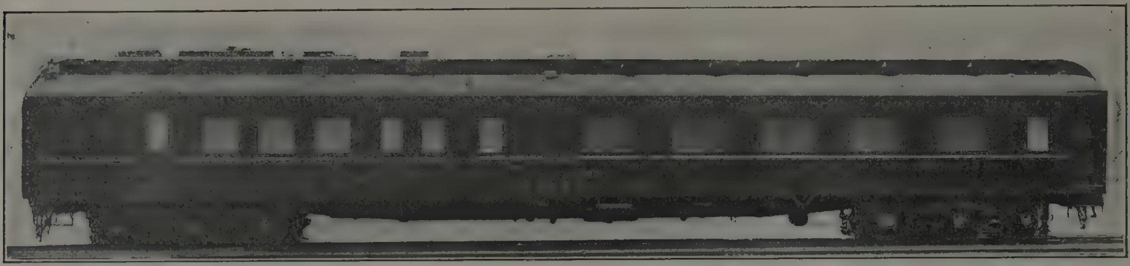


Fig. 326—All-Steel Dining Car. Builder, The Pullman Company.

Fig. 327—Interior View of Chicago & North Western Lunch Counter Car.

Fig. 328—Interior View of Chicago, Rock Island & Pacific Lunch Counter Car.

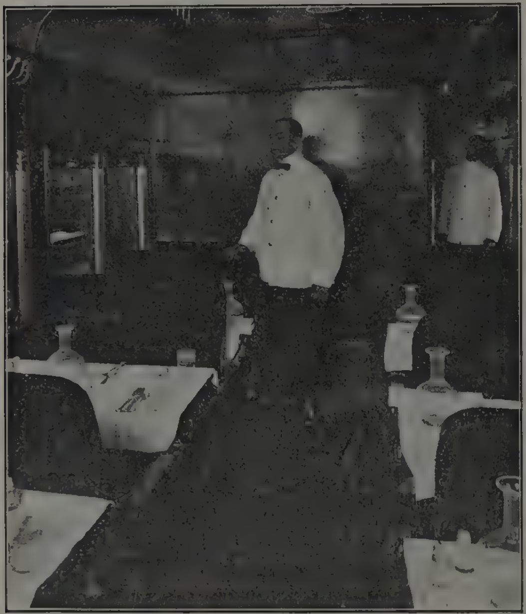


Fig. 329—Interior View of Cafe Coach in Use on the Pennsylvania Railroad.

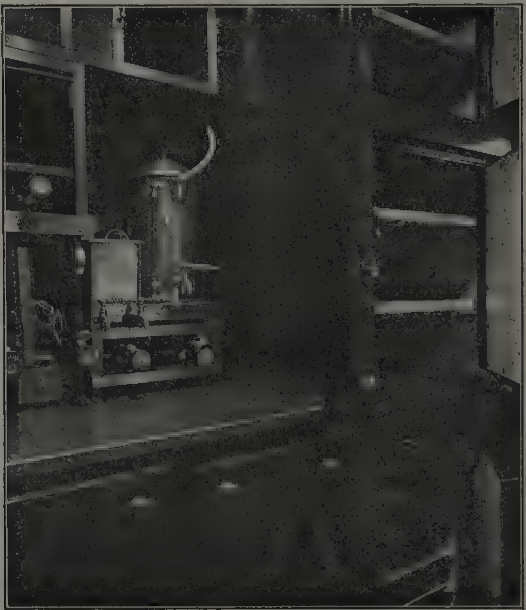


Fig. 330—Kitchen of the Cafe Coach on the Pennsylvania Railroad.

Fig. 331—Interior of Steel Dining Car. Builder, The Pullman Company.

Fig. 332—Interior of Observation Room, Northern Pacific Observation-Buffet Car. Builder, The Barney & Smith Car Company.

Fig. 333—Steel Chapel Car. Weight, 134,000 lb. Builder, The Barney & Smith Car Company.
(See Fig. 334.)

Fig. 334—Interior View of Chapel Car of the Catholic Church Extension Society. Builder, The Barney & Smith Car Company.
(See Fig. 333.)

Fig. 335—Interior of Women's Reception Room, Chicago, Burlington & Quincy Lounging Car. Builder, The Barney & Smith Car Company.

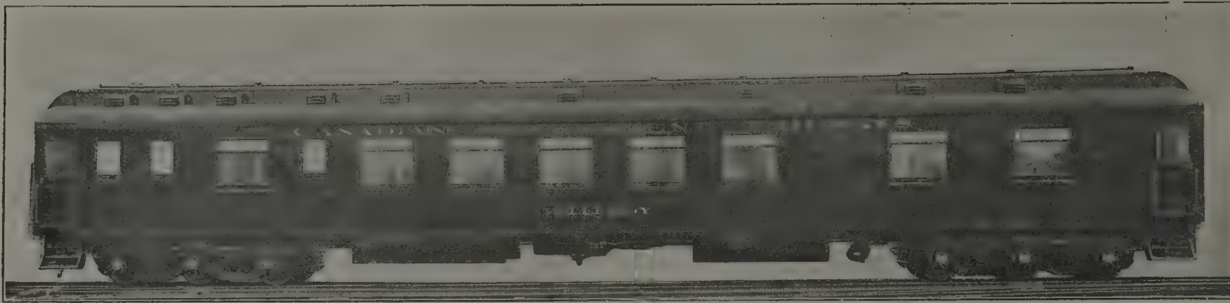


Fig. 336—All-Steel 10-Section Sleeping Car for Canadian Government Railways. Weight, 168,500 lb.; Length Over End Sills, 73 ft. 6 in. Builder, National Steel Car Company.

(*See Figs.* 337-343.)

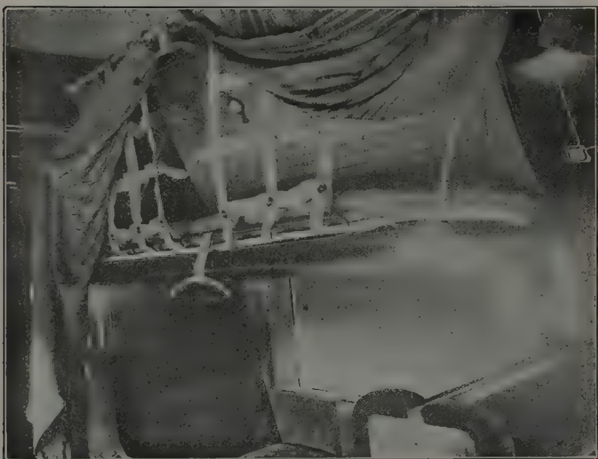


Fig. 337—Upper Berth Safety Straps and Coat Hangers.

Fig. 338—Interior of Canadian Government Railways Sleeping Car.

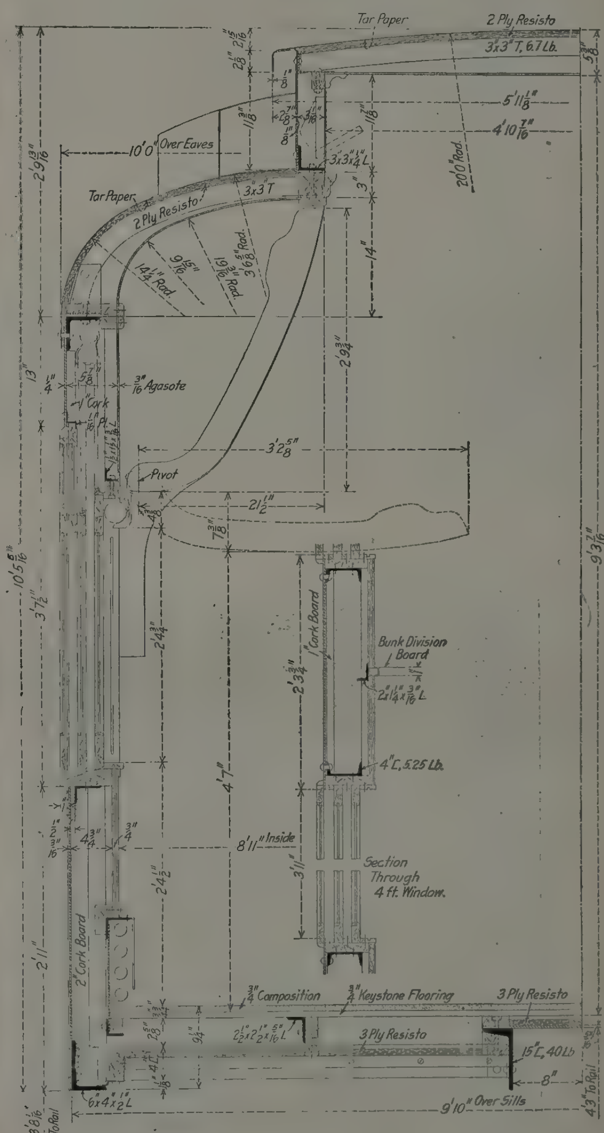


Fig. 339—Cross Section of Car Body and Horizontal Section Through the Windows.

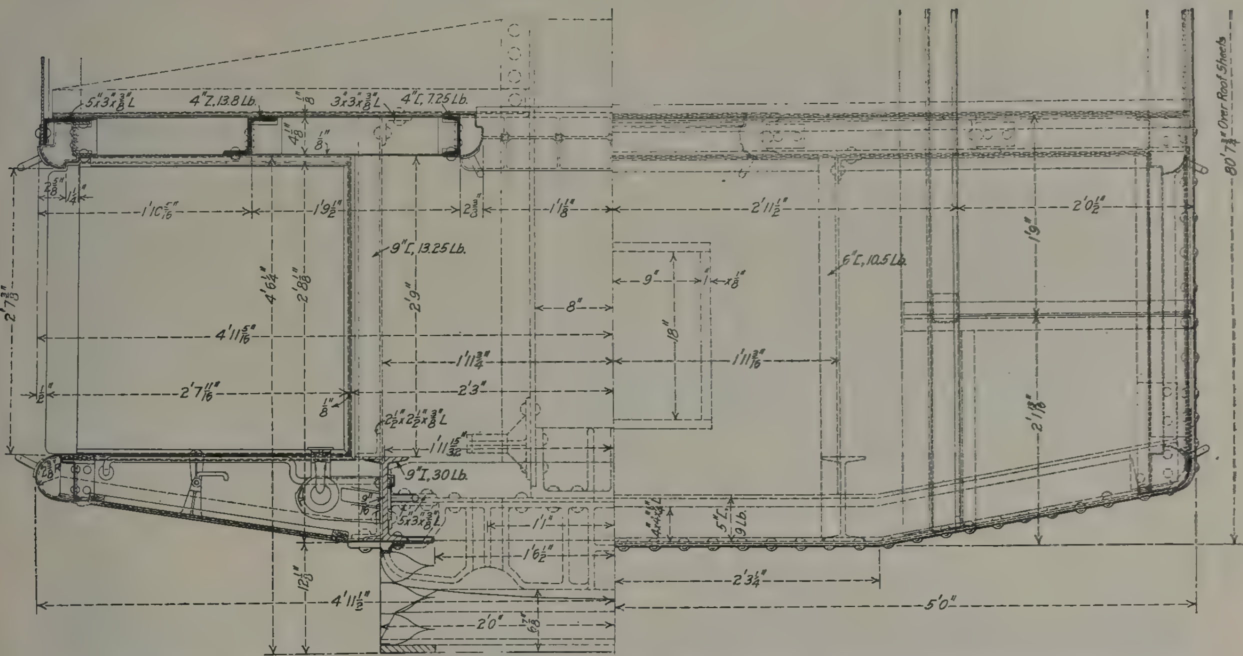


Fig. 340—Horizontal Section Through End Frame and Half-Plan of Hood. Canadian Government Railways Sleeping Car.
(*See Figs.* 336-341.)

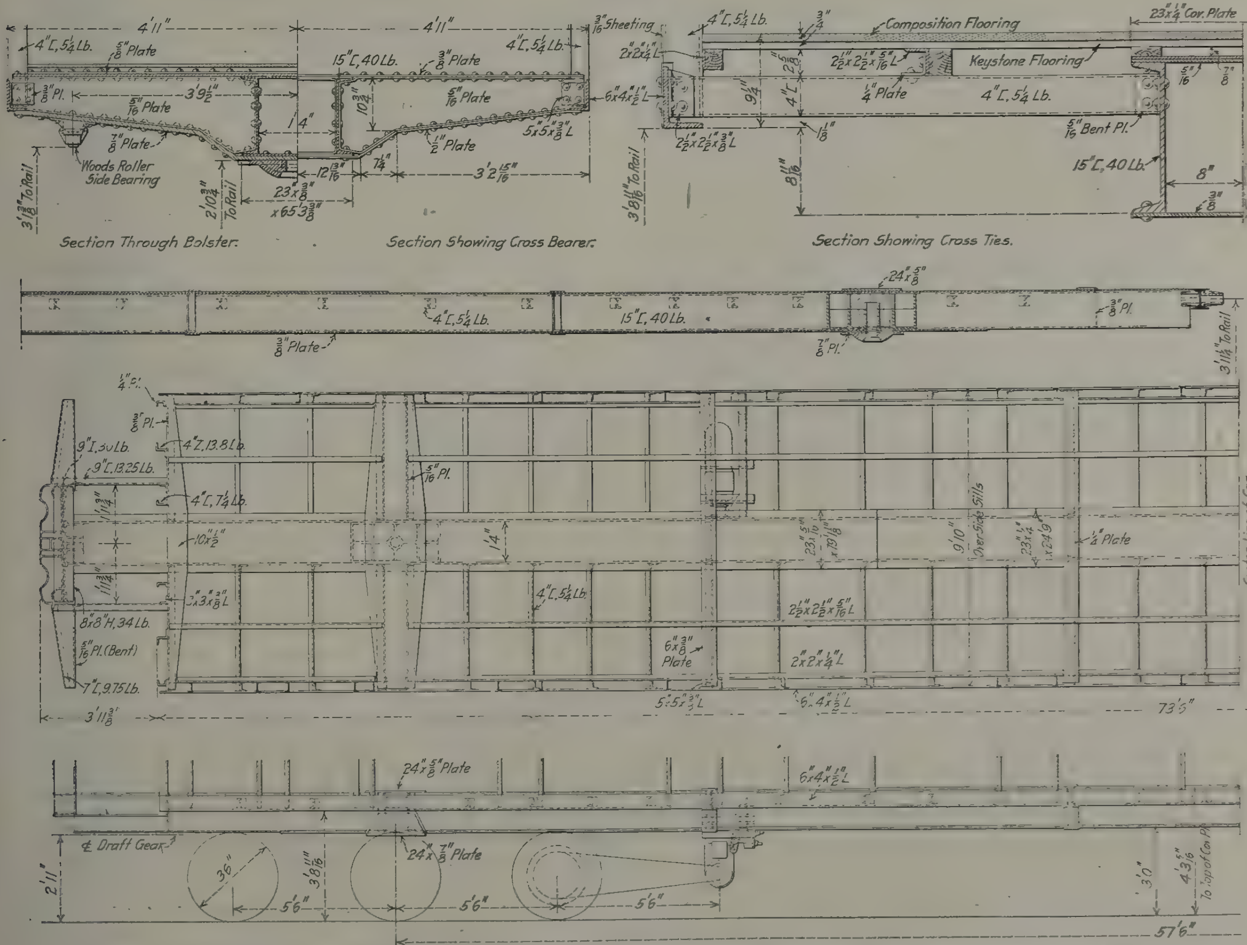


Fig. 341—Underframe Arrangement and Details of Construction. Canadian Government Railways Sleeping Car Shown in Figs. 336-343.

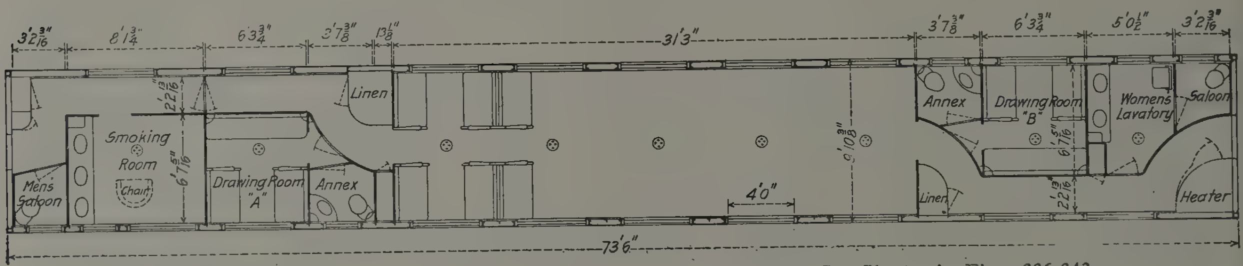


Fig. 342—Floor Plan of Canadian Government Railways Sleeping Car Shown in Figs. 336-343.

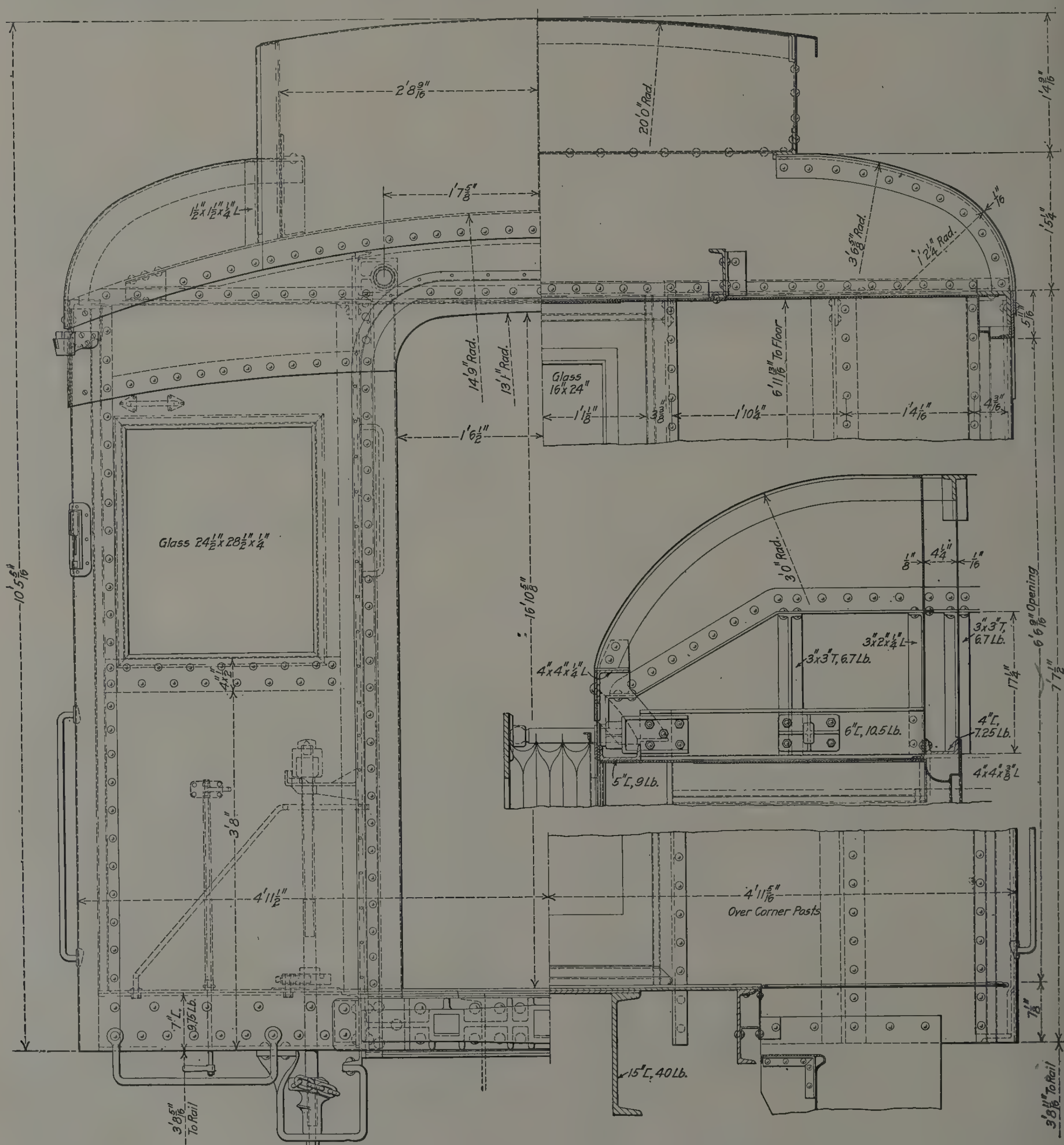


Fig. 343—Vestibule Construction of Canadian Government Railways Ten-Section Steel Sleeper, Shown in Figs. 336-343.

Fig. 344—Wooden Vestibuled Sleeping Car for Electric Interurban Service. Weight, 74,600 lb.; Length Over End Sills, 51 ft. 4 in. Builder, American Car & Foundry Company.

Fig. 345—Observation Room of Sleeping Car Shown in Figs. 346 and 347.

Fig. 346—Interior View of Sleeping Car Shown in Figs. 345 and 347.

Fig. 347—Steel Observation Sleeping Car. Total Weight, 148,300 lb.; Weight of Trucks, 40,800 lb.; Length Over Buffers, 81 ft. 6½ in. Builder, The Barney & Smith Car Company.

(*See Figs.* 345-346.)

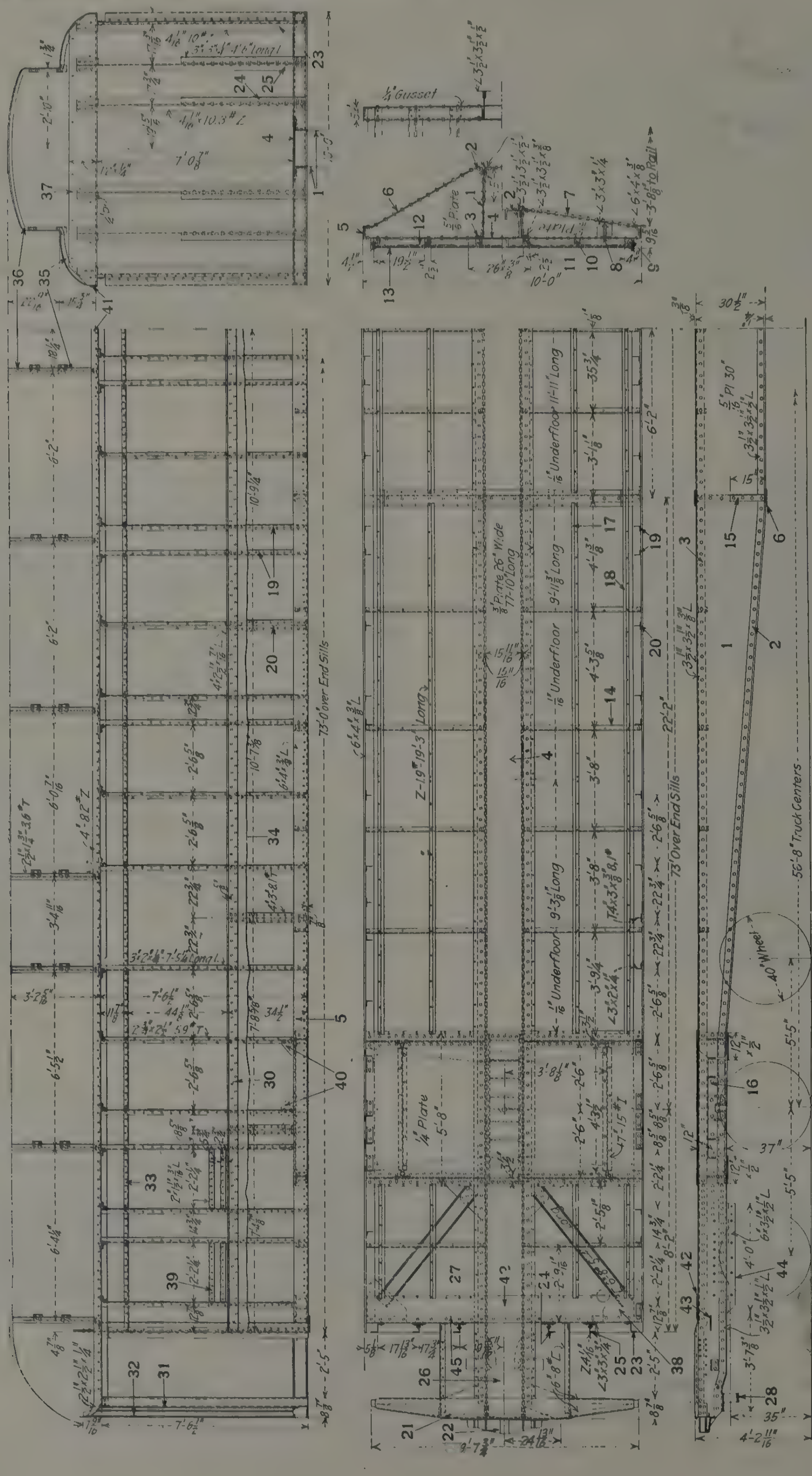


Fig. 348—Minneapolis, St. Paul & Sault Ste. Marie Steel Sleeping Car. Builder, The Barney & Smith Car Company.

See Page 403 for Names of Numbered Parts.

Fig. 349—Steel Frame Twelve-Section Stateroom Sleeping Car. Length Over Body End Frames, 72 ft. 6 in.; Weight, 154,000 lb. The Canadian Northern Railway.

Fig. 350—View Through Compartments, Chicago, Milwaukee & St. Paul Compartment Sleeping Car. Builder, The Barney & Smith Car Company.

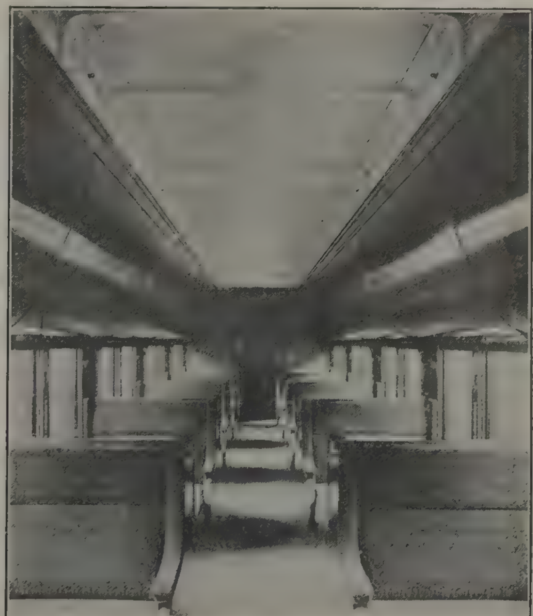


Fig. 351—Interior of Steel Sleeping Car. Builder, The Pullman Company.

Parts of Steel Passenger Train Cars. See Fig. 348.

1 *Center Sill Web Plate*
2 *Center Sill Bottom Angle*
3 *Center Sill Top Angle*
4 *Center Sill Cover Plate*
5 *Side Sill Angle*
6 *Crossbearer Bottom Tie Plate*
7 *Body Bolster Tie Plate*
8 *Body Side Bearing*
9 *Floor Nailing Strip*
10 *Floor Nailing Strip*
11 *Floor Nailing Strip*
12 *Underfloor Course*
13 *Top Floor Course*
14 *Floor Support*
15 *Crossbearer Center Filler*
16 *Bolster Center Filler*
17 *Floor Nailing Strip Stiffener*
18 *Floor Nailing Strip Stiffener*
19 *Angle Side Post*
20 *Tee Side Post*
21 *Buffer Beam*
22 *Buffer Beam Extension*
23 *Corner Post*
24 *End Door Post*
25 *Intermediate End Post*
26 *Platform Cover Plate*
27 *Steel Underfloor Plate*
28 *Drawbar Carry Iron*
30 *Side Girder Top Member or Belt Rail*
31 *Vestibule Corner Post*
32 *Vestibule Diaphragm Post*
33 *Window Header Angle*
34 *Side Sheathing Plate*
35 *Roof or Lower Deck Carline*
36 *Roof or Upper Deck Carline*
37 *Metal End Plate*
38 *Side and End Sill Corner Gusset*
39 *Window Sill Angle*
40 *Side Post Gusset*
41 *"Z" Bar Side Plate*
42 *End Sill Top Tie Plate*
43 *End Sill Bottom Tie Plate*
44 *Draft Lug Angle*
45 *End Sill Channel*

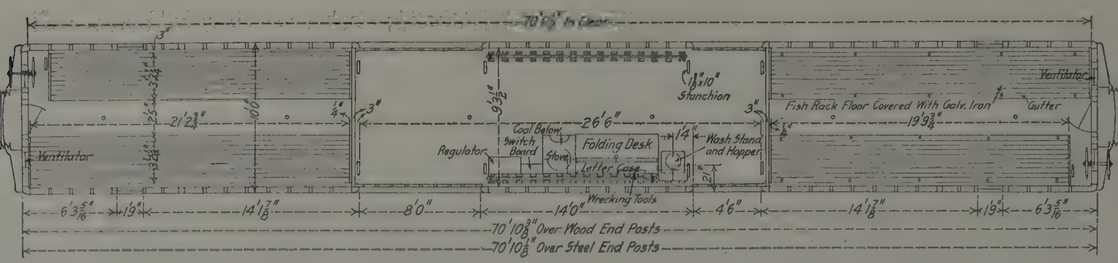


Fig. 352—Floor Plan of Missouri Pacific Baggage Car. Builder, American Car & Foundry Company.

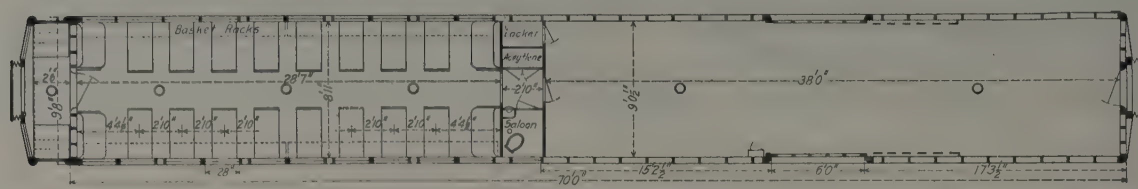


Fig. 353—Floor Plan of Chicago, Burlington & Quincy Combination Baggage and Passenger Car. Builder American Car & Foundry Company.

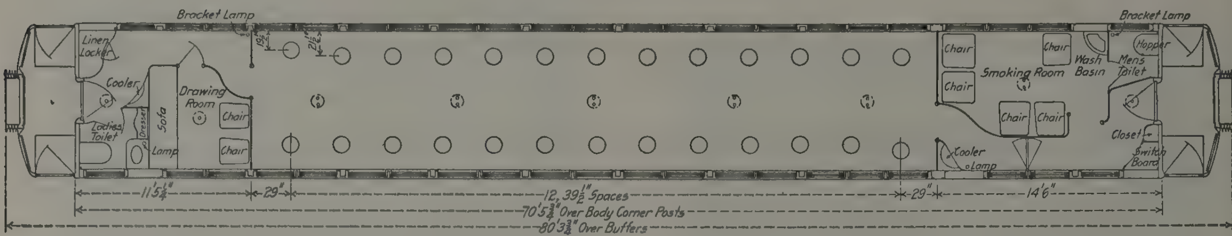


Fig. 354—Floor Plan of Long Island Steel Parlor Car. Builder, American Car & Foundry Company.

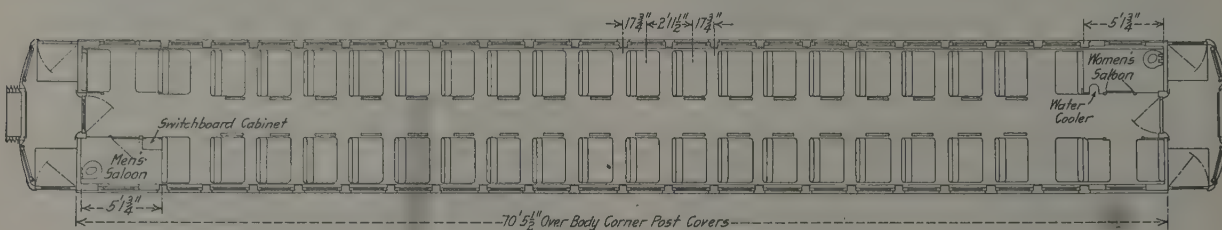


Fig. 355—Floor Plan of New York, New Haven & Hartford Steel Day Coach.

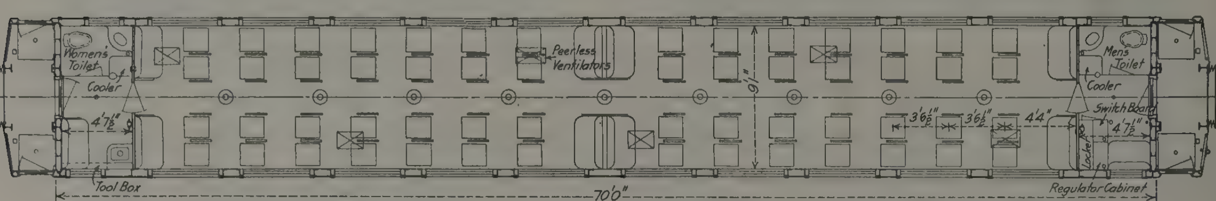


Fig. 356—Floor Plan of Atchison, Topeka & Santa Fe Steel Chair Car. Builder, The Pullman Company.

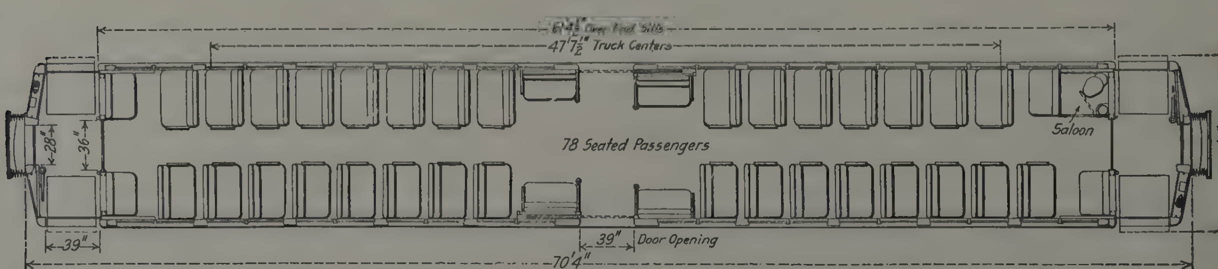


Fig. 357—Floor Plan of New York, Westchester & Boston Suburban Car Shown in Fig. 386.

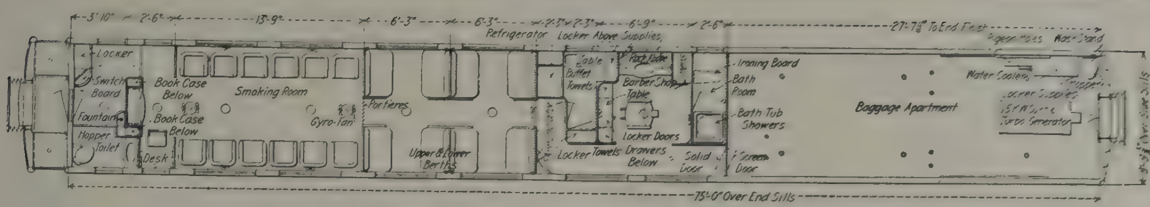


Fig. 358—Floor Plan of Steel Buffet Baggage Car. Builder, The Pullman Company.

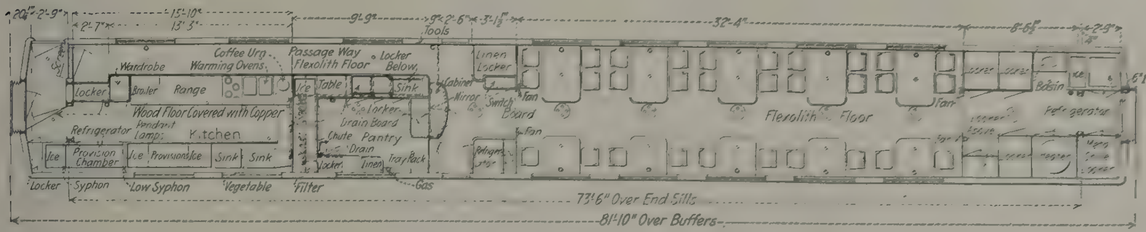


Fig. 359—Floor Plan of Canadian Government Railways Dining Car. Builder, Canadian Car & Foundry Co.

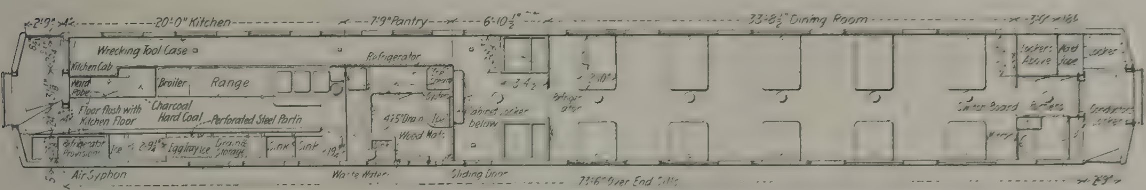


Fig. 360—Floor Plan of Steel Dining Car. Builder, The Pullman Company.

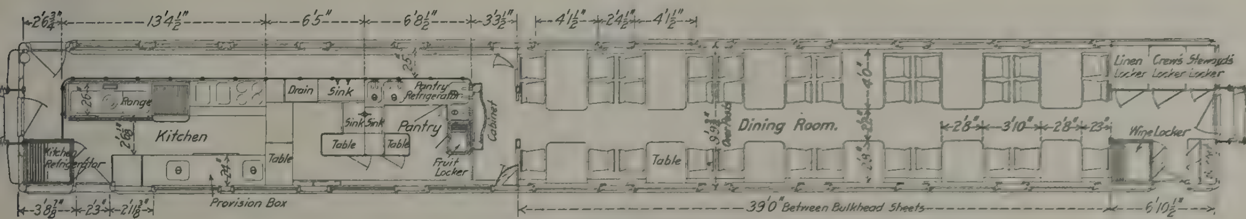


Fig. 361—Floor Plan of Pennsylvania Lines Dining Car.

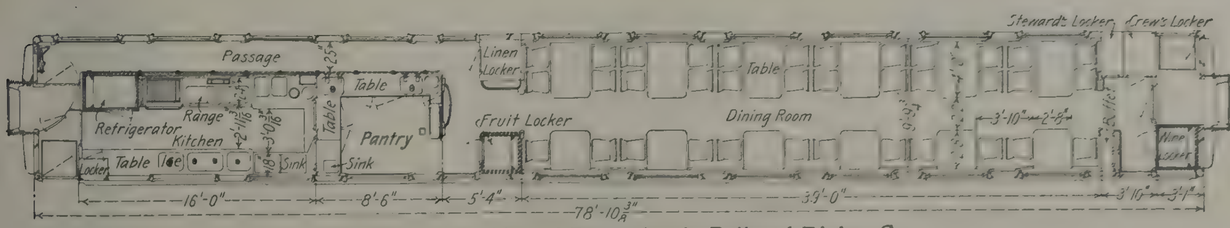


Fig. 362—Floor Plan of Pennsylvania Railroad Dining Car.

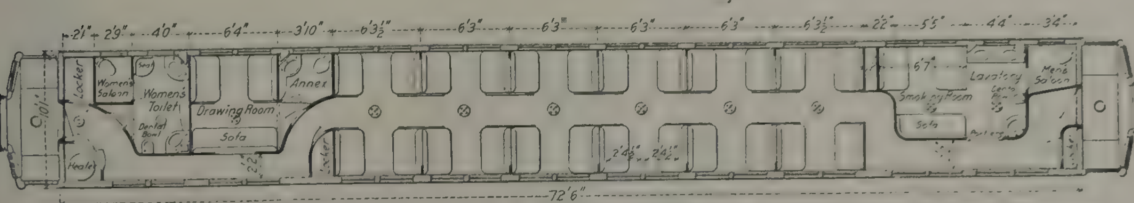


Fig. 363—Floor Plan of Chicago, Milwaukee & St. Paul Sleeping Car. Builder, The Pullman Company.

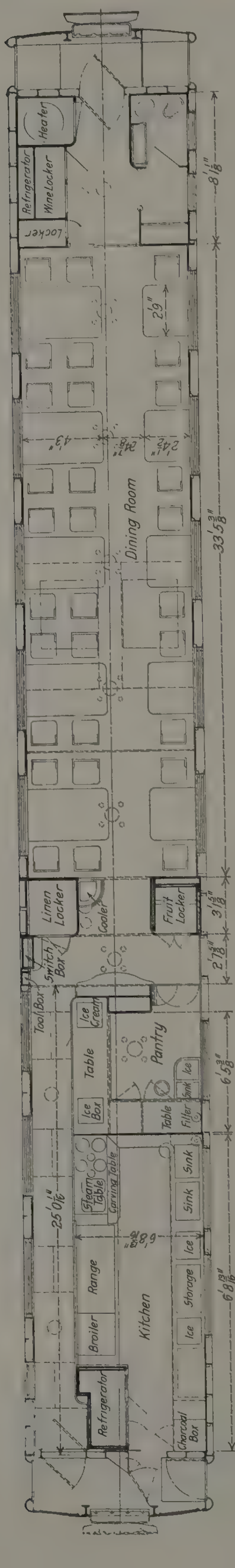


Fig. 364—Floor Plan of Union Pacific Steel Dining Car. Builder, The Pullman Company.

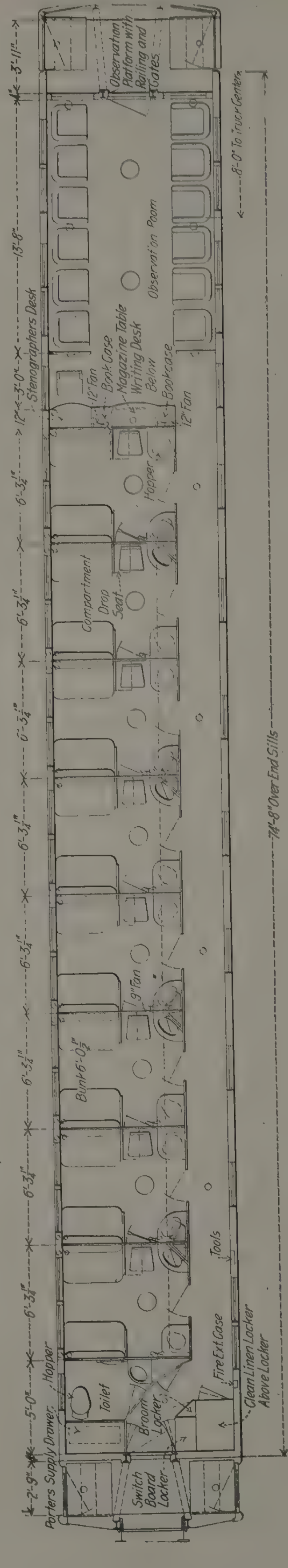


Fig. 365—Floor Plan of Compartment Sleeper and Ladies' Observation Room. Builder, The Pullman Company.

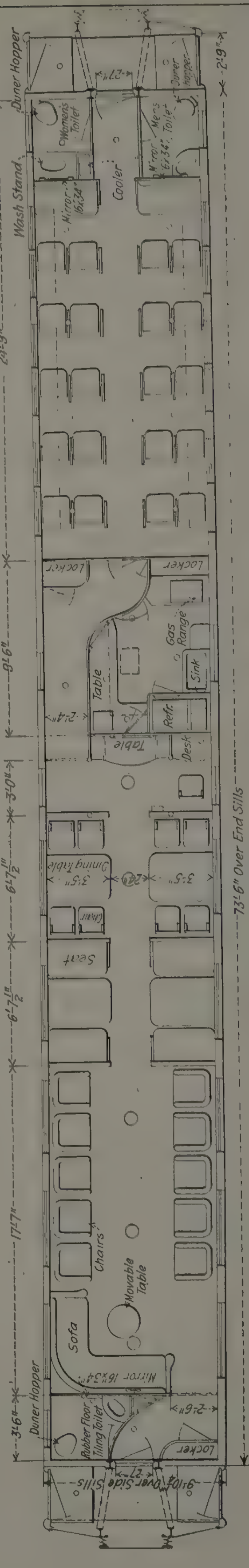


Fig. 366—Floor Plan of Steel Club Car. Builder, The Pullman Company.

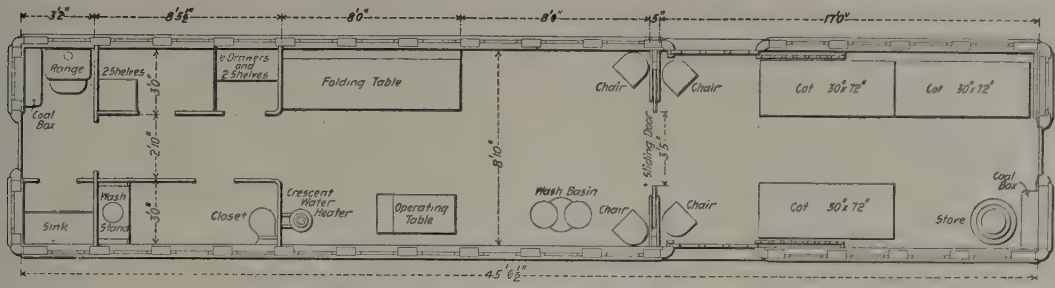


Fig. 367—Floor Plan of Lehigh Valley Hospital Car.

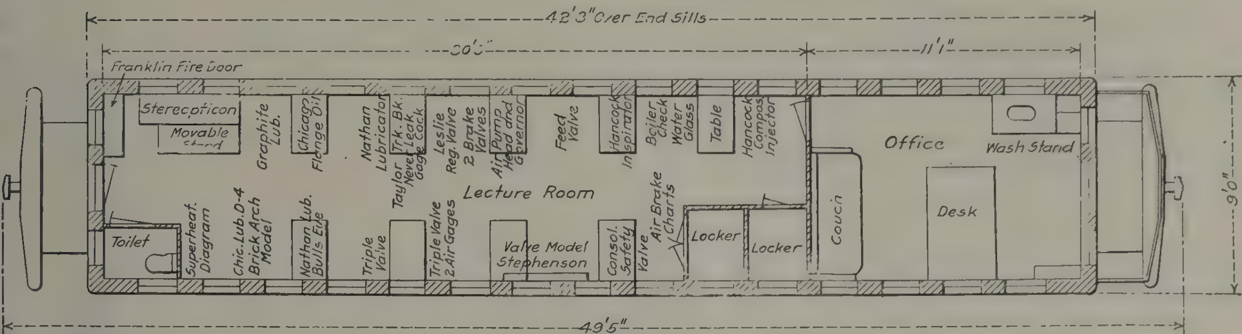


Fig. 368—Floor Plan of Delaware, Lackawanna & Western Fuel Instruction Car. Interior View Is Shown in Fig. 426.

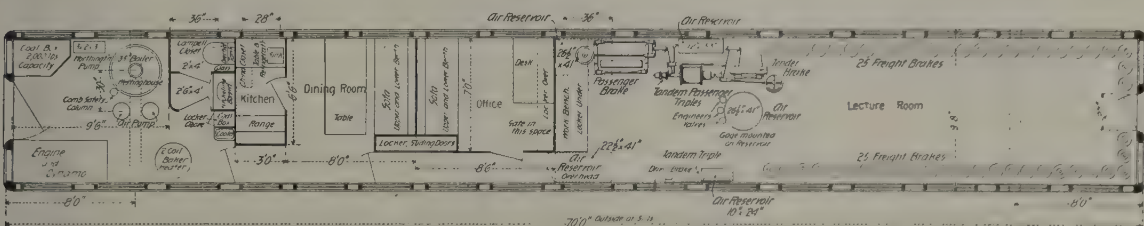


Fig. 369—Floor Plan of International Correspondence Schools Air Brake Instruction Car. Interior View is Shown in Fig. 424.

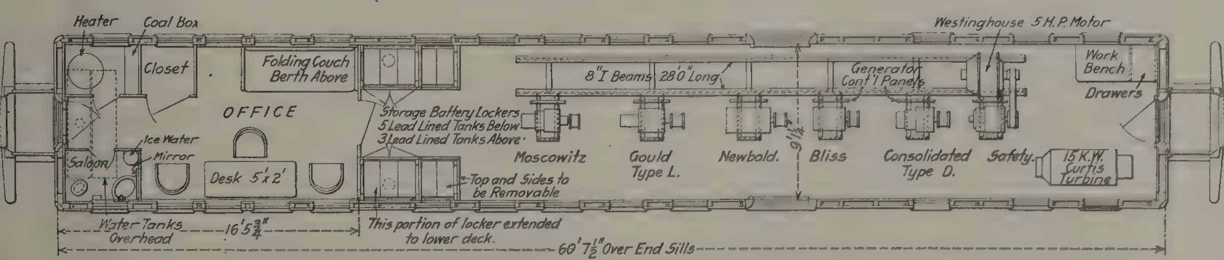


Fig. 370—Floor Plan of Pennsylvania Railroad Train Lighting Instruction Car.

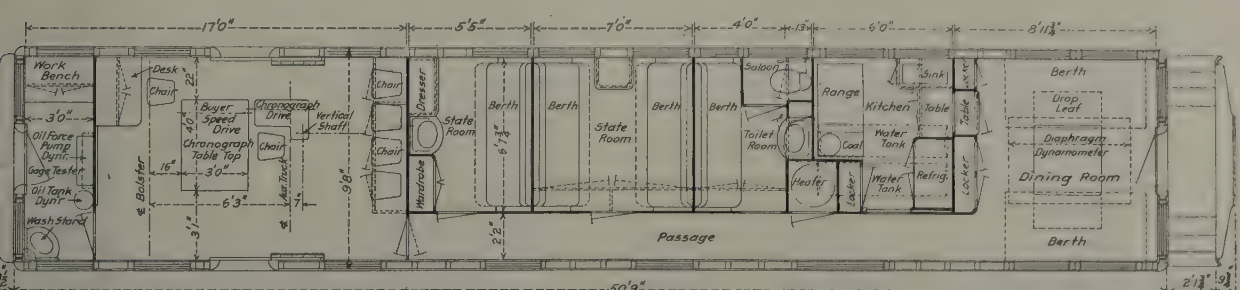


Fig. 371—Floor Plan of Baltimore & Ohio Dynamometer Car.

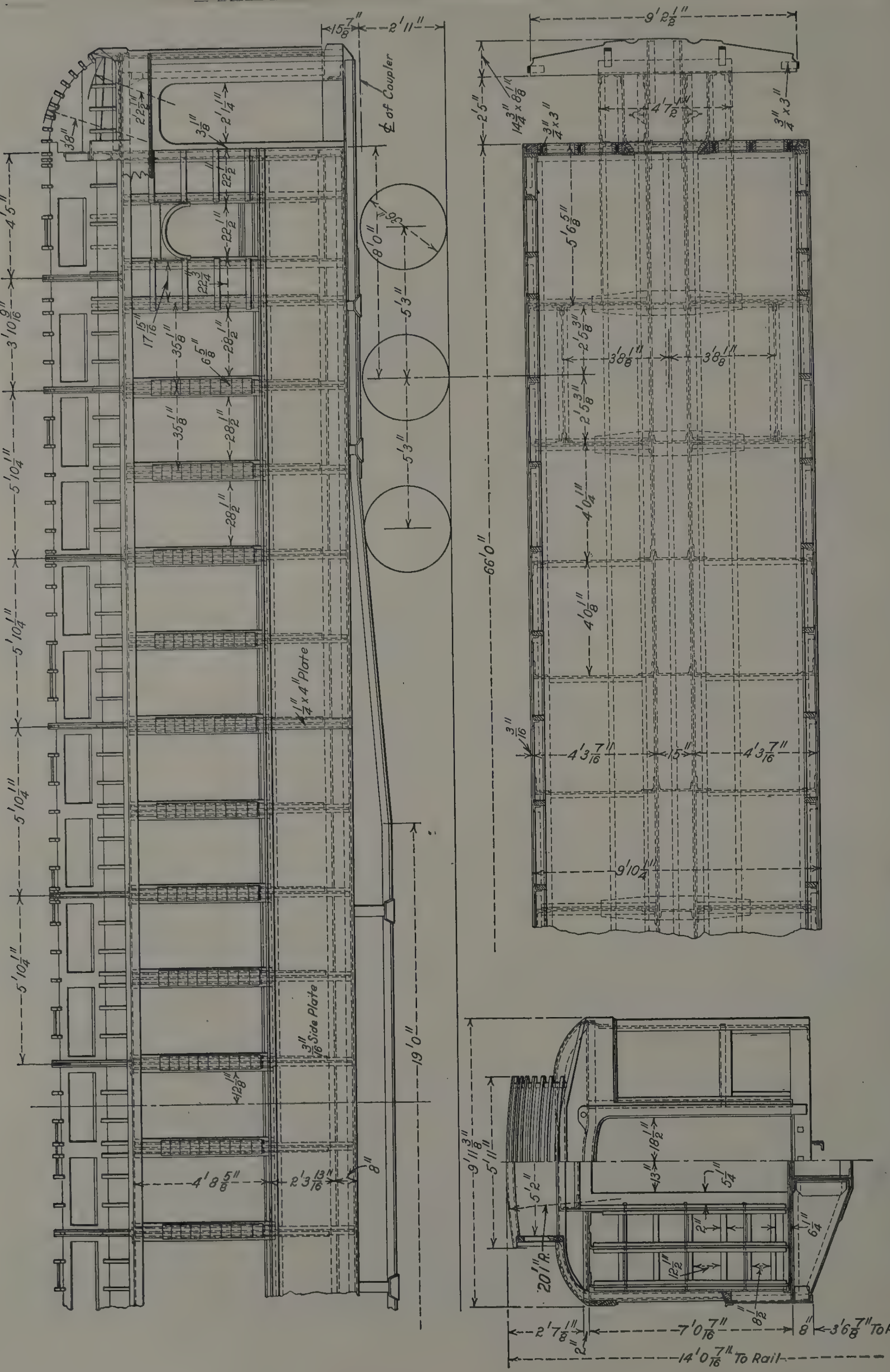


Fig. 372—Southern Railway Steel Frame Day Coach. Builder, The Harlan Works of the Bethlehem Ship Building Corporation.

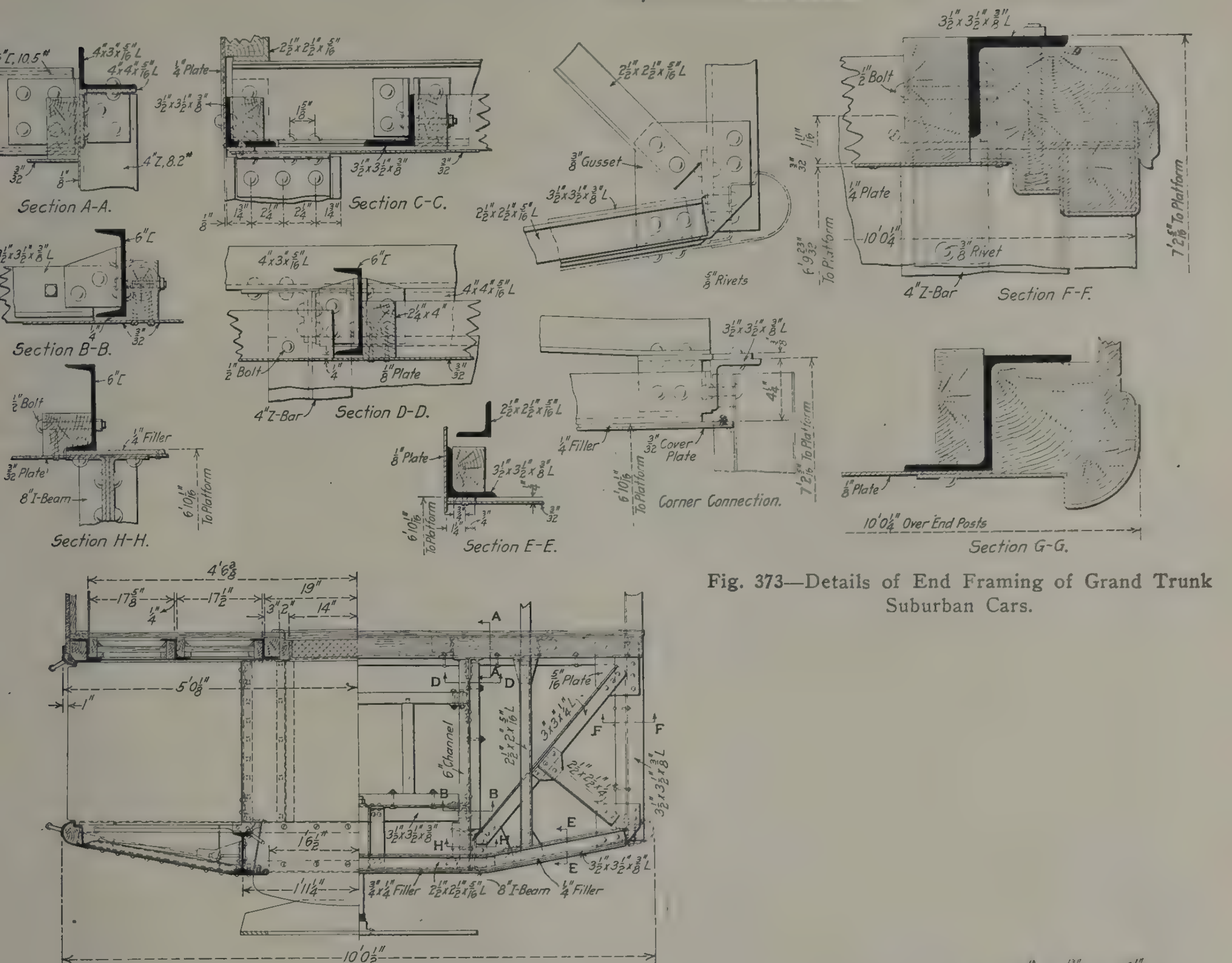


Fig. 373—Details of End Framing of Grand Trunk Suburban Cars.

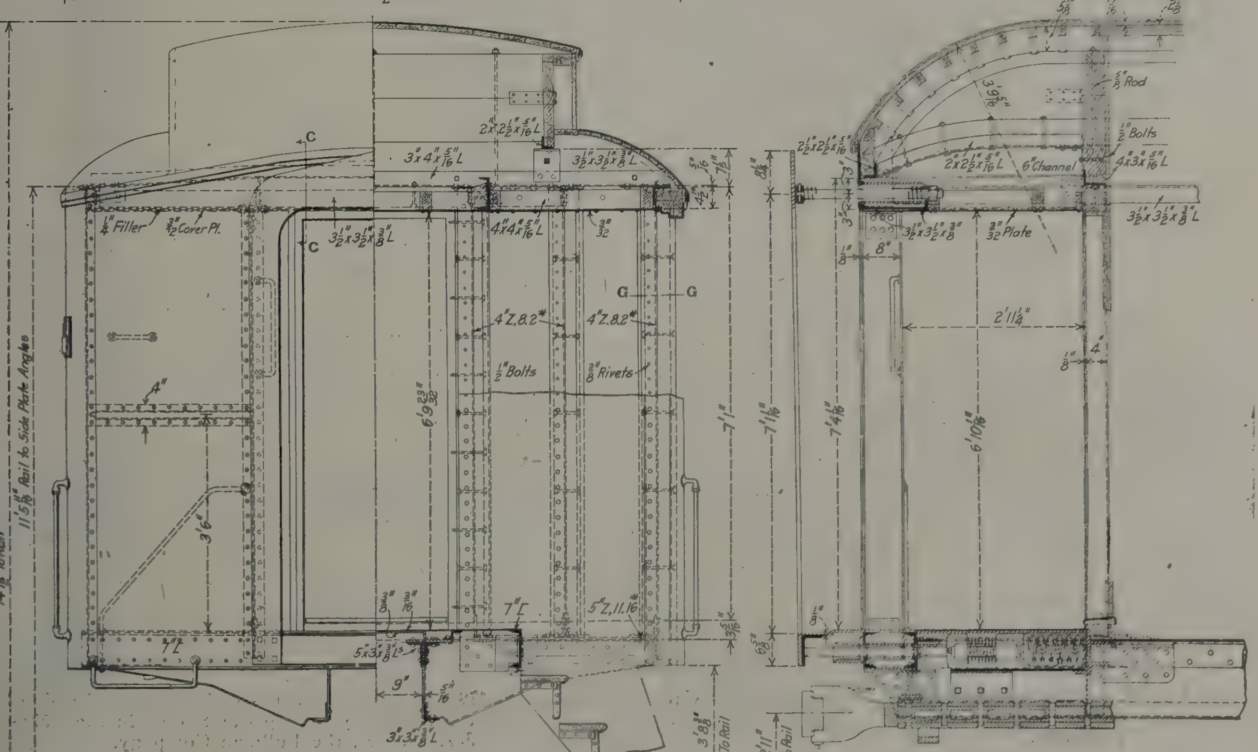


Fig. 374—End Arrangement of Grand Trunk Suburban Cars.

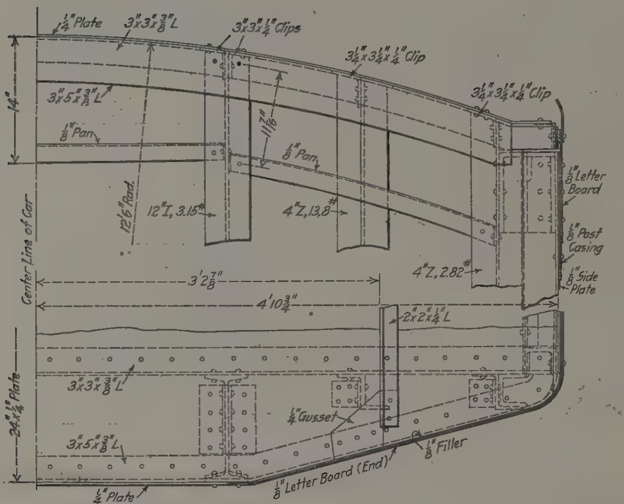


Fig. 375—Roof Details at End of Burlington Dining Car.

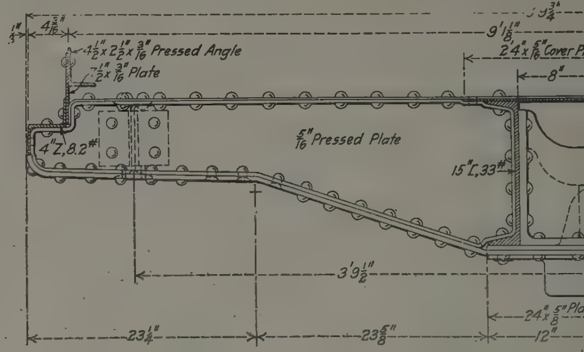


Fig. 376—Double Body Bolster of Burlington Diner.

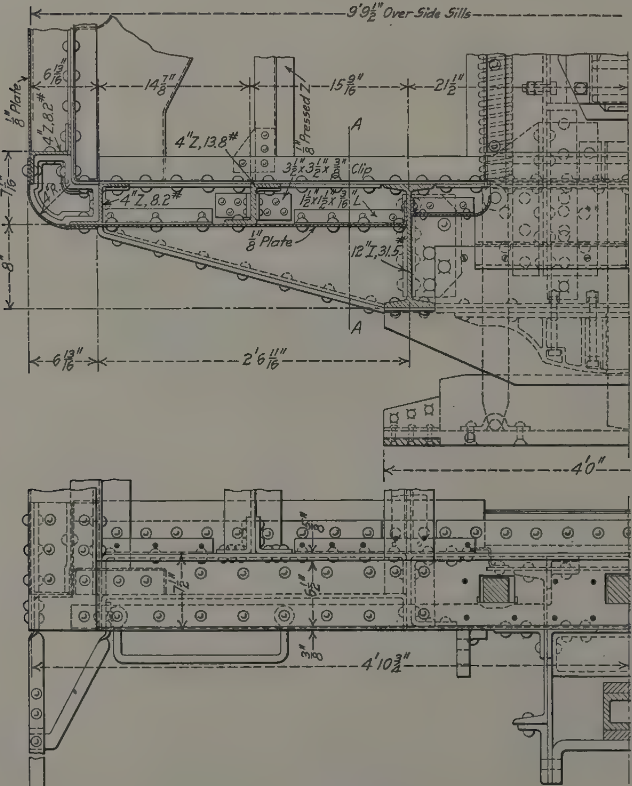


Fig. 377—End Sill of the Burlington Dining Car Shown in Figs. 375-378. Builder, The Pullman Company.

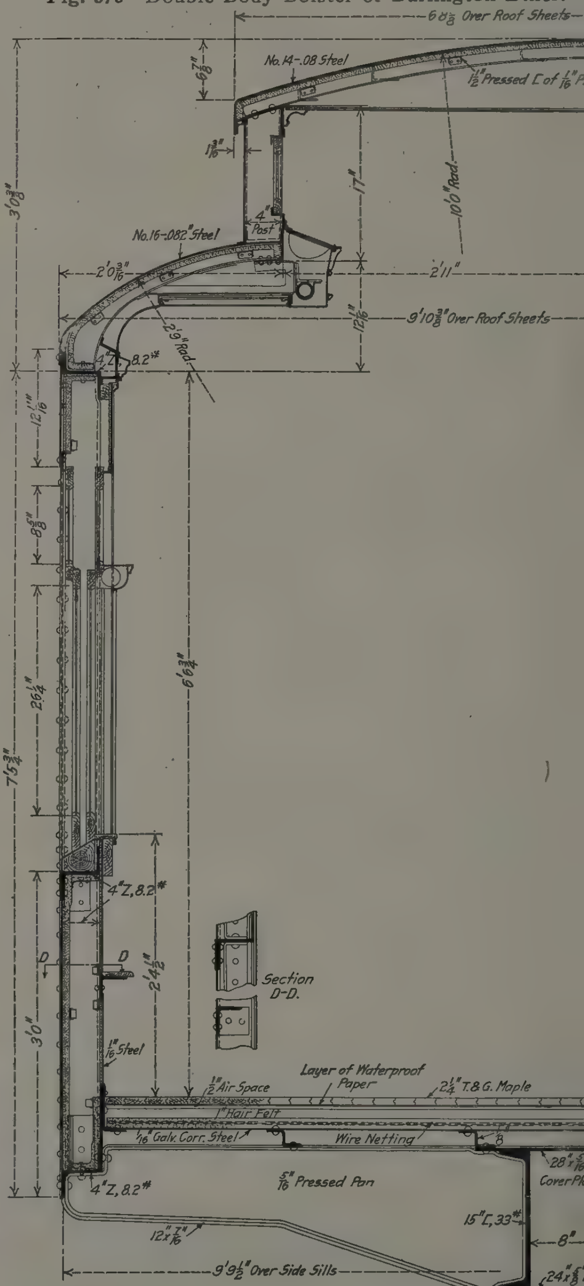


Fig. 378—Cross Section Through Chicago, Burlington & Quincy Dining Car Shown in Figs. 375-377. Builder, the Pullman Company.

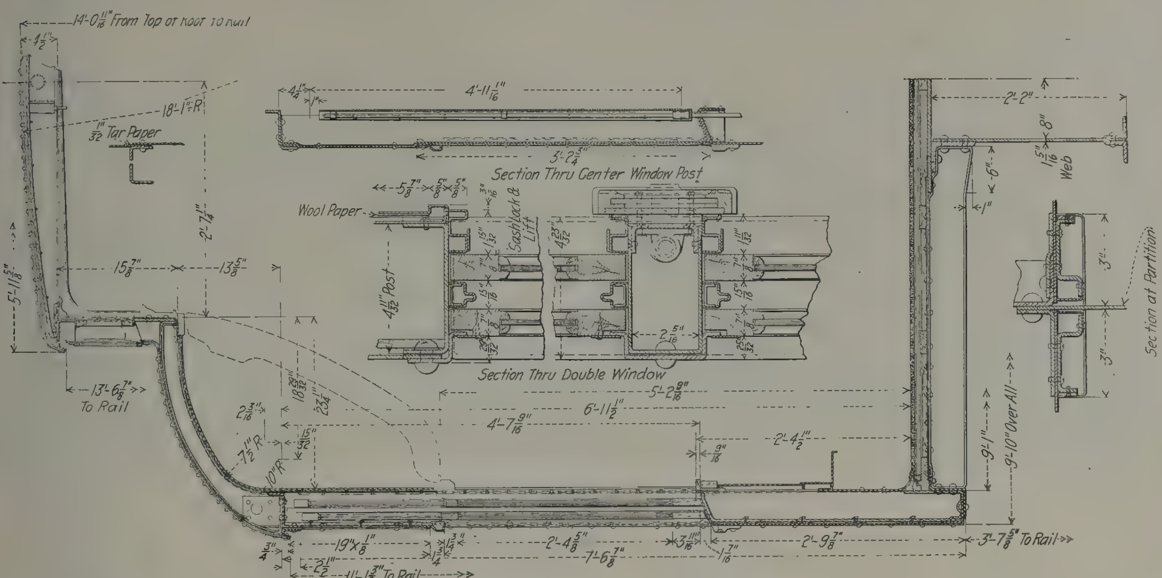


Fig. 380—The Pullman Company Standard Cross Section.

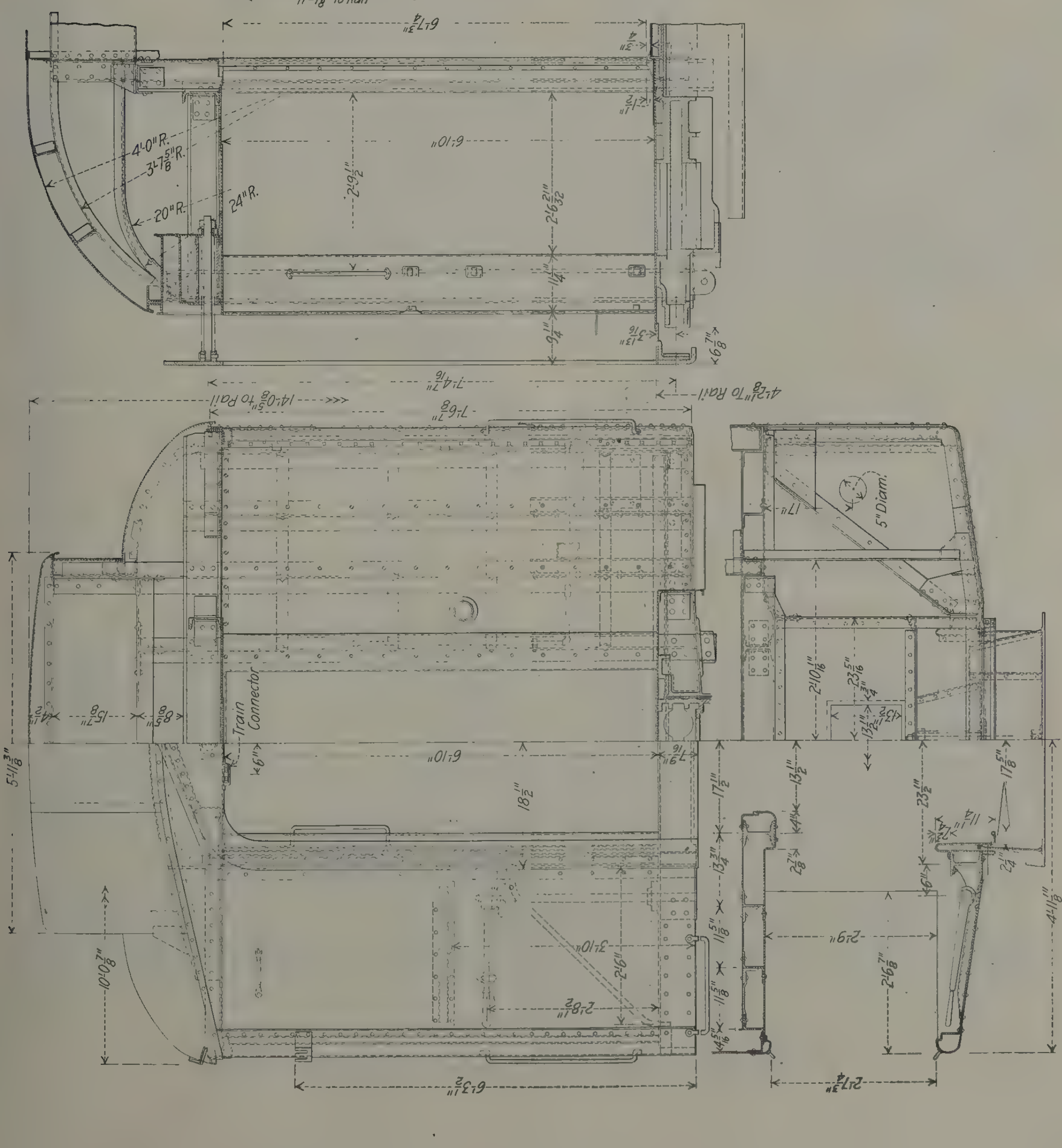


Fig. 379—The Pullman Company Standard Vestibule Construction.

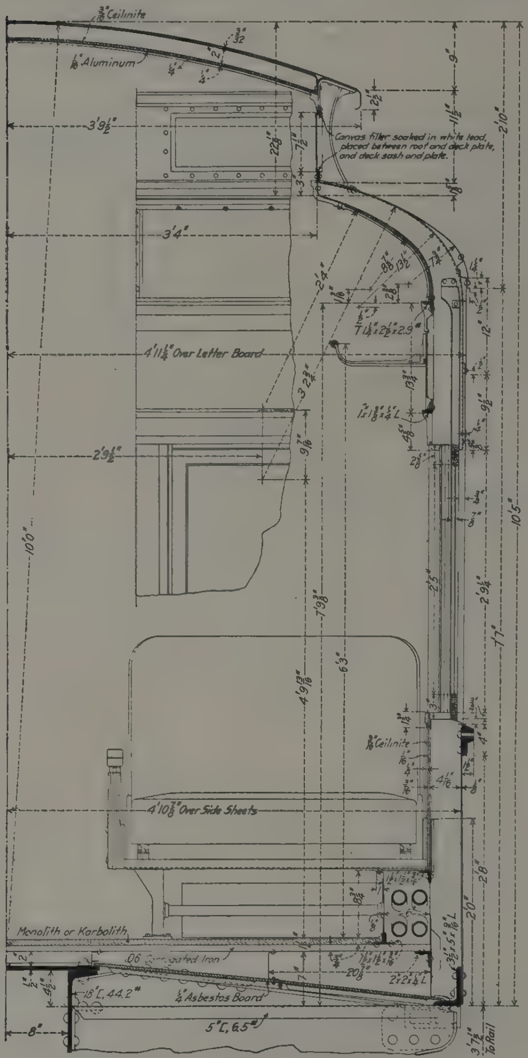


Fig. 381—Cross Section of Pennsylvania Railroad Steel Day Coach and Combination Cars, Classes P70 and PB70. Section Through Windows Shown in Fig. 384.

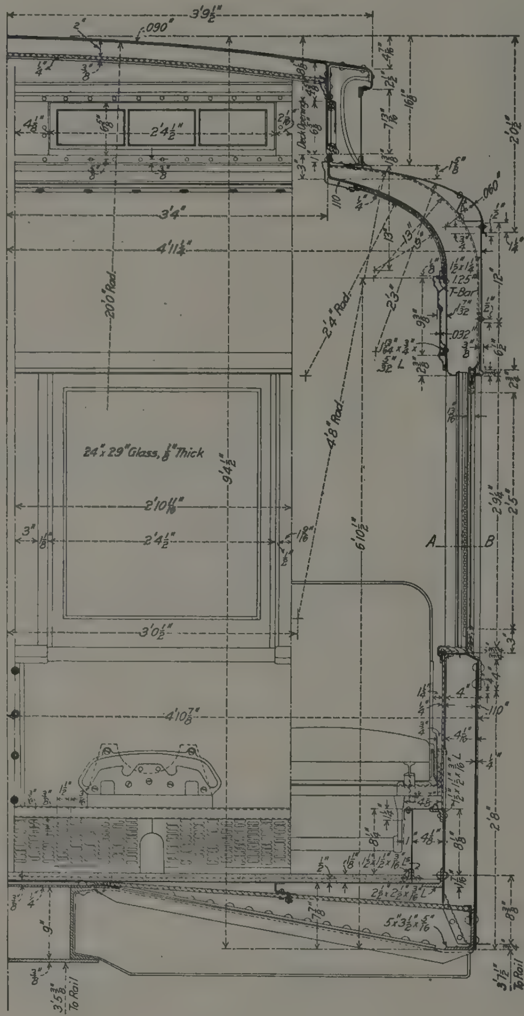


Fig. 382—Cross Section of Pennsylvania Railroad Steel Combination Cars, Classes MP54 and MPB54. See Fig. 383 for Section AB.

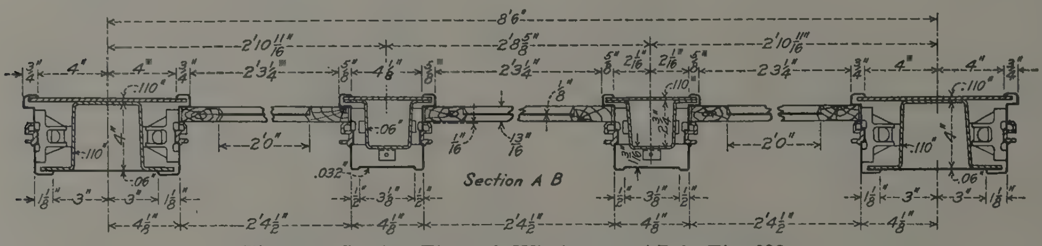


Fig. 383—Section Through Windows at AB in Fig. 382.

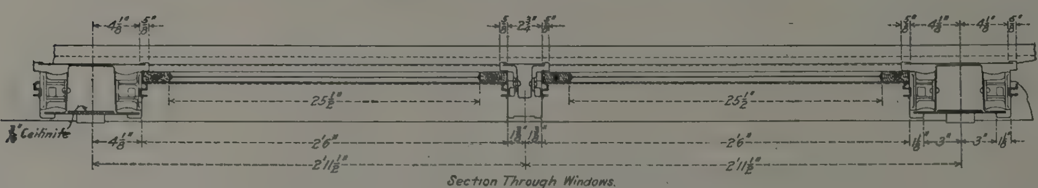


Fig. 384—Section Through Windows in Fig. 381.

Fig. 385—Steel Vestibuled Electric Motor Car Taking Power from Storage Batteries. Weight, 59,000 lb.; Seating Capacity, 51; Length of Passenger Compartment, 32 ft.; Length of Baggage Compartment, 12 ft. 10 in.; Equipped with Four 25 hp. Motors. Builder, Railway Storage Battery Car Company.

Fig. 386—Steel Vestibuled Electric Motor Car for Suburban Service. Weight Without Motors, 107,200 lb.; Weight Complete, 120,000 lb. Builder, Pressed Steel Car Company.

Fig. 387—Steel Vestibuled Electric Motor Car Used on the Philadelphia-Paoli Section, Pennsylvania Railroad. Weight 117,000 lb.; Length Over Platforms, 64 ft. 6 in.; Seating Capacity, 68. Equipped with Two 225-hp. Motors.

Fig. 388—Steel Gas-Electric Motor Car. Weight, 107,000 lb.; Length Over Buffers, 70 ft. 4 in.; Seating Capacity, 86; Motor Rating, 200 hp. Builder General Electric Company.

Fig. 389—Steel Trailer Car for Summer Service with Electric Motor Cars. Weight, 63,000 lb.; Seating Capacity, 80; Length Over End Sills, 54 ft. 4 in. Builder, Standard Steel Car Company.

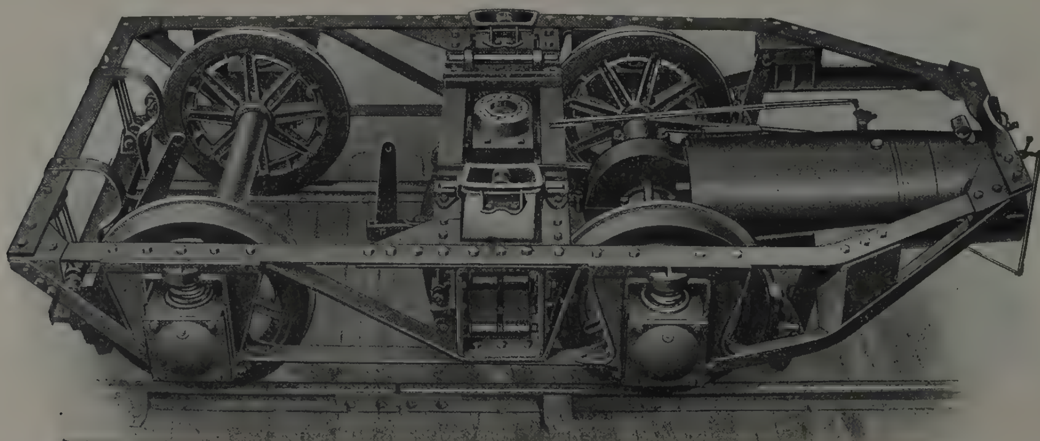


Fig. 390—Motor truck for Auto Car Shown in Figs. 391-393, with Engine Mounted on Truck. Builder, Unit Railway Car Company.

Fig. 391—Semi-Steel Auto Railway Passenger, Smoker and Baggage Car. Length over Bumpers, 48 ft. 7 in.; Width, 8 ft. 6 in.; Weight, 30,000 lb. Steam Power Generated by Gasolene, Kerosene or Fuel Oil. Builder, Unit Railway Car Company.

(See Figs. 390, 392 and 393.)

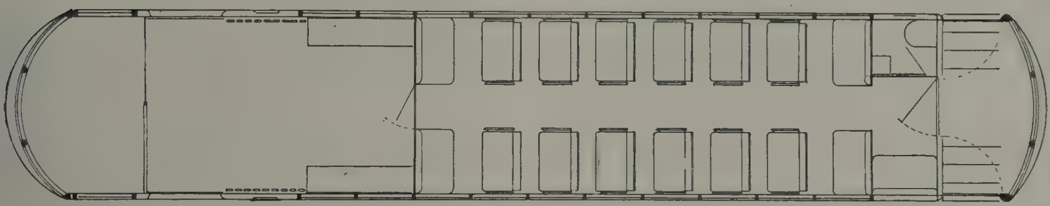


Fig. 392—Floor Plan of Auto-Car.

Fig. 393—Interior of Passenger Compartment of Auto-Car Shown in Figs. 390-392.

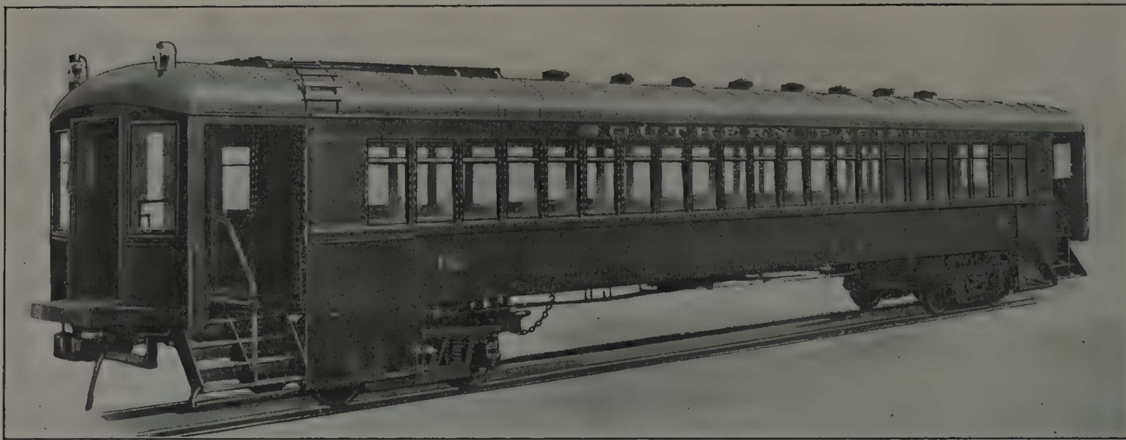


Fig. 394—Steel Vestibuled Electric Motor Car for Suburban Service. Weight, 77,600 lbs.; Length Over Buffers, 69 ft. 10 in. Builder, American Car & Foundry Company.

Fig. 395—Interior View of the Steel Suburban Car Shown in Fig. 394.

Fig. 396—Interior View of the Motor Car Shown in Fig. 397.

Fig. 397—Steel Gasolene Motor Car. Weight, 72,000 lb. Builder, Hall-Scott Motor Car Company, Incorporated.

Fig. 398.—Beach Oil-Electric Motor Car. Built for the Nashville, Chattanooga & St. Louis by the Electric Car & Locomotive Corporation.

(See Fig. 398-A for Floor Plan.)

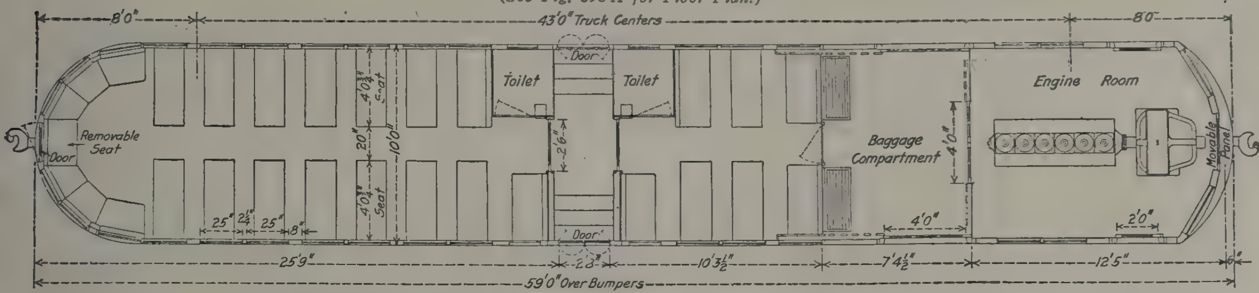


Fig. 398-A—Floor Plan of Beach Oil-Electric Motor Car Shown in Fig. 398.

Fig. 399.—Steel Gasolene Motor Car and Steel Trailer. Length of Motor Car Over-All, 70 ft. Seating Capacity of Trailer, 78. Builder, McKeen Motor Car Company.

Fig. 400.—Steel Gasolene Motor Car. Weight, 78,000 lb.; Motor Length Over End Sills, 70 ft.; Seating Capacity, 28. Builder, McKeen Motor Car Company.

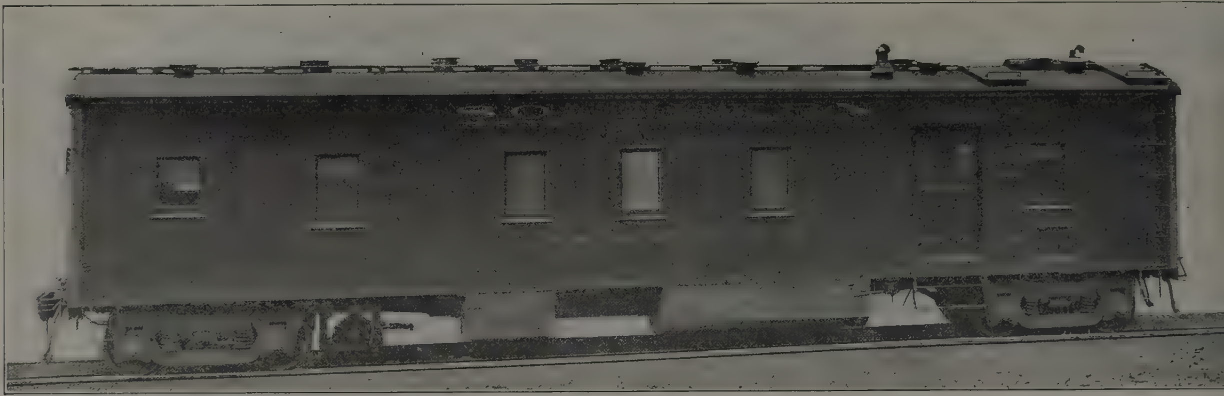


Fig. 401—Dynamometer Car for the Southern Railway. Builder, The Burr Company.
(*See Figs.* 402-413.)

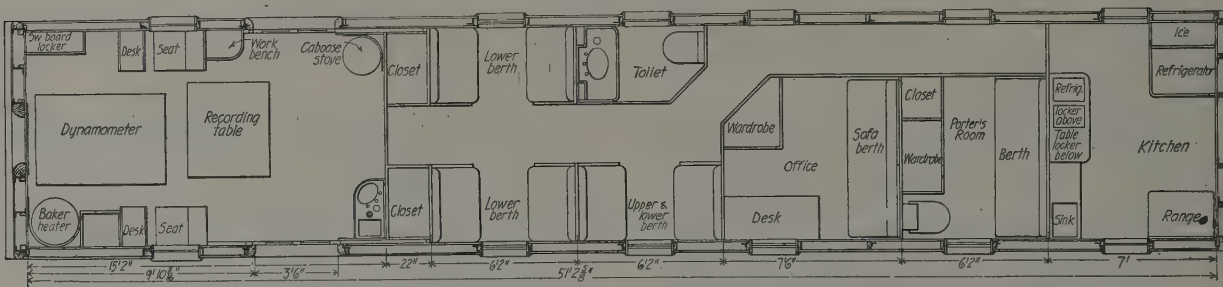


Fig. 402—General Plan, Dynamometer Car for the Southern Railway.
Length over End Sills 51 ft.; Inside Width 10 ft. 8 in.; Length of Dynamometer Compartment 15 ft. 2 in.

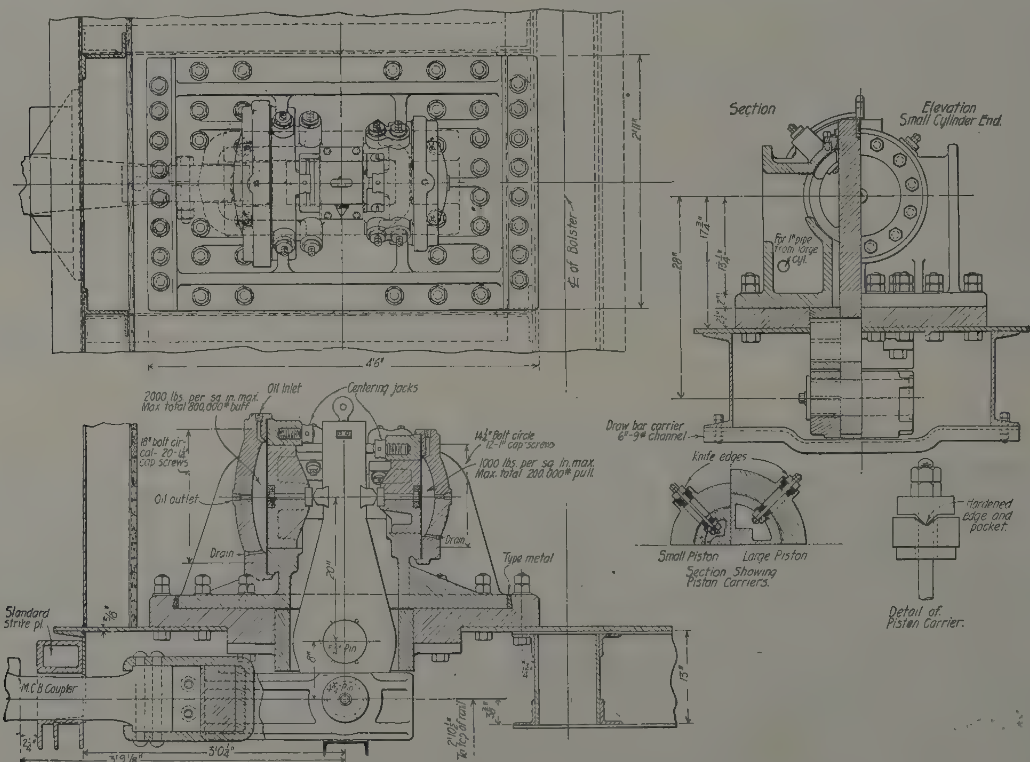


Fig. 403—Weighing Head Assembly, Dynamometer Car.

Dynamometer Car for Southern Railway. Builder, The Burr Company.
(*Figs.* 401-413.)

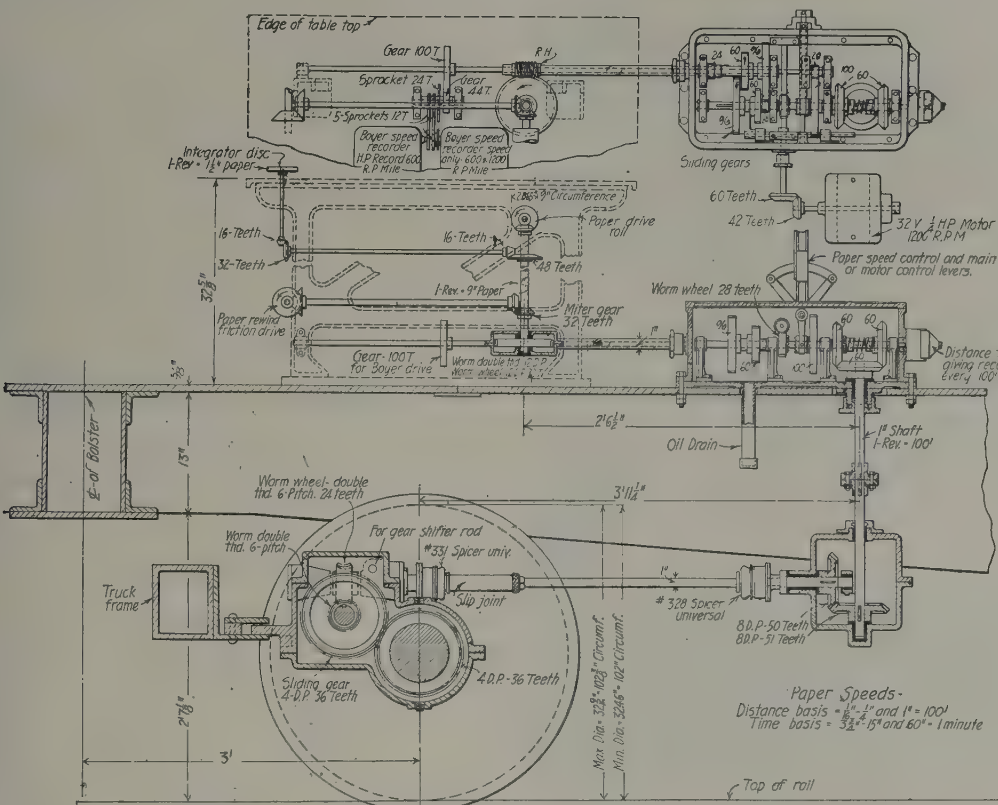


Fig. 404—Assembly of Transmission Mechanism for Paper Drive, Dynamometer Car.

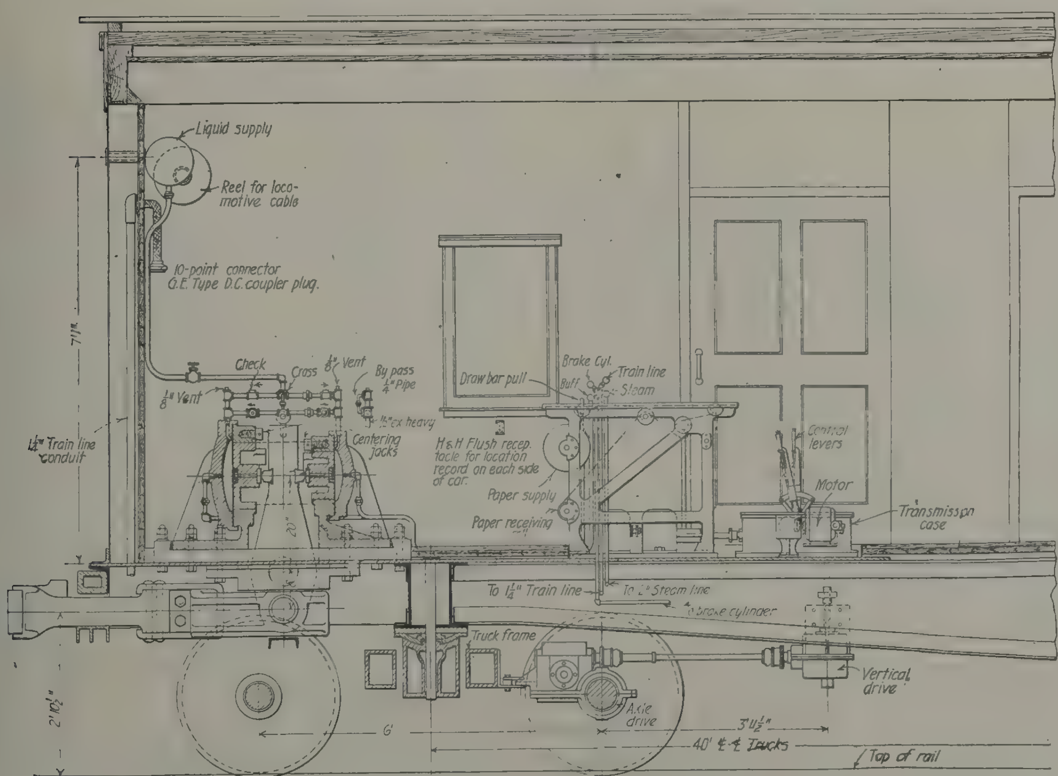


Fig. 405—Longitudinal Section Through Forward End of Dynamometer Car.

Dynamometer Car for Southern Railway. Builder, The Burr Company.

(*Figs.* 401-413.)

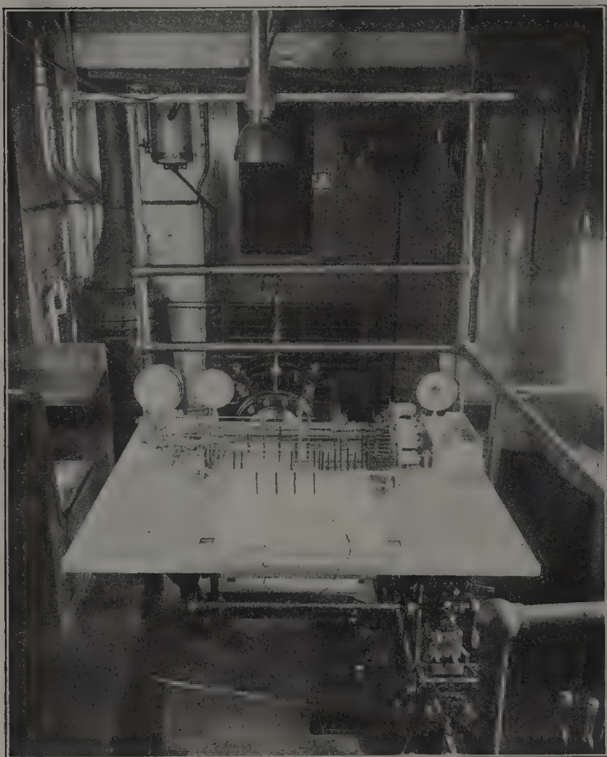


Fig. 406—Interior of Dynamometer Compartment, Dynamometer Car.

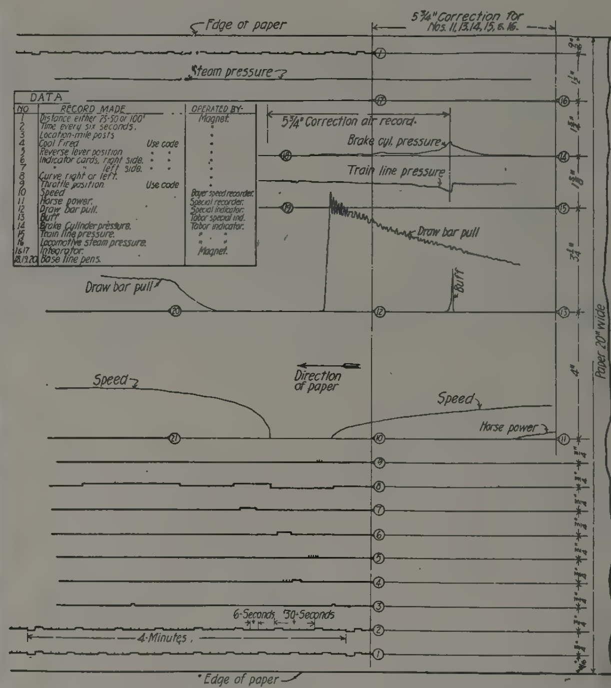


Fig. 407—Typical Autographic Record Made by Dynamometer Car.

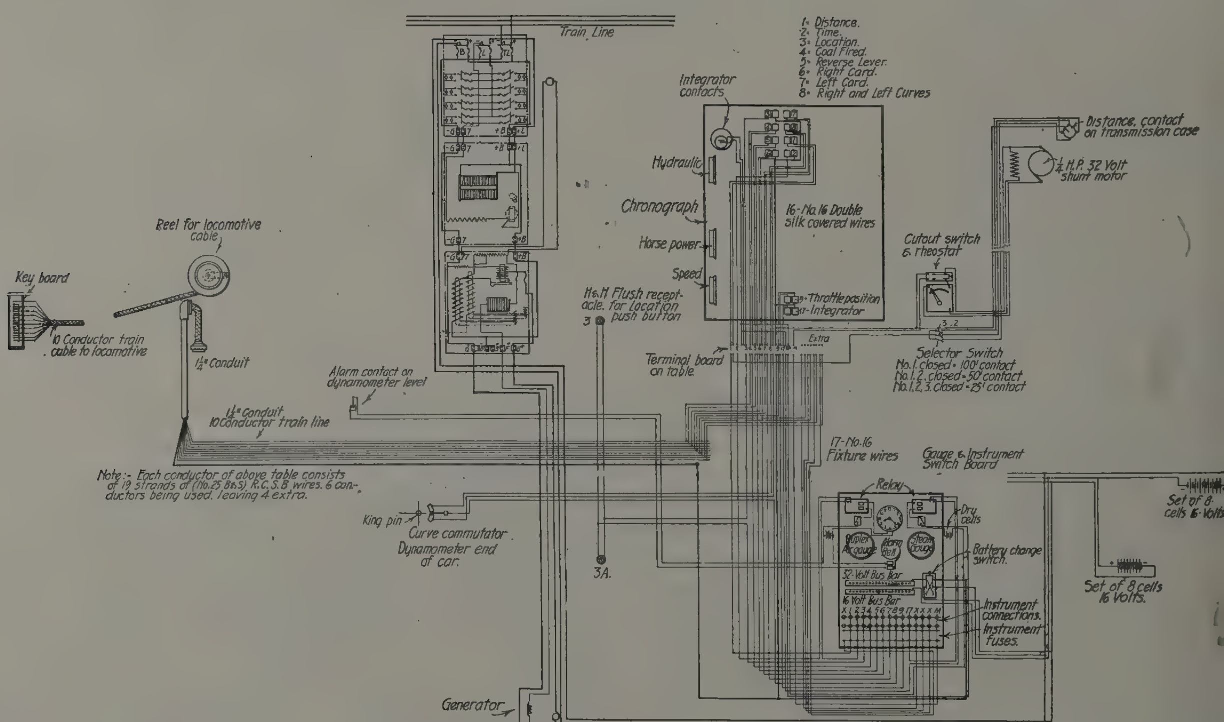


Fig. 408—Wiring Diagram for Dynamometer Car.

Dynamometer Car for Southern Railway. Builder, The Burr Company.

(*Figs.* 401-413.)

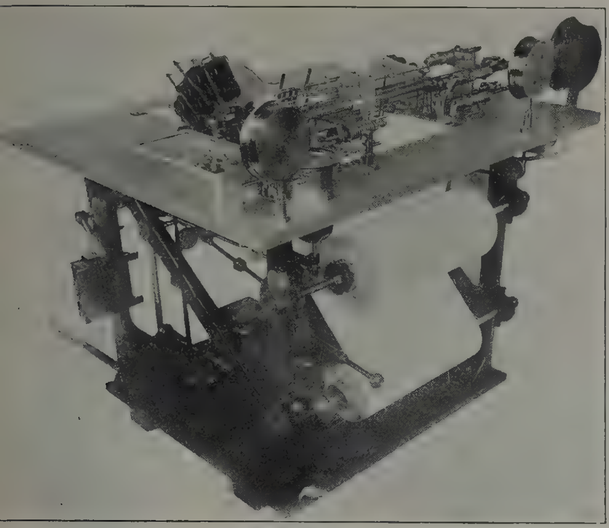


Fig. 409—Rear View of Recording Table, Dynamometer Car.

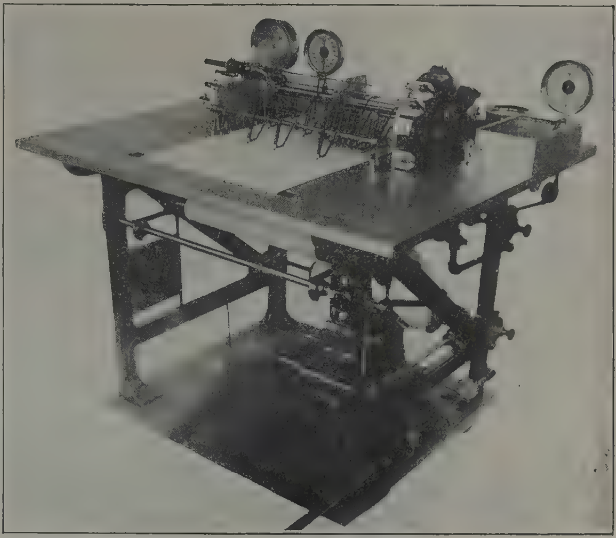


Fig. 410—Front View of Recording Table, Dynamometer Car.

Note.—The table shown in Figs. 409-410 records: location, drawbar pull, speed, time, distance, train line pressure, brake cylinder pressure, steam pressure, buffing shocks, integration of drawbar pull diagram, horsepower at drawbar, curve right or left, positions of throttle and of the reverse lever.

The speed record is made by means of a Boyer recorder, while a second Boyer recorder is provided for furnishing the speed element of the horsepower computer.

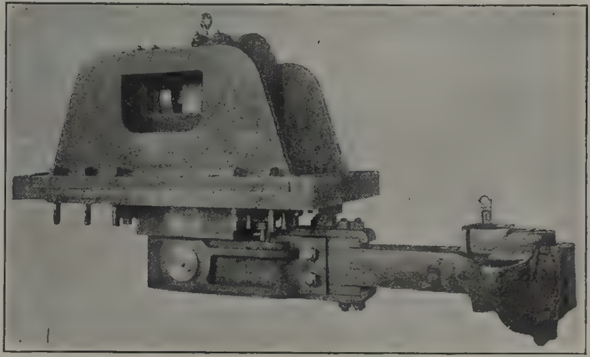


Fig. 411—Drawbar and Weighing Head Assembly, Dynamometer Car.

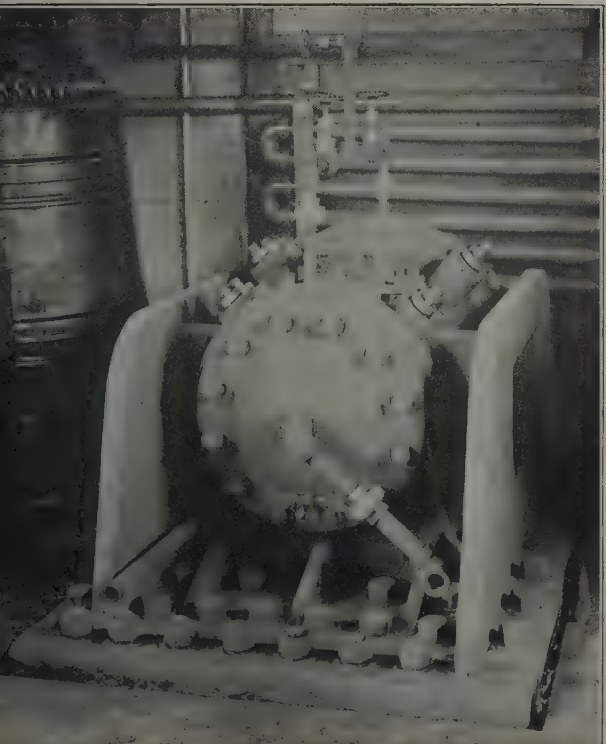


Fig. 412—Weighing Head, Dynamometer Car.

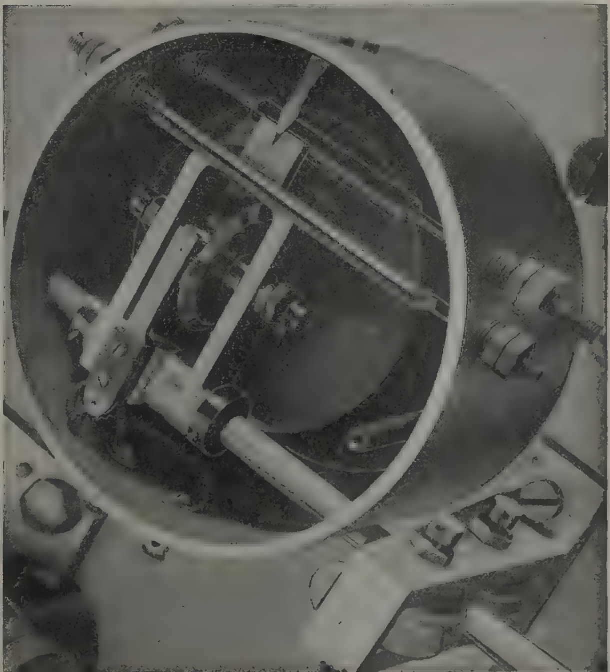


Fig. 413—Integrating Apparatus, Dynamometer Car.

Dynamometer Car for Southern Railway. Builder, The Burr Company.
(*Figs.* 401-413.)

Fig. 414—Steel Frame Dynamometer Car. Weight, 91,000 lb.; Dynamometer Capacity, 1,000,000 lb. Builder, Atchison, Topeka & Santa Fe Railway.
(*See Figs.* 415-418.)

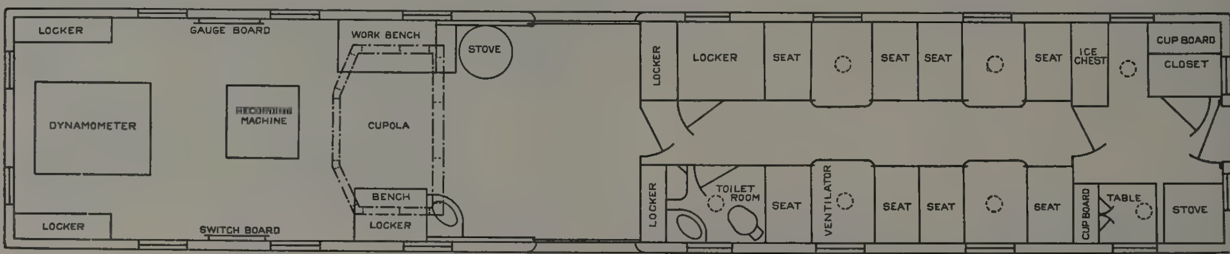


Fig. 415—Floor Plan of Atchison, Topeka & Santa Fe Dynamometer Car Shown in Figs. 414-418.

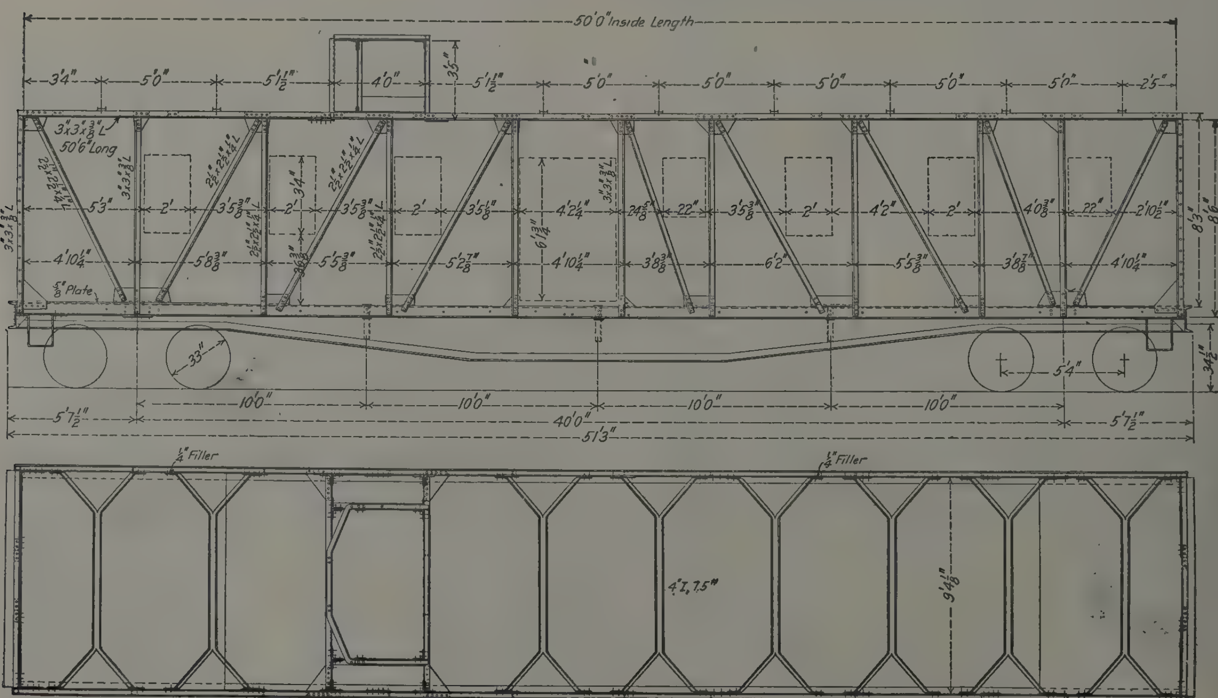


Fig. 416—Side and Roof Framing of Atchison, Topeka & Santa Fe Steel Frame Dynamometer Car.

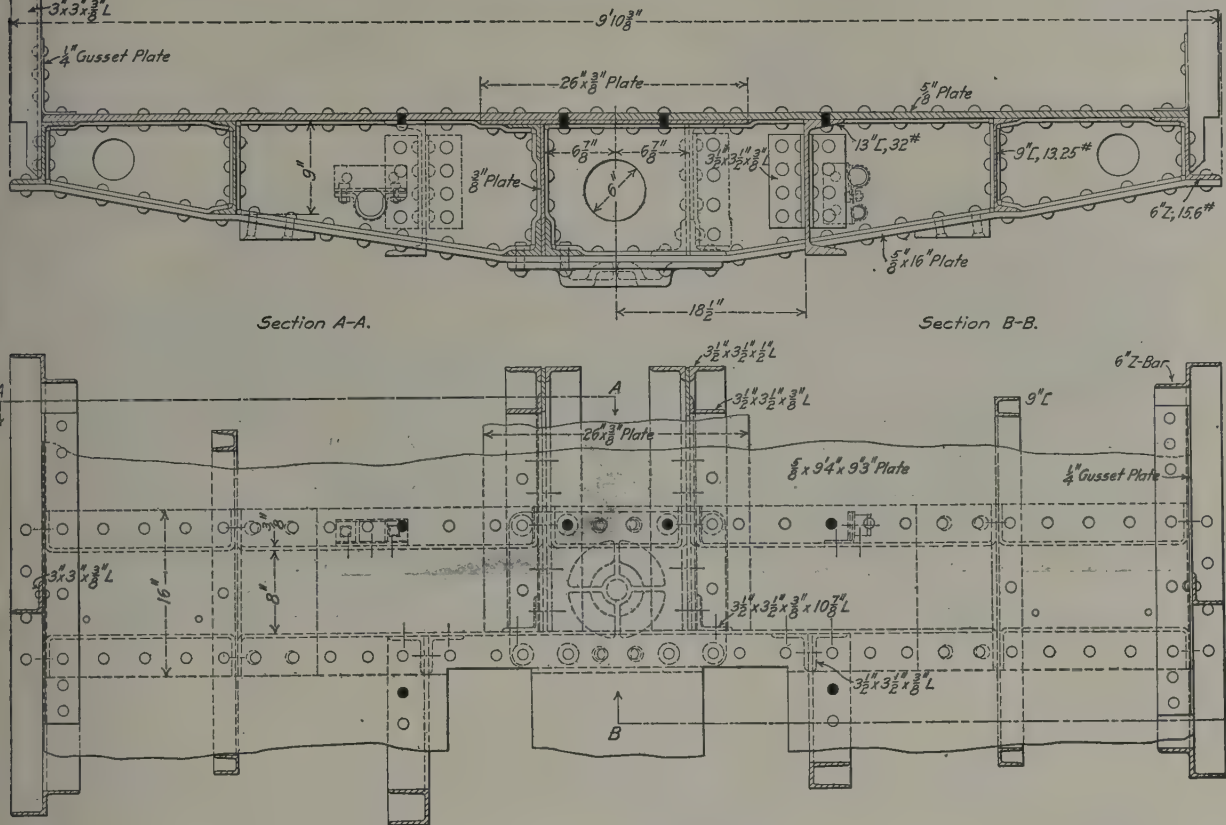


Fig. 417—Body Bolster at Dynamometer End of Santa Fe Dynamometer Car.

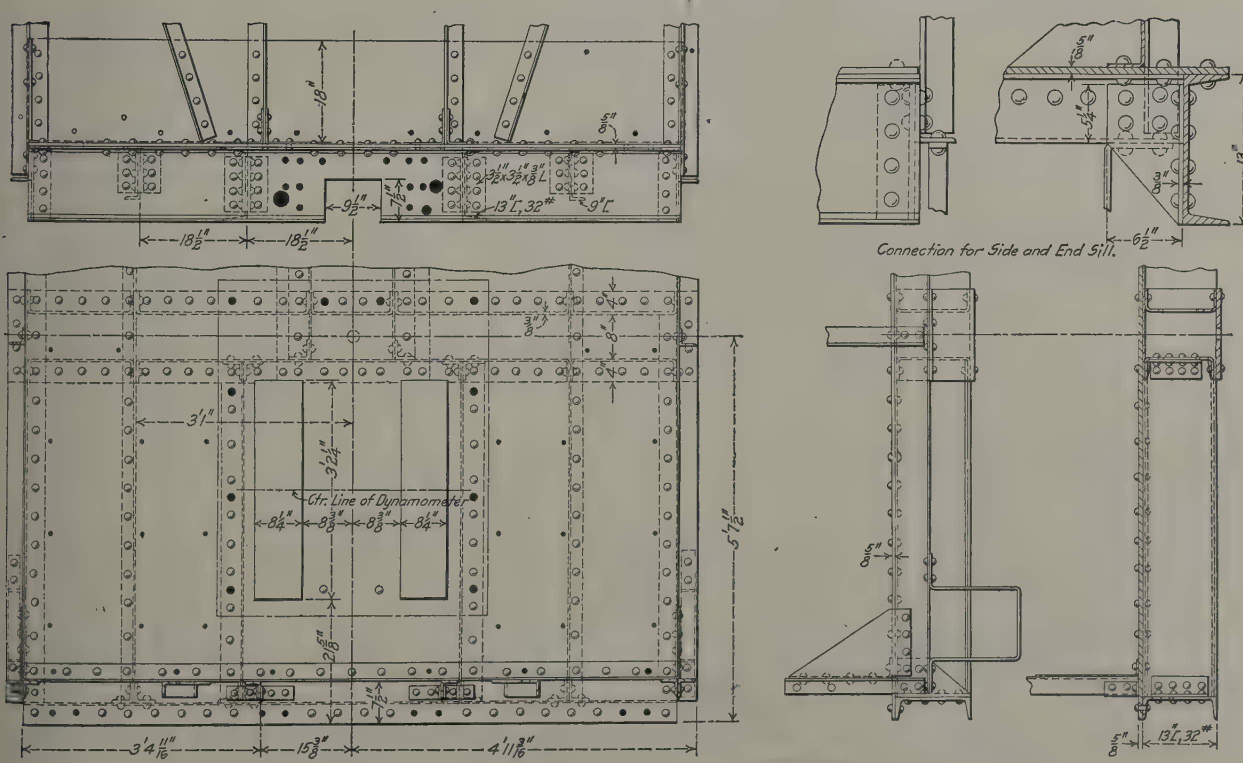


Fig. 418—Underframe Construction at Dynamometer End of Santa Fe Dynamometer Car.

Fig. 419—Test Weight Car, 80,000 lb. Capacity. Pennsylvania Railroad.
(*See Figs.* 420 *and* 422.)

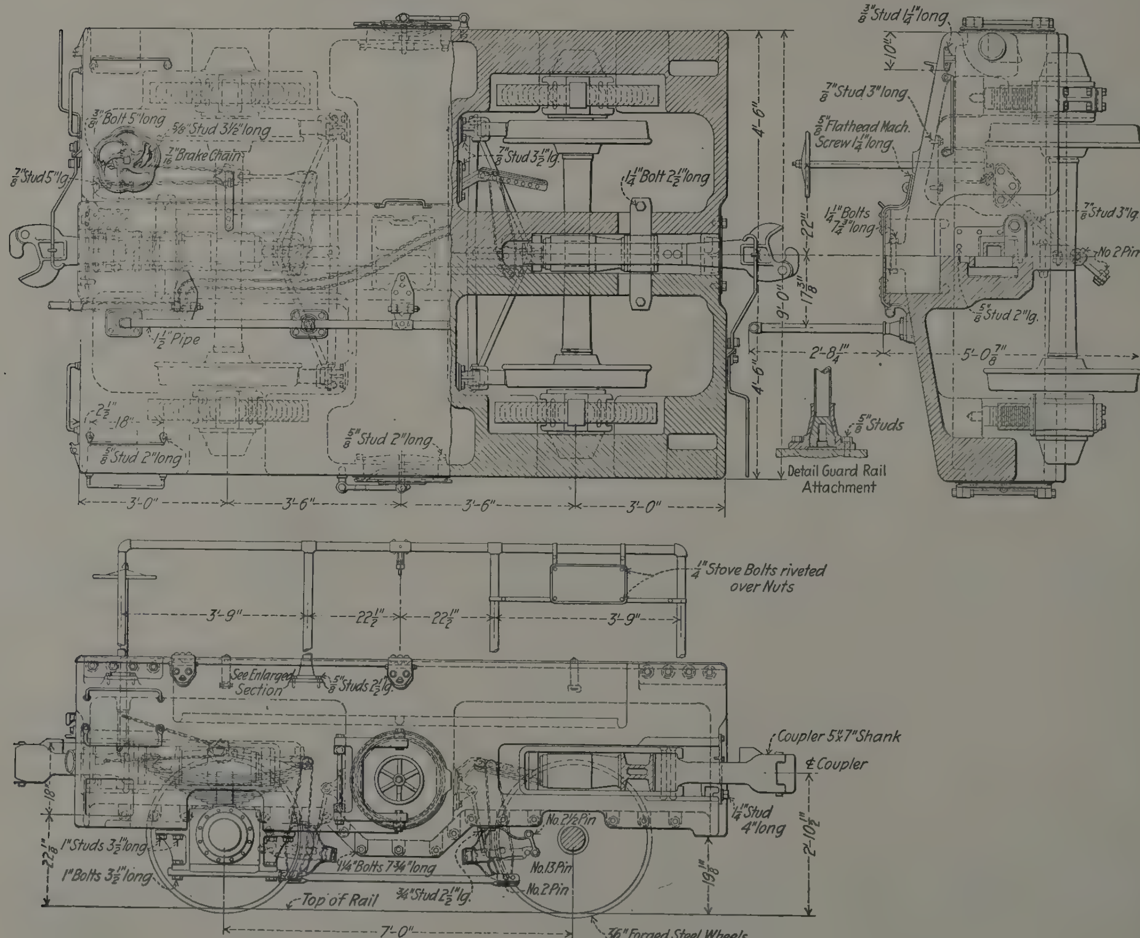


Fig. 420—General Arrangement of Test Weight Car Shown in Figs. 419 and 422.

Fig. 421—Test Weight Car Similar to Car Shown in Fig. 419. U. S. Government Bureau of Standards, Department of Commerce.

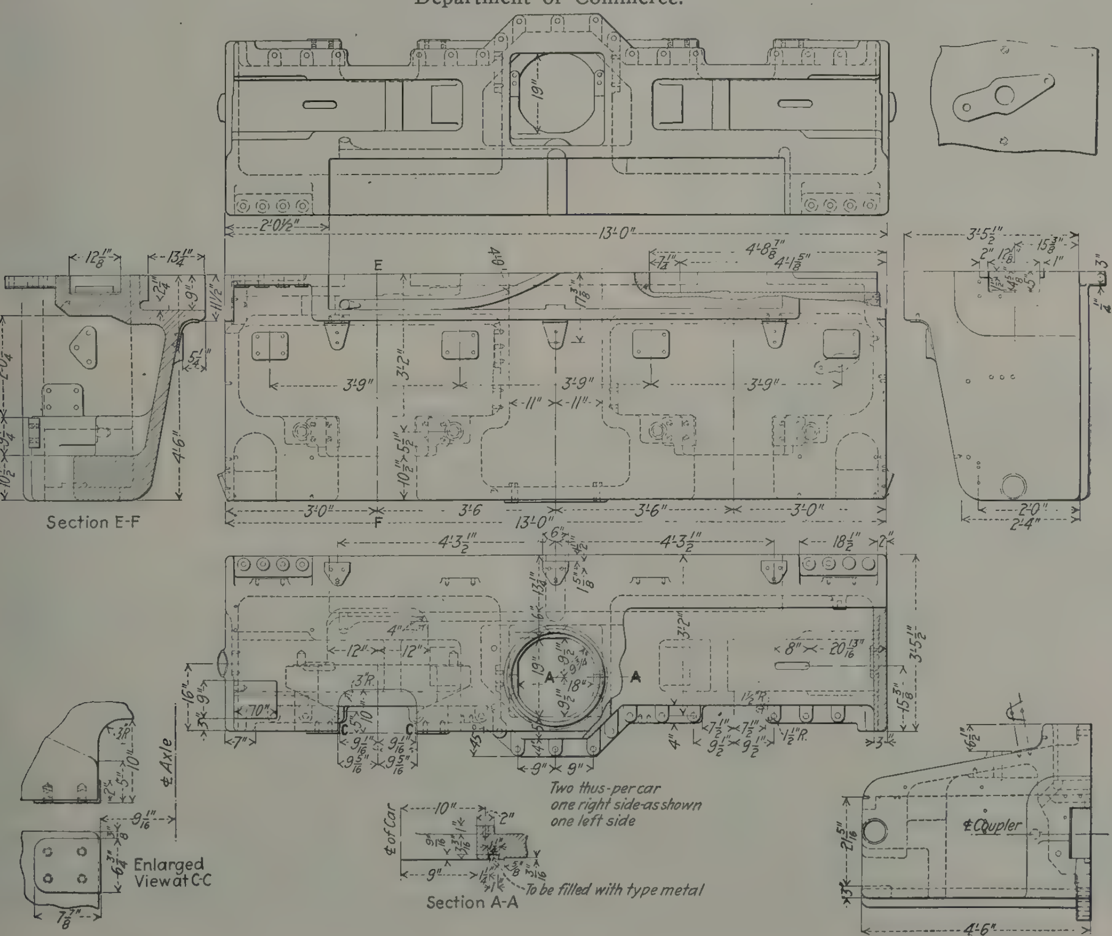


Fig. 422—Details of Main Body of Pennsylvania Test Weight Car Shown in Figs. 419-420.

Car End. Locomotive End.

Fig. 423—Interior of Pennsylvania Railroad Air Brake Instruction Car.

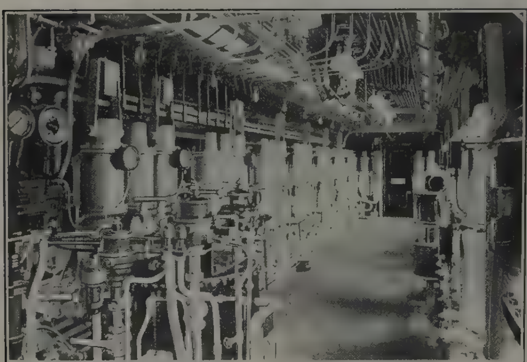


Fig. 424—Interior View of Air Brake Instruction Car. International Correspondence Schools.
(*See Fig. 369 for Floor Plan.*)

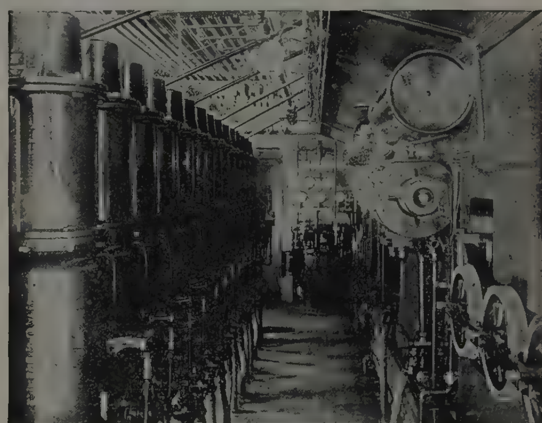


Fig. 425—Interior View of the Westinghouse Air Brake Company's Air Brake Construction Car.

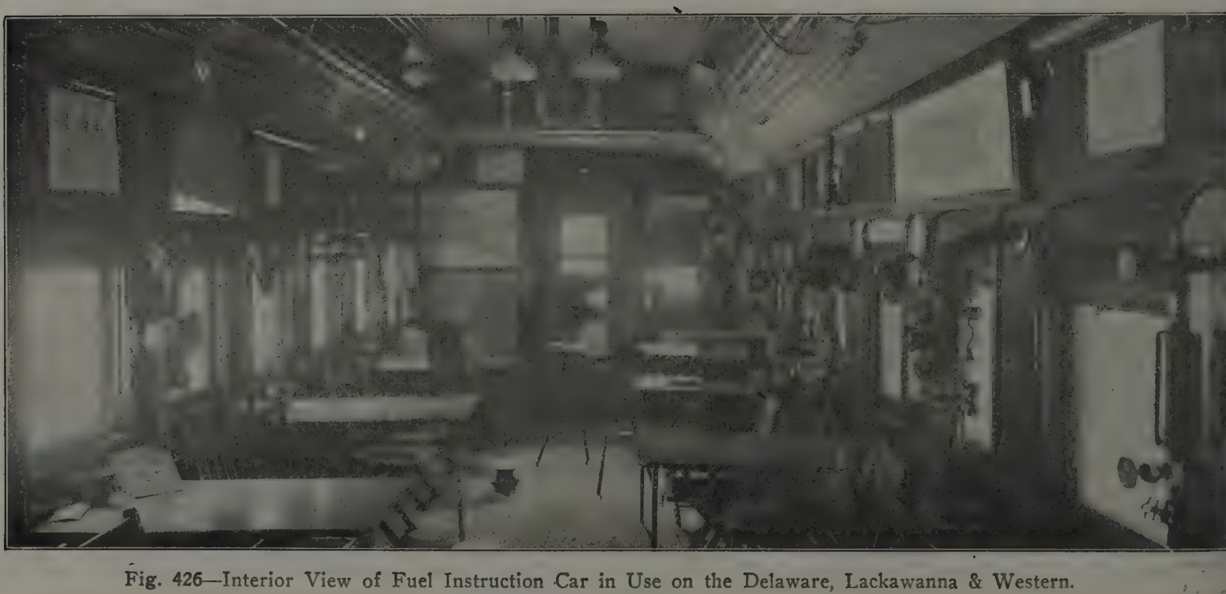


Fig. 426—Interior View of Fuel Instruction Car in Use on the Delaware, Lackawanna & Western.
(*See Fig. 468 for Floor Plan.*)

Fig. 427—Steel Car for Use in Quenching Coke. Builder, American Car & Foundry Company.

Fig. 428—Weed Killer and Track Spraying Equipment Operated in Coast Division of Santa Fe. Chipman Chemical Engineering Company,

Fig. 429—Portable All-Steel Logging Equipment, with Loading and Yarding Donkey, Swivel Trucks and Hydraulic Jacks. Builder, Pacific Car & Foundry Company.

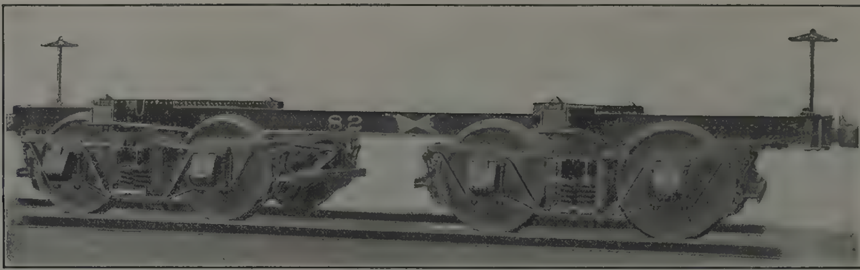


Fig. 430—Steel Frame 30-Ton Capacity Logging Car. Weight, 15,000 lb. Builder, American Car & Foundry Company.

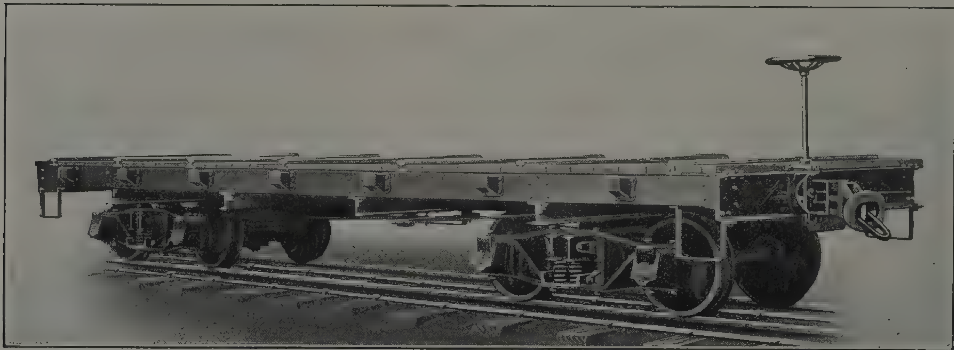


Fig. 431—Steel Frame Logging Car with Composite Floor. Capacity, 15 Tons; Length, 24 ft. 0 in.; Width, 7 ft. 0 in.; Used in the Argentine Republic. Builder, The Gregg Company, Ltd.

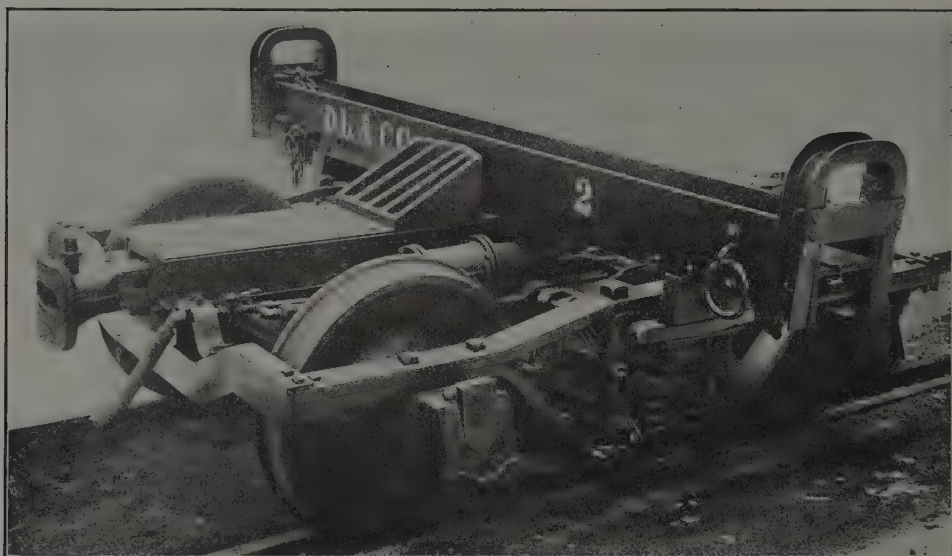


Fig. 432—Logging Car Truck. Used in Pairs with Adjustable Reach Rod. Builder, Magor Car Corporation.

Fig. 433—Steel Frame 40-Ton Capacity Logging Car. Weight, 31,500 lbs.; Length of Platform, 39 ft. 9 in. Builder, The Bettendorf Company.

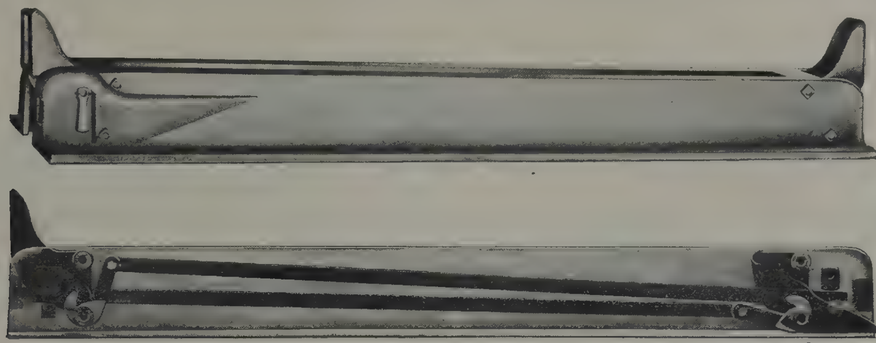


Fig. 434—"Rainier" Automatic Log Bunk in Closed and in Tripped Positions.
Pacific Car & Foundry Company.

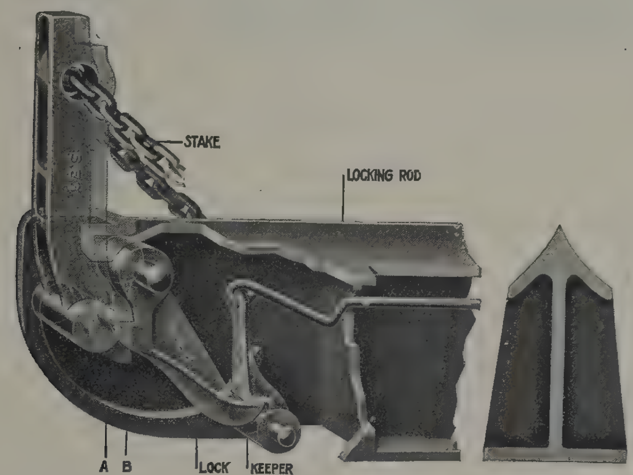


Fig. 435—End Arrangement Russel Spear-Edge Drop Stake Logging Bunk.
(*See Fig.* 436.)

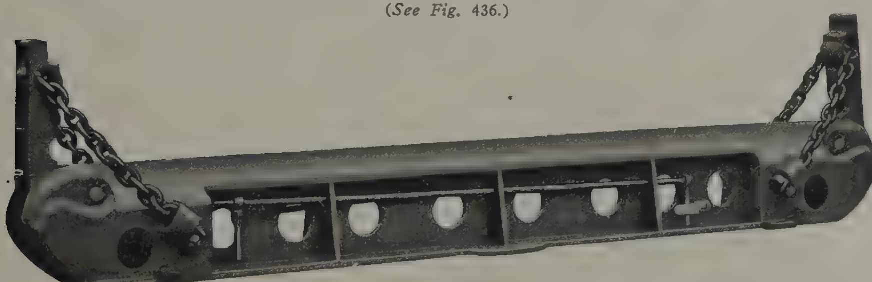


Fig. 436—Russel Spear-Edge Cast Steel Drop Stake Logging Bunk.
Russel Wheel & Foundry Company.

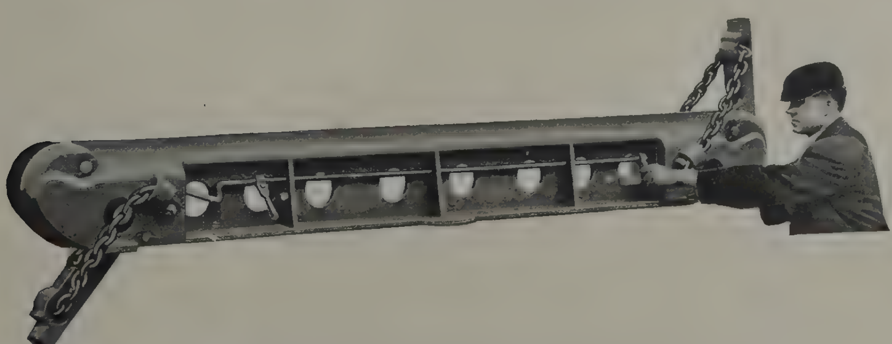


Fig. 437—Operation of the Russel Spear-Edge Bunk.
Russel Wheel & Foundry Company.

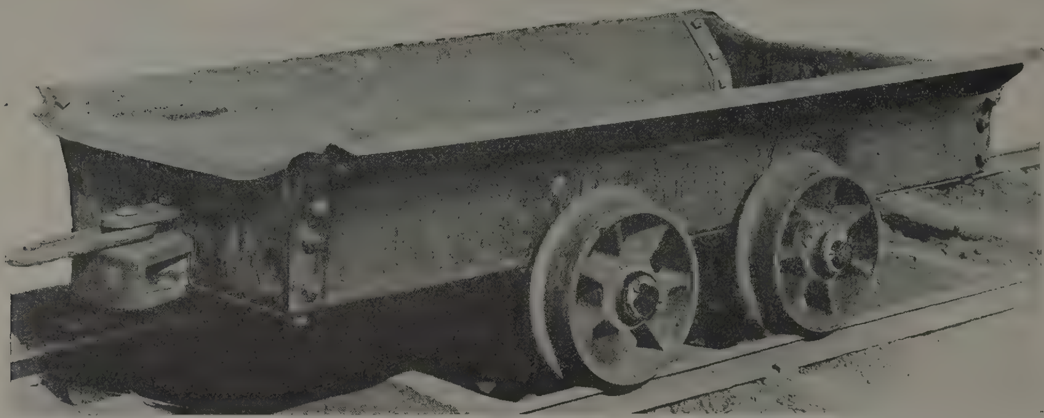


Fig. 438—Steel 50 cu. ft. Capacity Mine Car with Wooden Bumpers. Builder, Cambria Steel Company.
(*See Fig.* 439.)

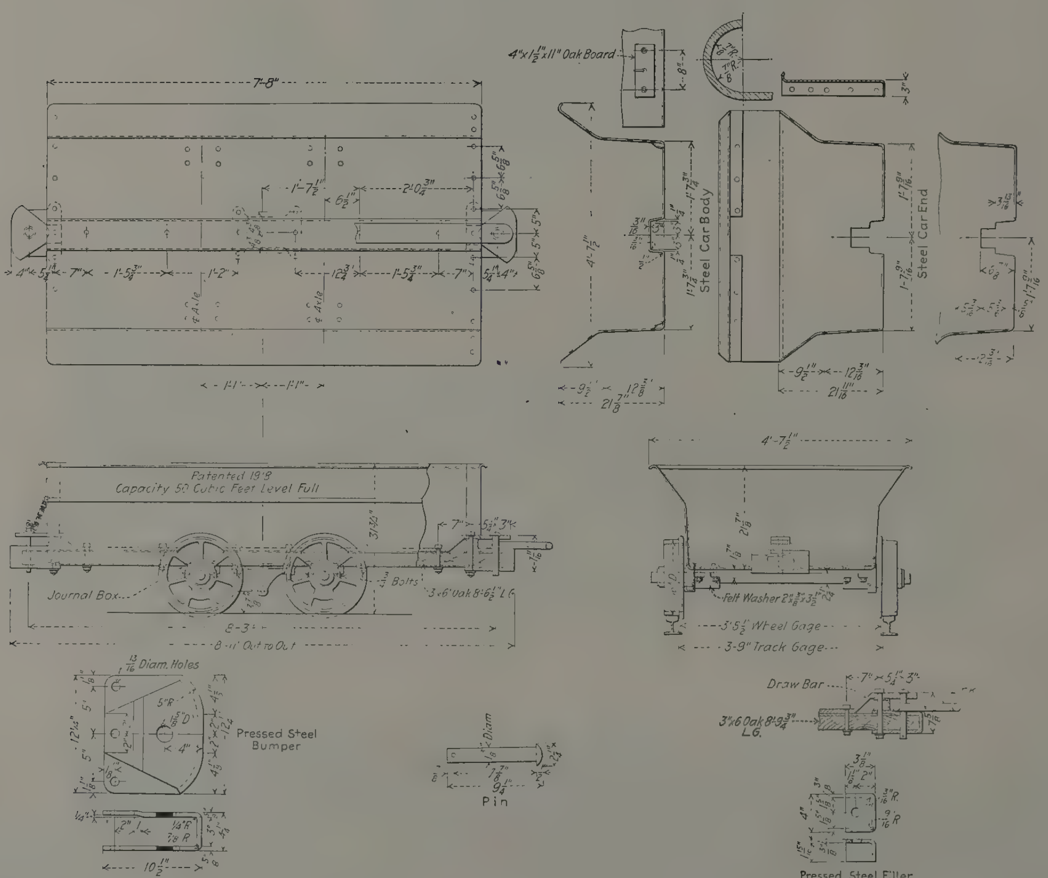


Fig. 439—Arrangement and Details of Mine Car Shown in Fig. 438.

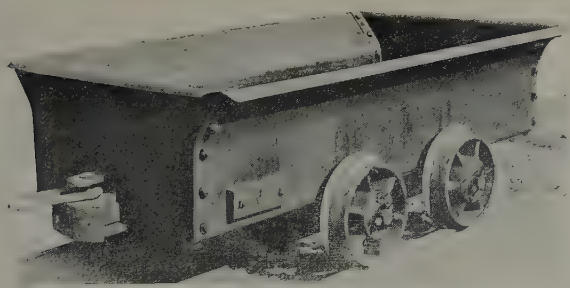


Fig. 440—Mine Car Shown in Fig. 441.

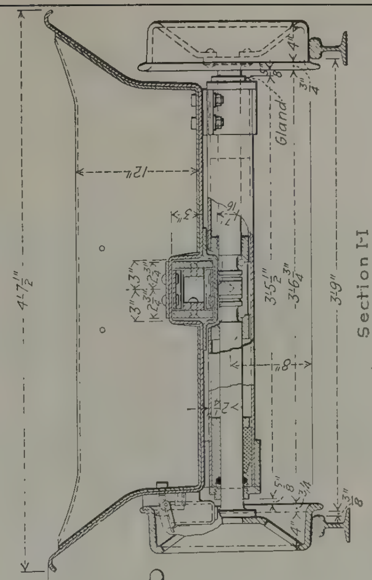
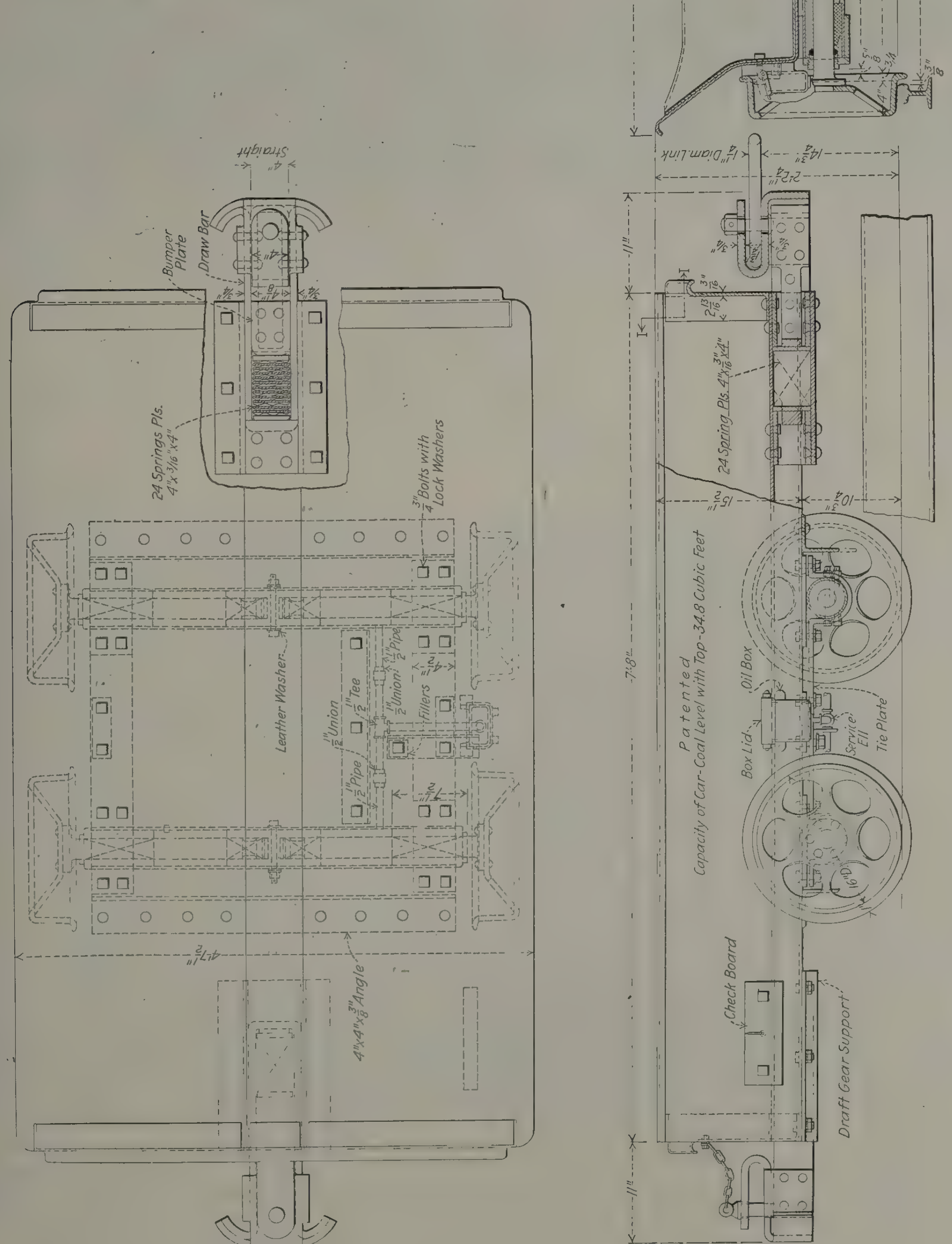



Fig. 441—All-Steel 34.8 cu. ft. Capacity Mine Car with Slick Draft Gear and Two-Piece Axles. Builder, Cambria Steel Company.

Fig. 442—Snow Flanger Car Similar to Car Shown in Fig. 443. Delaware & Hudson Company.

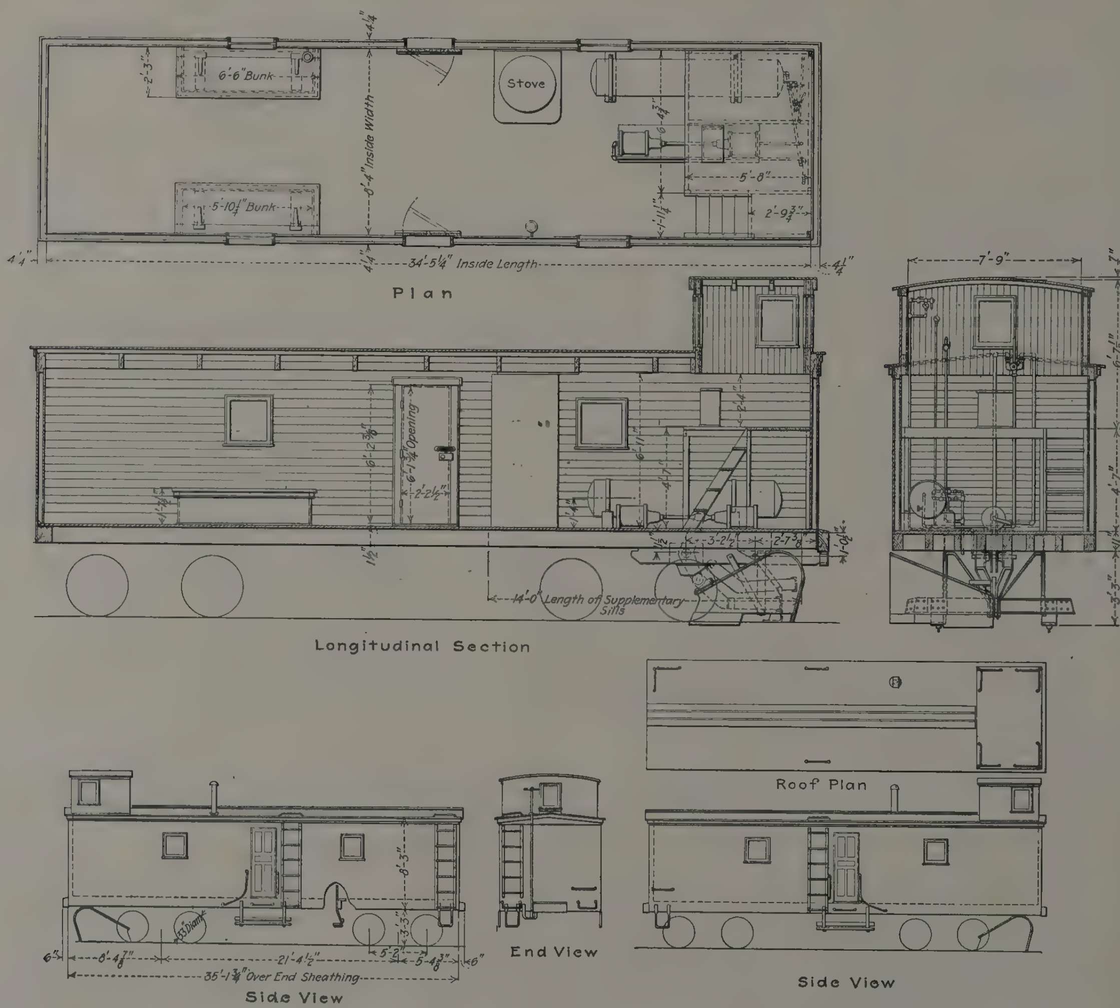


Fig. 443—General Arrangement of Snow Flanger Car. Canadian Government Railways.
(See Fig. 442 for Similar Car.)

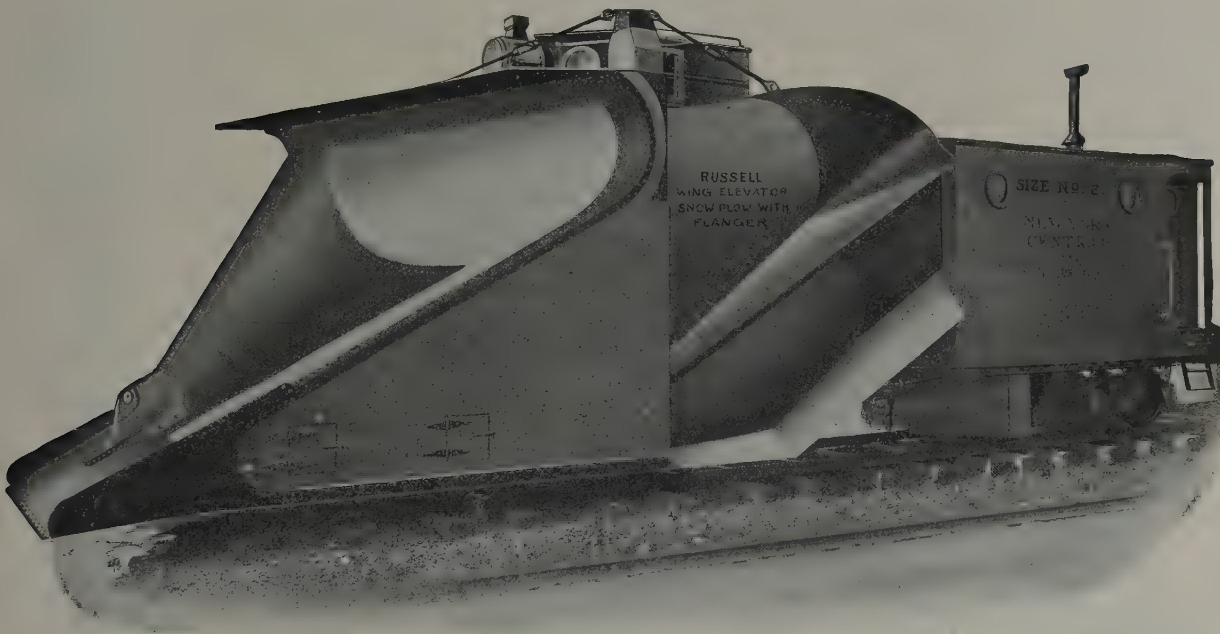


Fig. 444—Single Track Wing Elevator Snow Plow with Flanger. The Side Wings are Swung Out by Compressed Air to Increase the Width of the Cleared Area. Builder, Russell Car & Snow Plow Company.

(See Fig. 445 for application of Flanger.)

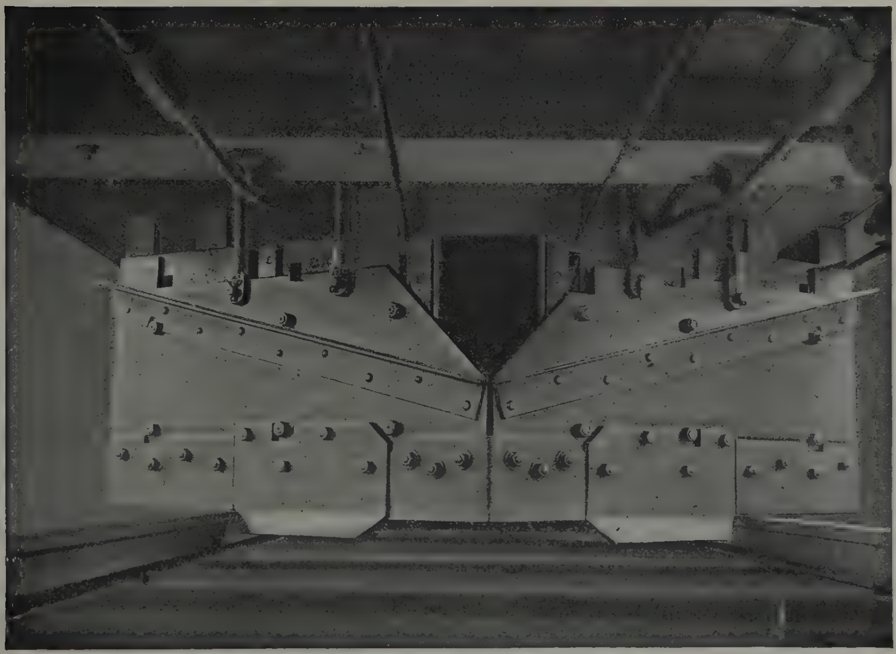


Fig. 445—Single Track Flanger Applied to Snow Plow. Builder, Russell Car & Snow Plow Company.

Fig. 446—All-Steel Snow Plow for Canadian Pacific Railway. Builder, Canadian Car & Foundry Company.

(Drawing of similar Plow shown in Fig. 448.)

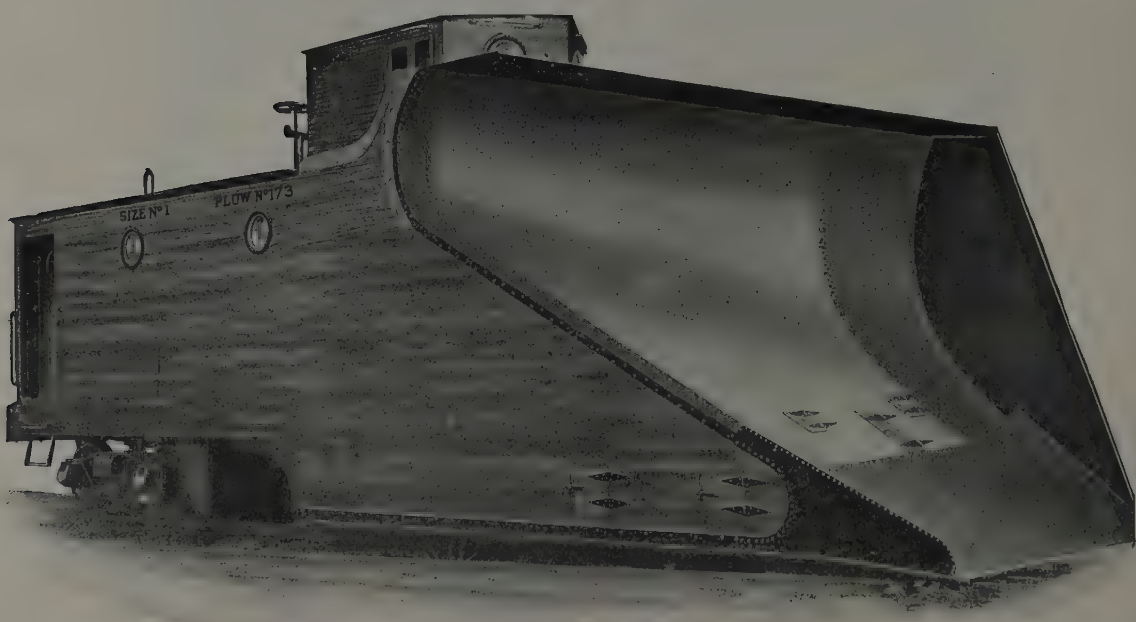


Fig. 447—Right Hand Double Track Snow Plow with Flanger. Builder, Russell Car & Snow Plow Company.

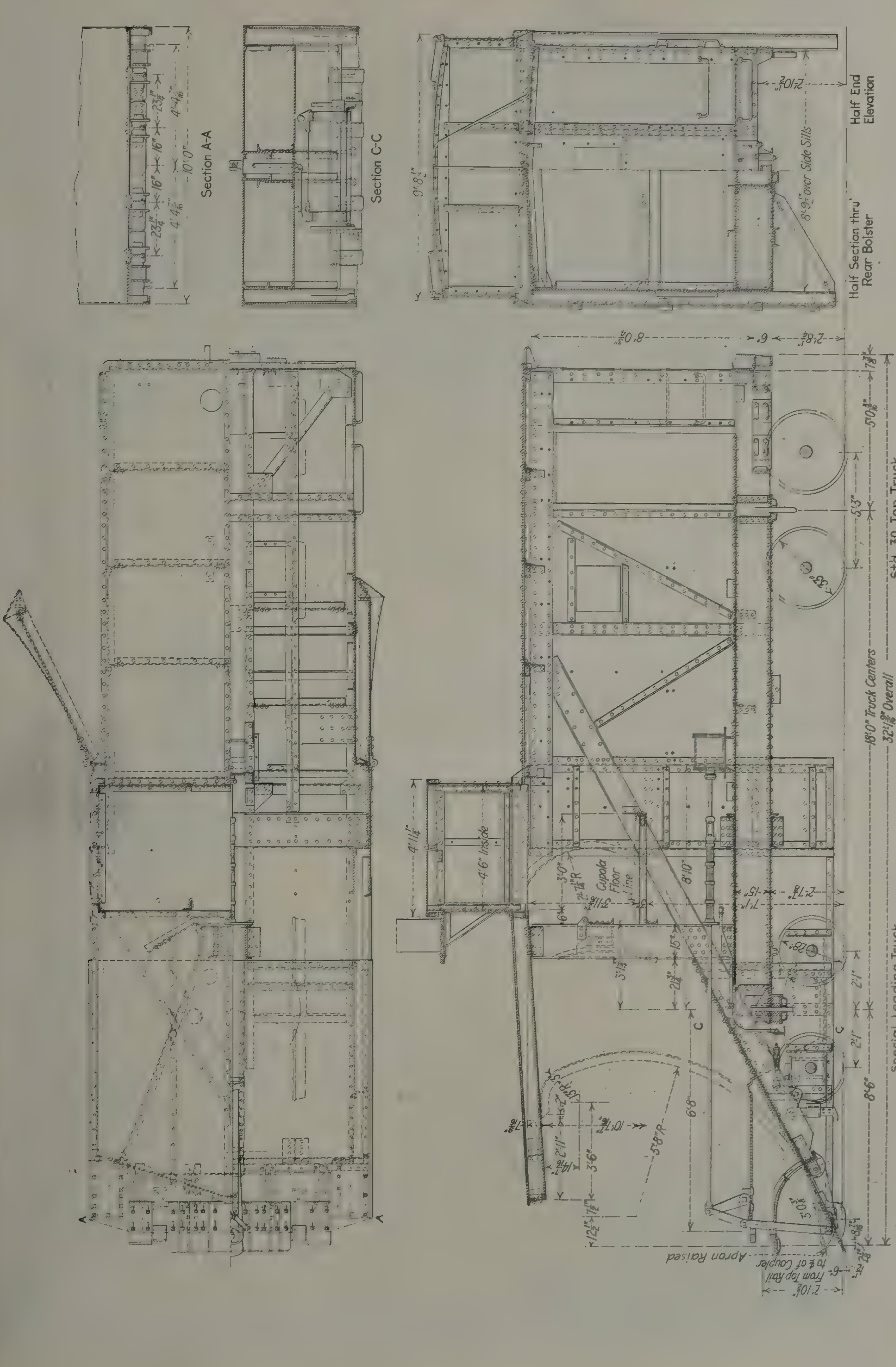


Fig. 448—General Arrangement of All-Steel Snow Plow for the Canadian Government Railways. Builder, Canadian Car & Foundry Company.
(Similar Plow Shown in Fig. 446.)

Fig. 449—Rotary Snow Plow in Use on the Canadian Pacific. Specially Designed Six-Wheel Trucks; Boiler of Locomotive Type; Working Pressure 200 lb.; 317 2-in. Tubes and 44 sq. ft. of Grate Area; Vertical Engine with Two 20 in. x 24 in. Cylinders; Tender Capacity 7,000 Imperial Gallons of Water and 10 Tons of Coal.

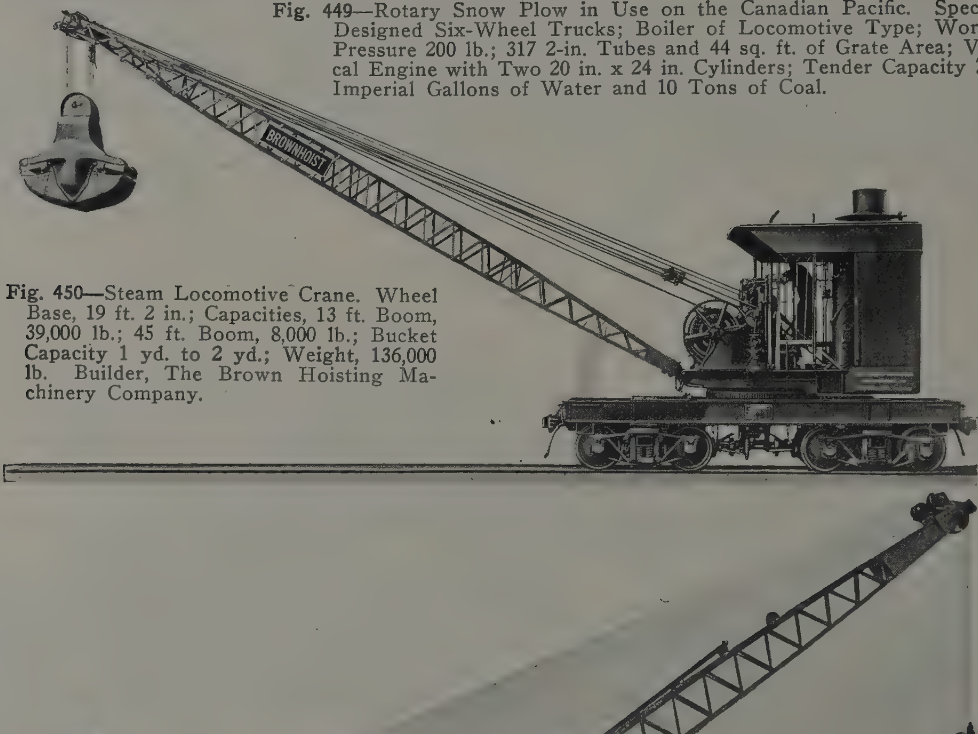


Fig. 450—Steam Locomotive Crane. Wheel Base, 19 ft. 2 in.; Capacities, 13 ft. Boom, 39,000 lb.; 45 ft. Boom, 8,000 lb.; Bucket Capacity 1 yd. to 2 yd.; Weight, 136,000 lb. Builder, The Brown Hoisting Machinery Company.

Fig. 451—Steam Locomotive Crane. Weight, 127,000 lb.; Lifting Capacity, 20 Tons. Builder, The McMyler Interstate Company.

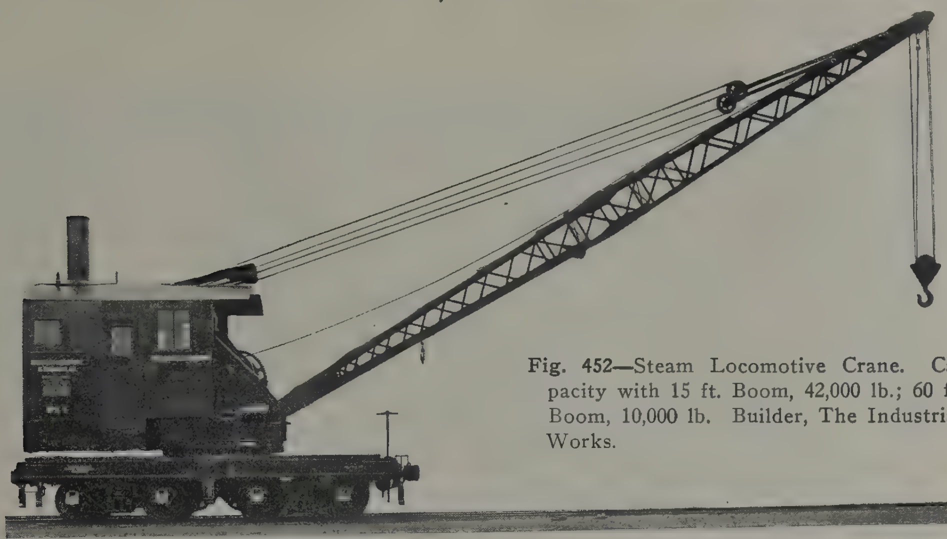


Fig. 452—Steam Locomotive Crane. Capacity with 15 ft. Boom, 42,000 lb.; 60 ft. Boom, 10,000 lb. Builder, The Industrial Works.

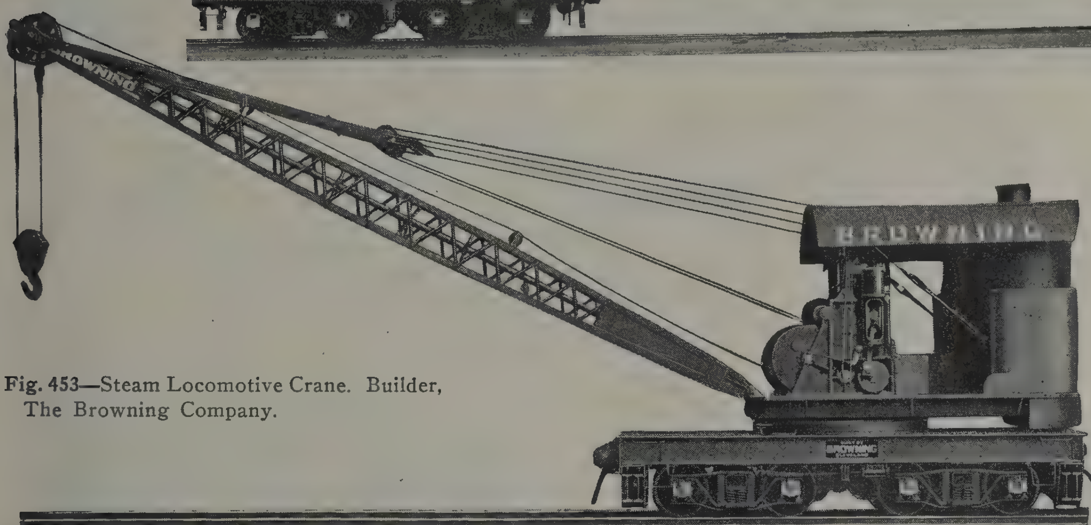
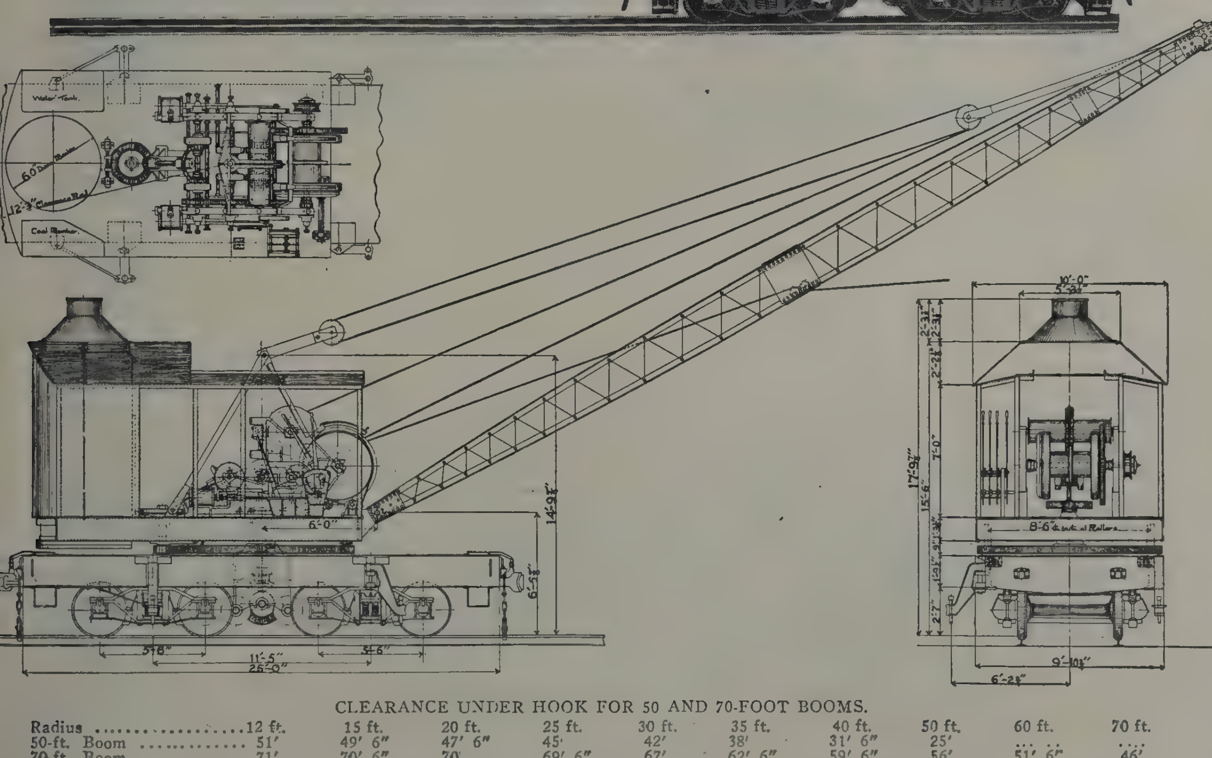


Fig. 453—Steam Locomotive Crane. Builder, The Browning Company.



CLEARANCE UNDER HOOK FOR 50 AND 70-FOOT BOOMS.

Radius	12 ft.	15 ft.	20 ft.	25 ft.	30 ft.	35 ft.	40 ft.	50 ft.	60 ft.	70 ft.
50-ft. Boom	51′	49′ 6″	47′ 6″	45′	42′	38′	31′ 6″	25′	....	....
70-ft. Boom	71′	70′ 6″	70′	69′ 6″	67′	62′ 6″	59′ 6″	56′	51′ 6″	46′

Fig. 454—Type "J" Standard Gage Locomotive Crane. Builder, The McMyler-Interstate Company.

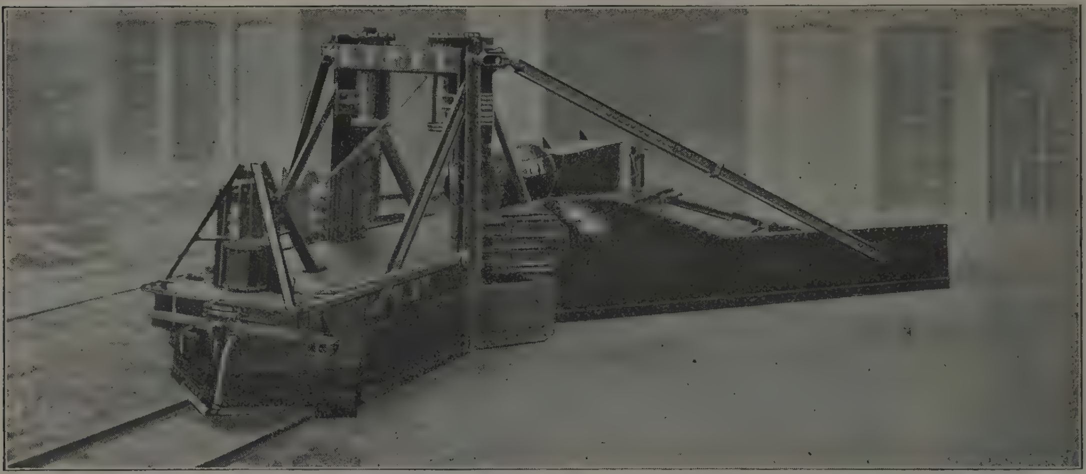


Fig. 455—Ballast Spreader. The Wings are Operated by Compressed Air. Builder, The O. F. Jordan Company.

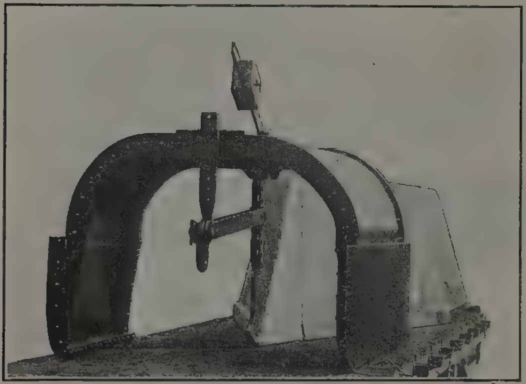


Fig. 456—Ballast Plow or Unloader for Plowing from Tops of Cars. Builder, The Marion Steam Shovel Company.

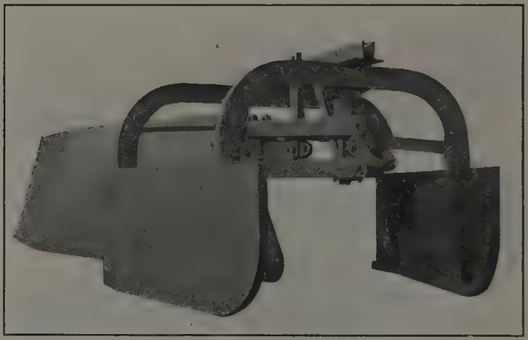


Fig. 457—Ballast Plow or Unloader for Plowing from Tops of Cars. Builder, Bucyrus Company.

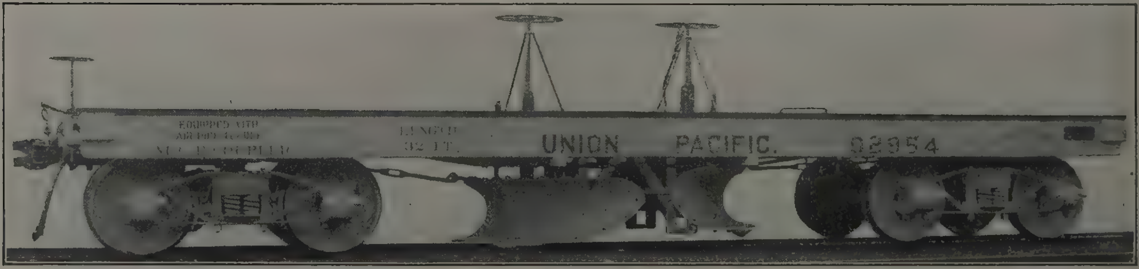


Fig. 458—Ballast Distributing Plow. Builder, Rodger Ballast Car Company.

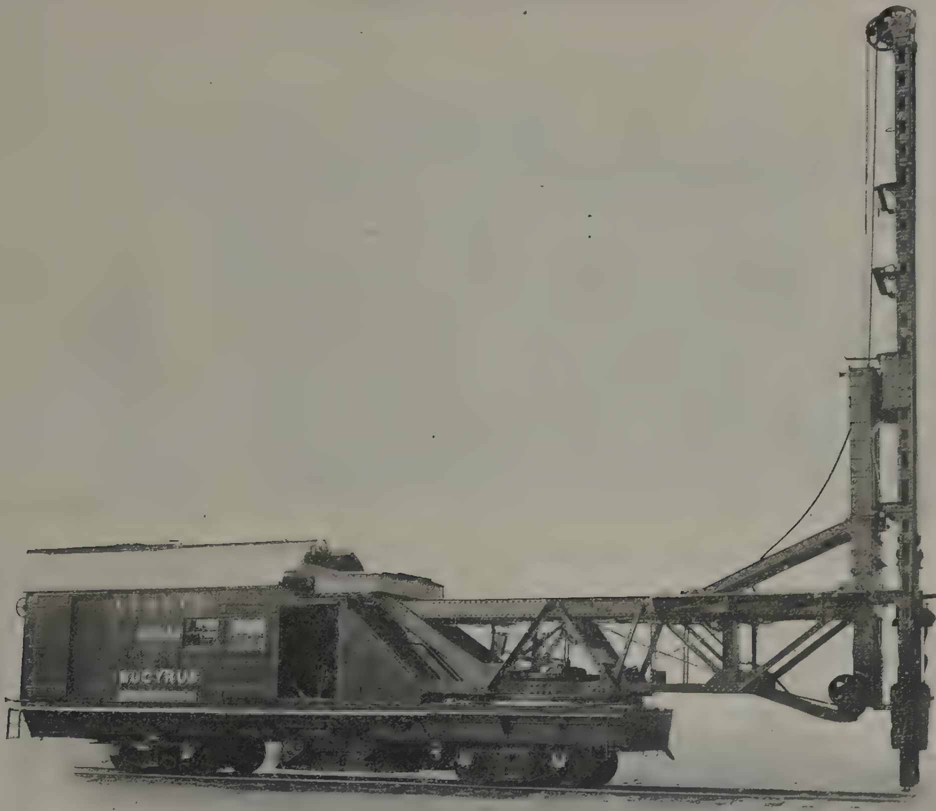


Fig. 459—Self-Propelling Steam Pile Drive. Builder, Bucyrus Company.

Fig. 460—Self-Propelling Pile Driver. Builder, Industrial Works.

Fig. 461—Snow Sweeper for Railroad Yard Service. Builder, The J. G. Brill Company.

Fig. 462—Snow Sweeper for Railroad Yard Service. Builder, The J. G. Brill Company.

Fig. 463—Scoop Car Used on the Norfolk & Western for Removing Earth or Rock Slides.

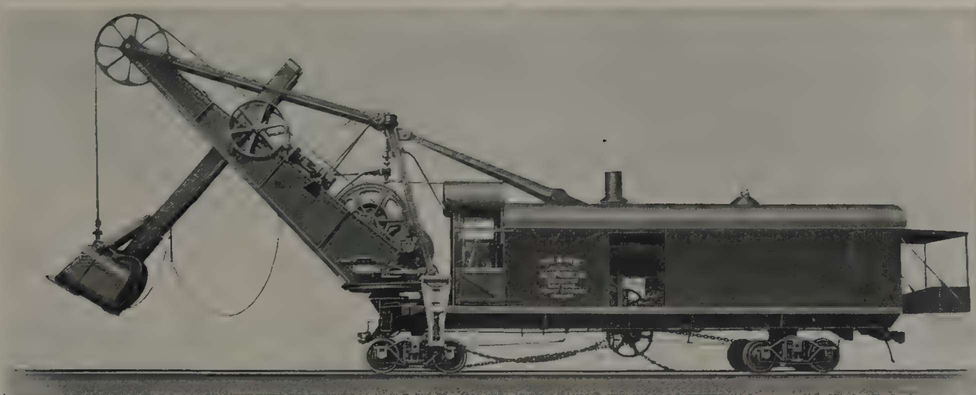


Fig. 464—Atlantic Steam Shovel. Weight in Working Order, 203,000 lb. Builder, Bucyrus Company.

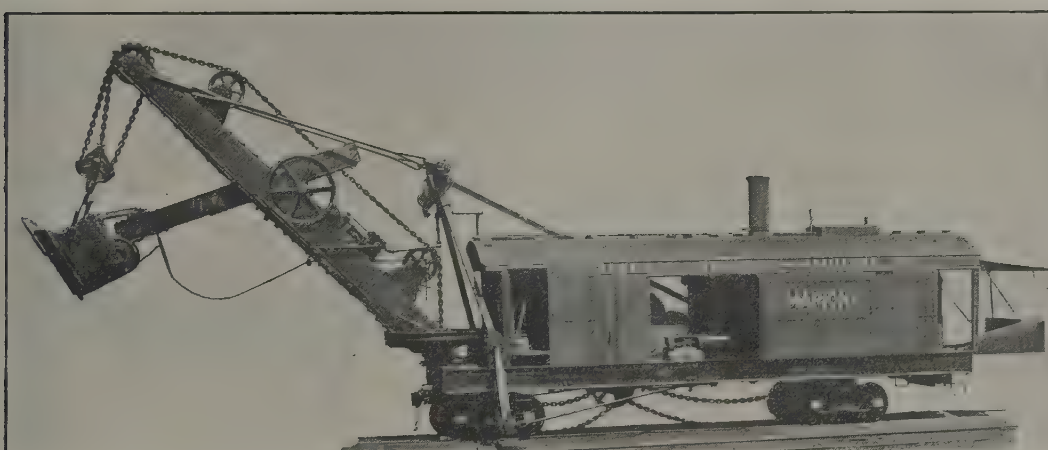


Fig. 465—Marion Steam Shovel. Builder, The Marion Steam Shovel Co.

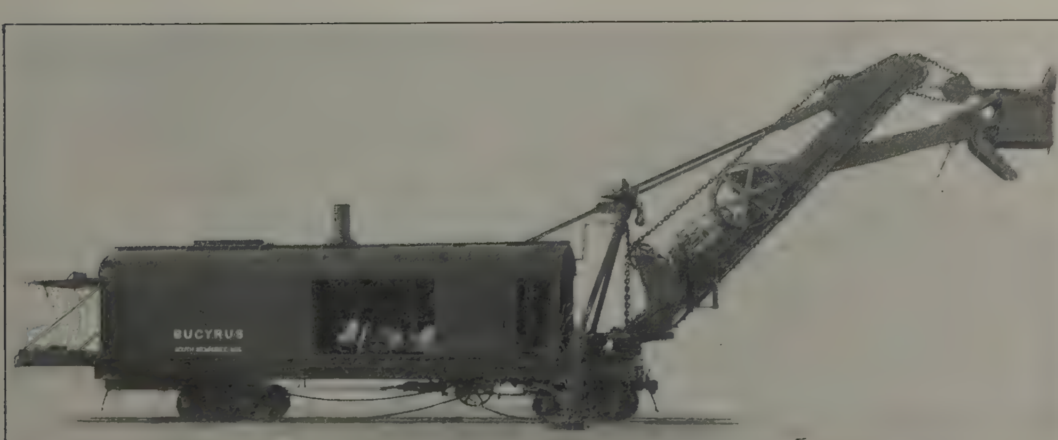


Fig. 466—Bucyrus 88-C Steam Shovel. Capacity of Standard-Dipper 4 cu. yds. Weight in working order, 206,000 lb. Builder, Bucyrus Company.

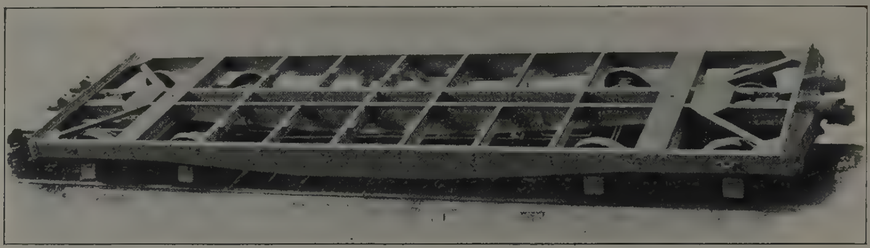


Fig. 467—Pressed Steel Underframe for 50-Ton Capacity Box Car. Builder, Pressed Steel Car Company.

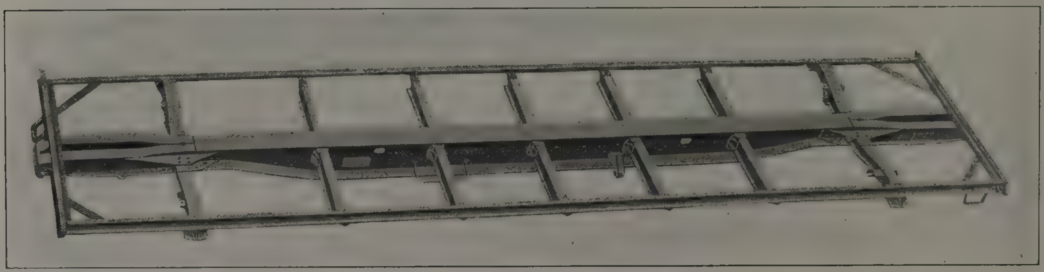


Fig. 468—Underframe for Union Pacific 50-Ton Capacity Box Car with Wooden Superstructure. Builder, The Bettendorf Company.

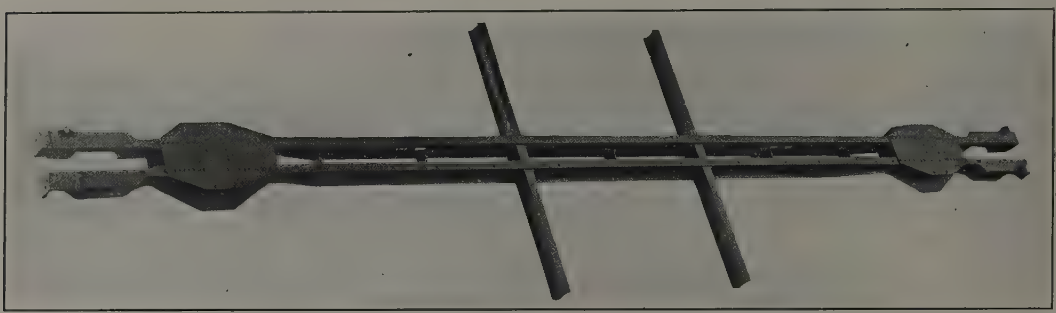


Fig. 469—Subsills for Strengthening Old Cars. Builder, The Bettendorf Company.

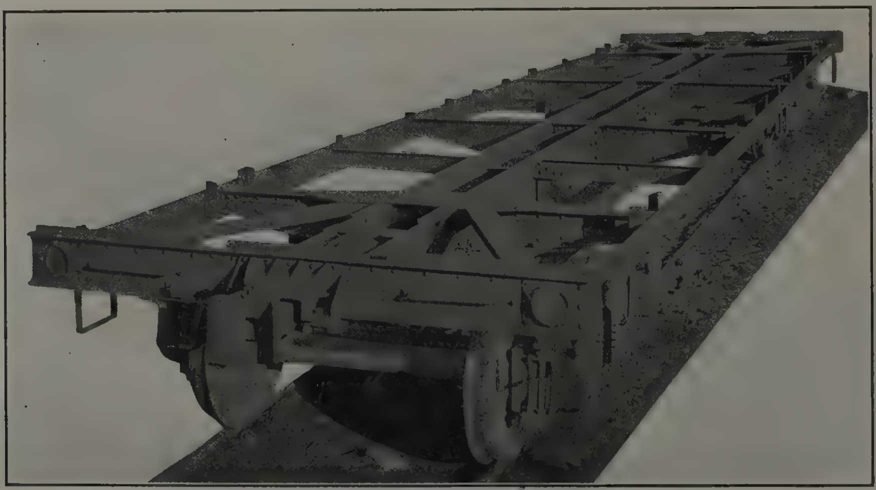


Fig. 470—Steel Underframe for Ann Arbor 40-Ton Capacity Box Car. Builder, Western Steel Car & Foundry Company.

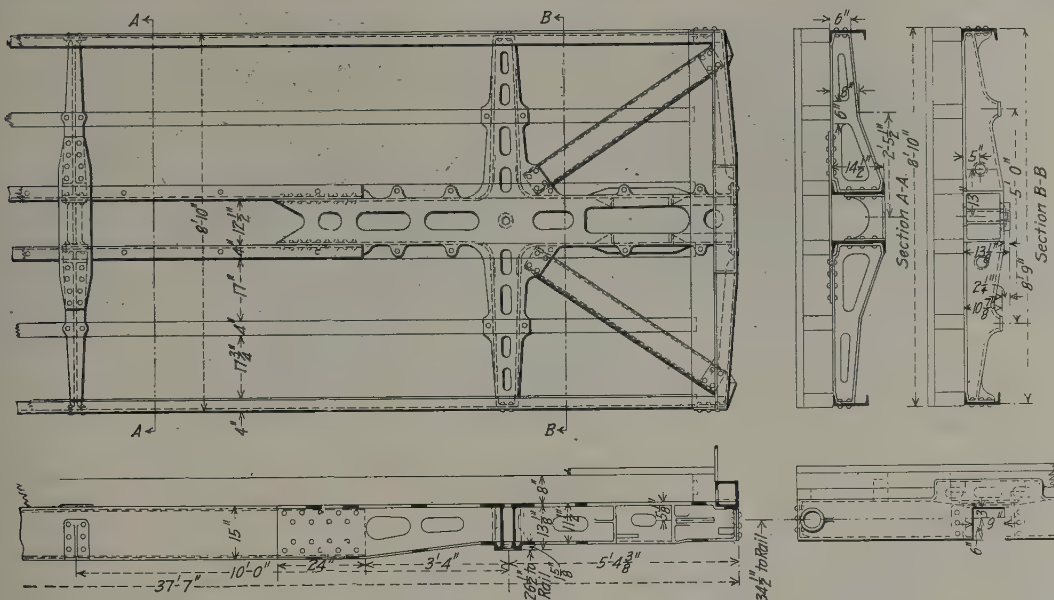


Fig. 471—Steel Underframe for 40-Ton Capacity Box Car. Builder, Pittsburgh Steel Foundry Company.

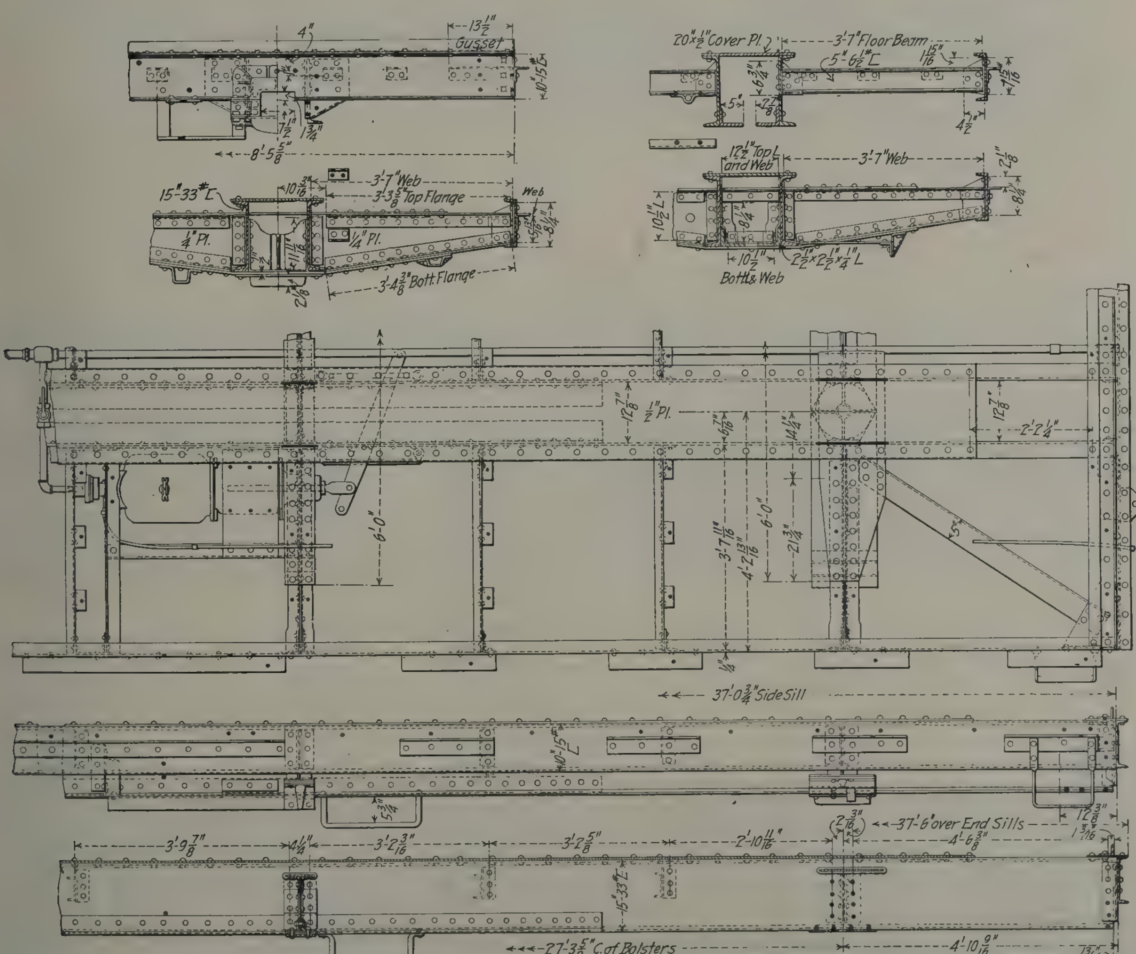


Fig. 472—Steel Underframe for Boston & Maine 40-Ton Capacity Box Car. Builder, Western Steel Car & Foundry Company.

Fig. 473—Steel Frame for Erie Railroad 75-Ton Capacity Flat Car. Builder, American Car & Foundry Company.

Fig. 474—Bottom View of Steel Underframe for Caboose. Builder, The Bettendorf Company.

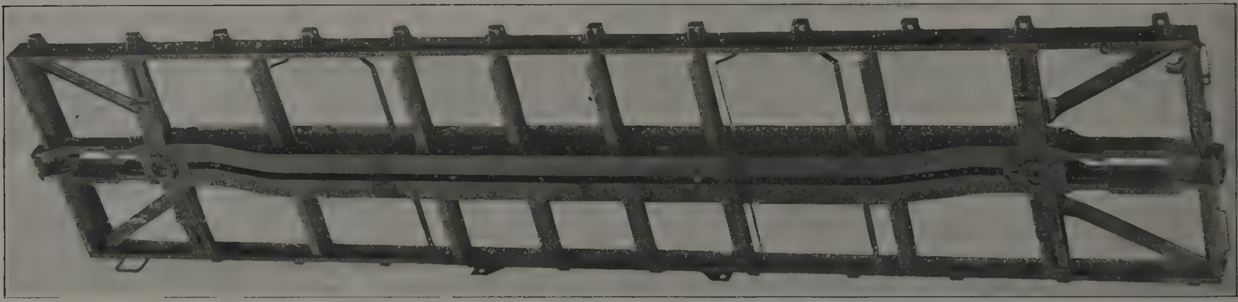


Fig. 475—Steel Underframe for 50-Ton Capacity Gondola Car. Builder, The Bettendorf Company.

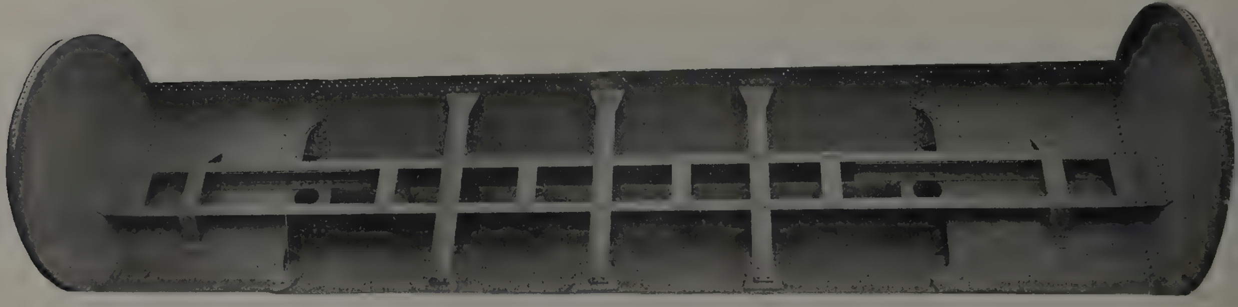


Fig. 476—Underframe for Tank Car, Capacity 8,000 U. S. Gallons. Builder, Chicago Steel Car Company.

Fig. 477—Steel Underframe for Passenger Train Cars.

Fig. 477-A—Steel Underframe for Passenger Train Cars.

Built by the Harlan Works of The Bethlehem Ship Building Corporation.

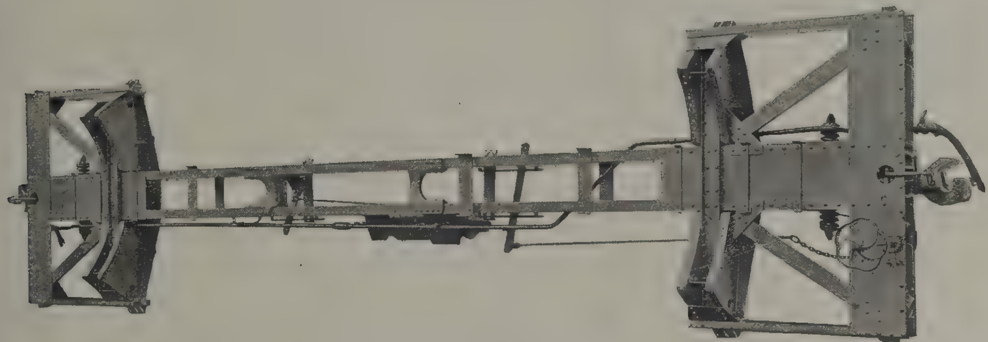


Fig. 478—Steel Underframe for Tank Car, Capacity 12,000 U. S. Gallons. Builder, American Car & Foundry Company.

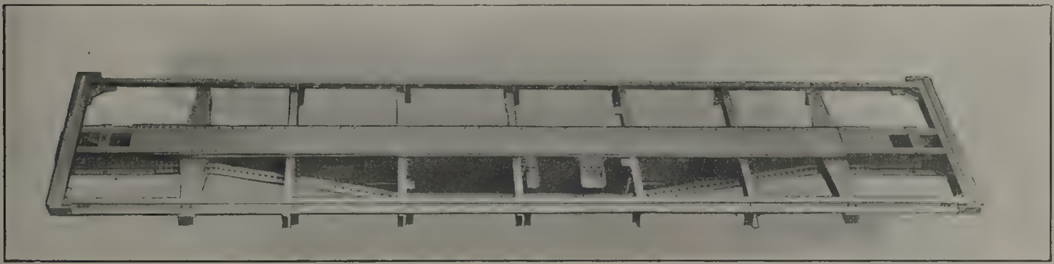


Fig. 479—American Car & Foundry Company Steel Underframe.

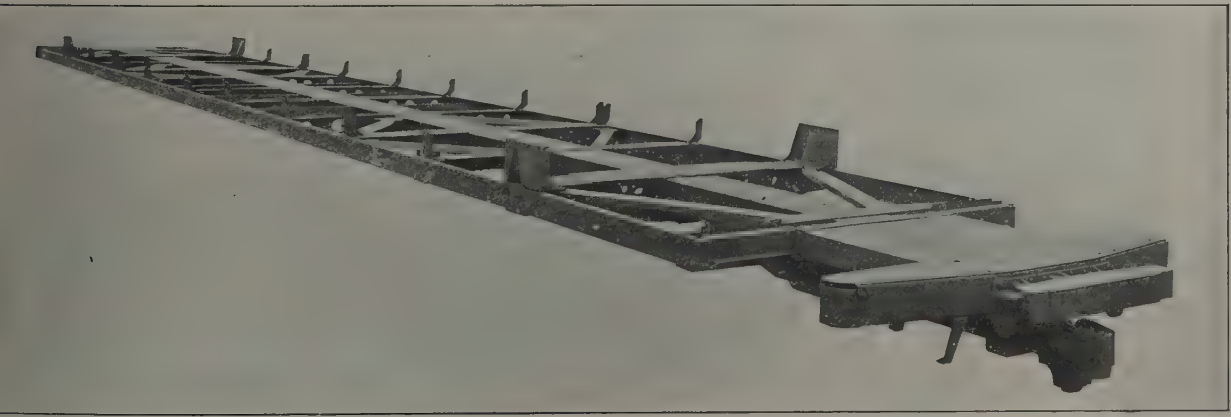


Fig. 480—Underframe for Erie Railroad Steel Suburban Coach.

Fig. 481—Combined Steel and Wood Underframe for Passenger Train Cars.

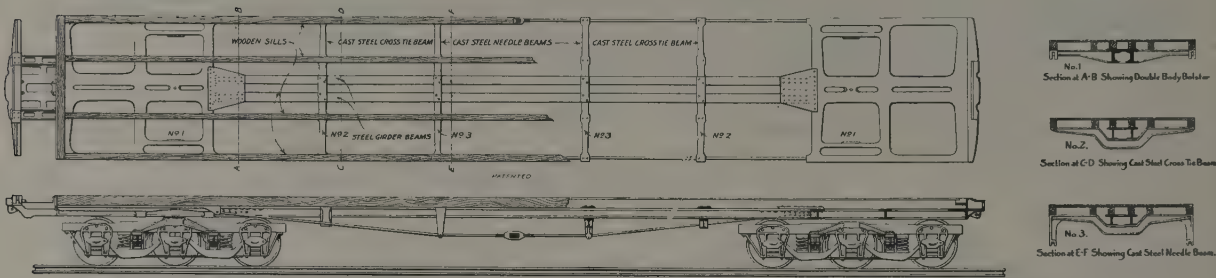


Fig. 482—Combined Wood and Steel Underframe for Passenger Train Cars with One Vestibule and One Non-Vestibule End, Using Commonwealth Steel Company's Cast Steel Combined Platform and Double Body Bolsters.

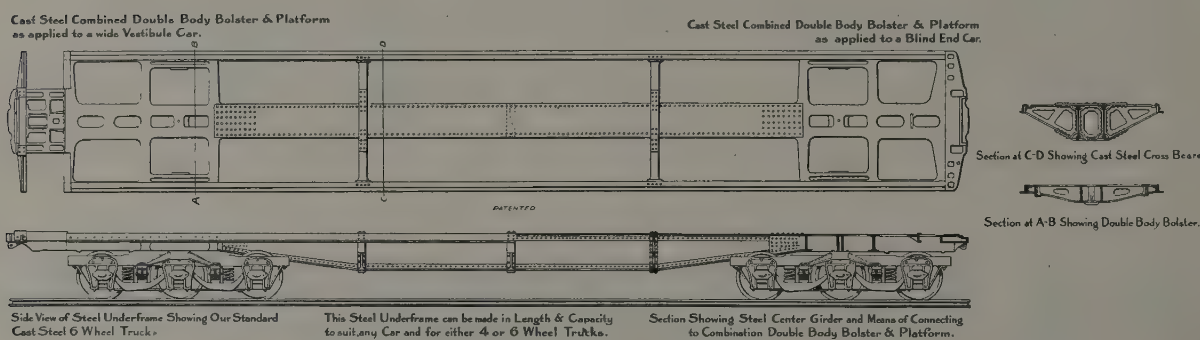


Fig. 483—Steel Underframe for Passenger Train Cars.

Fig. 484—Commonwealth Steel Underframe for Strengthening Old Postal Cars.

Commonwealth Steel Company.

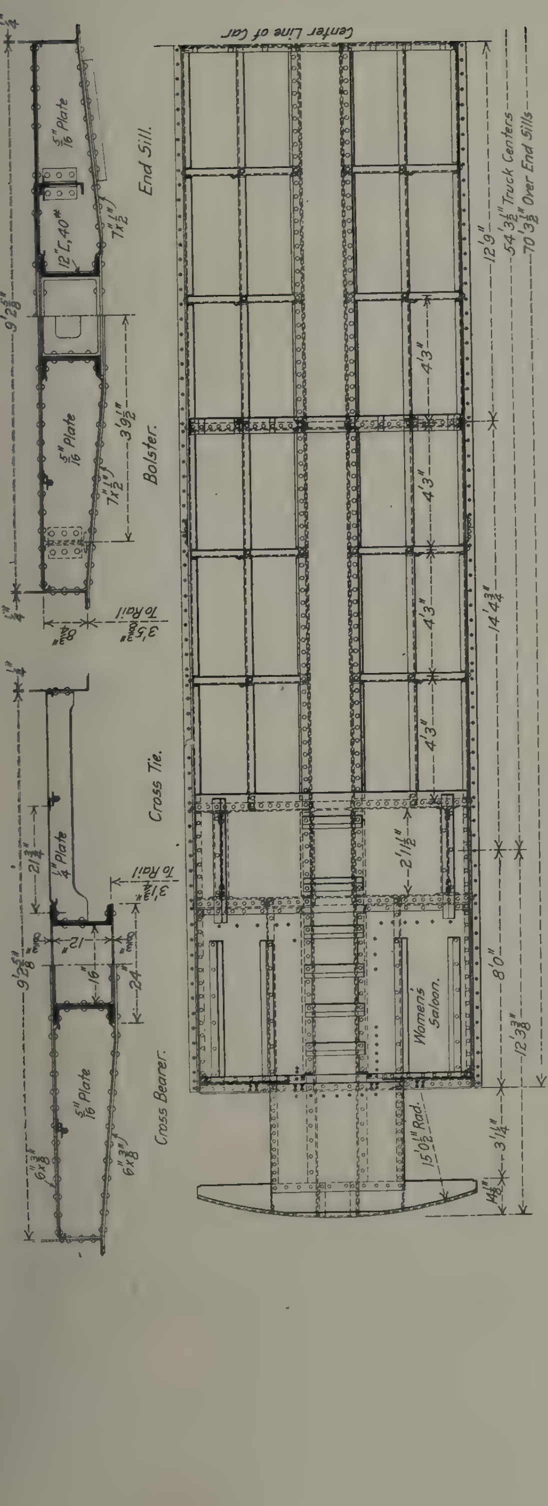


Fig. 485—Steel Underframe for New York, New Haven & Hartford Steel Day Coach.

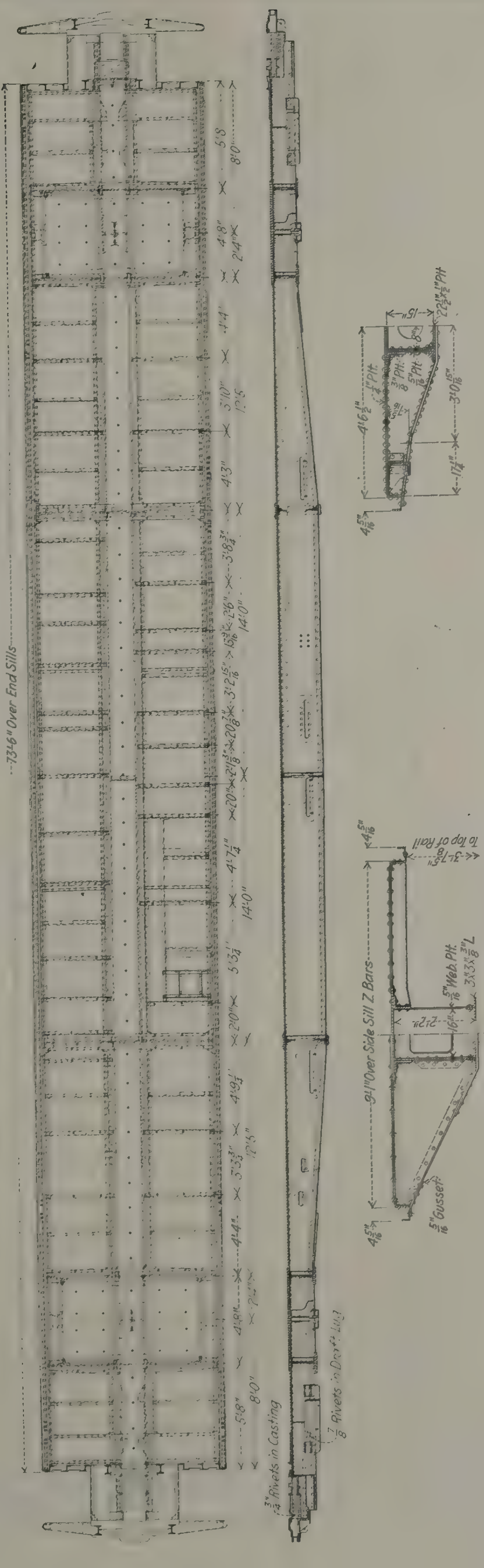


Fig. 486—The Pullman Company Standard Steel Underframe for Passenger Train Cars.

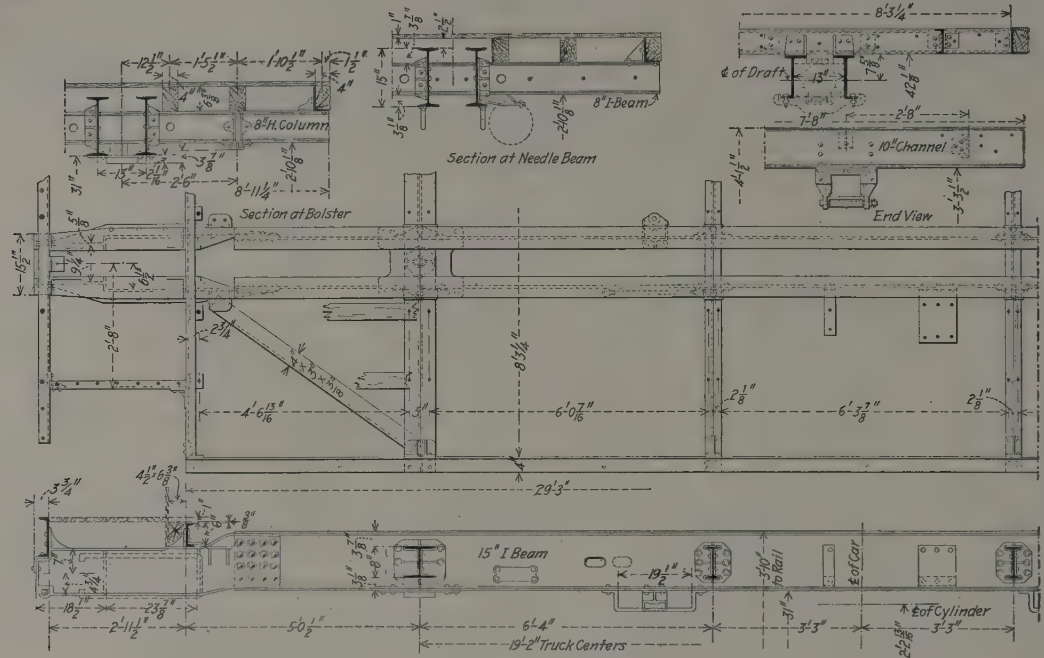


Fig. 487—Steel Underframe for Caboose. Builder, The Bettendorf Company.

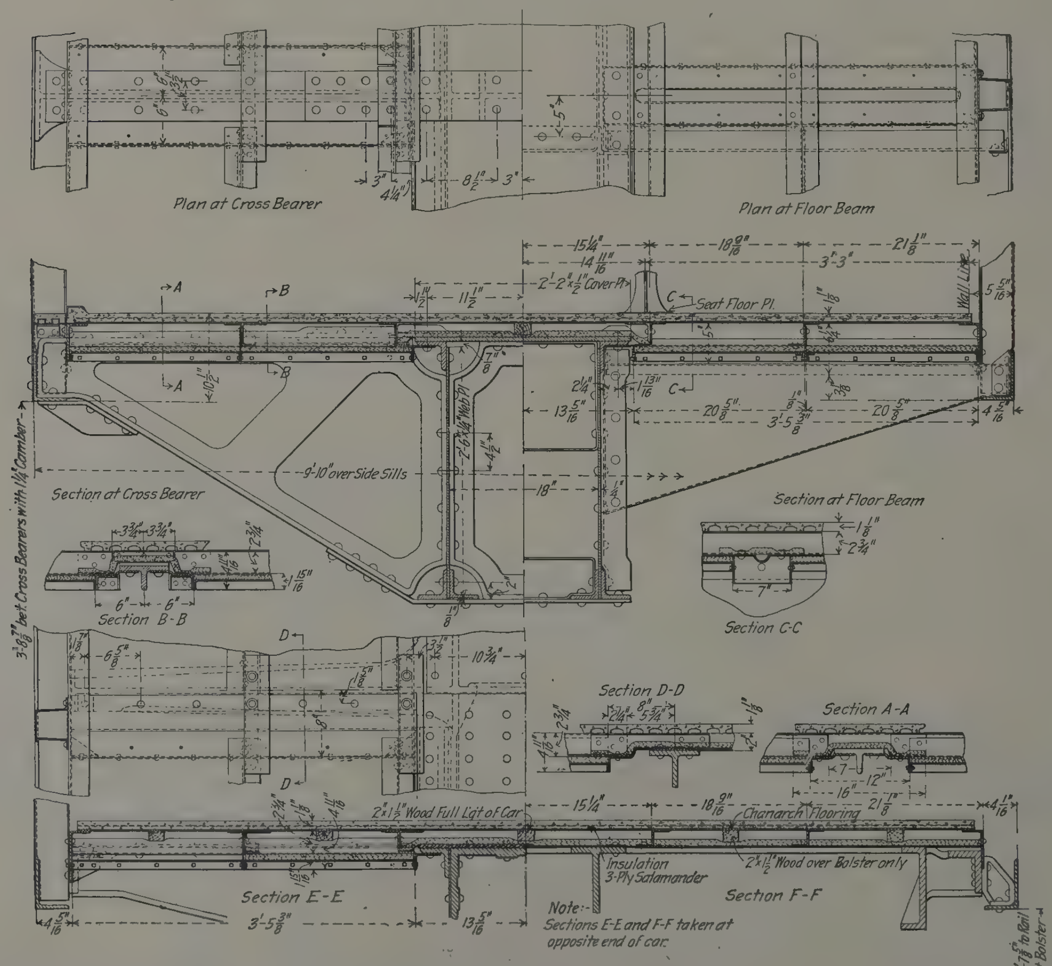


Fig. 488—Cross Sections of Underframe of New York Central Steel Day Coach Shown in Figs. 489 and 492. These Sections Refer to Fig. 489.

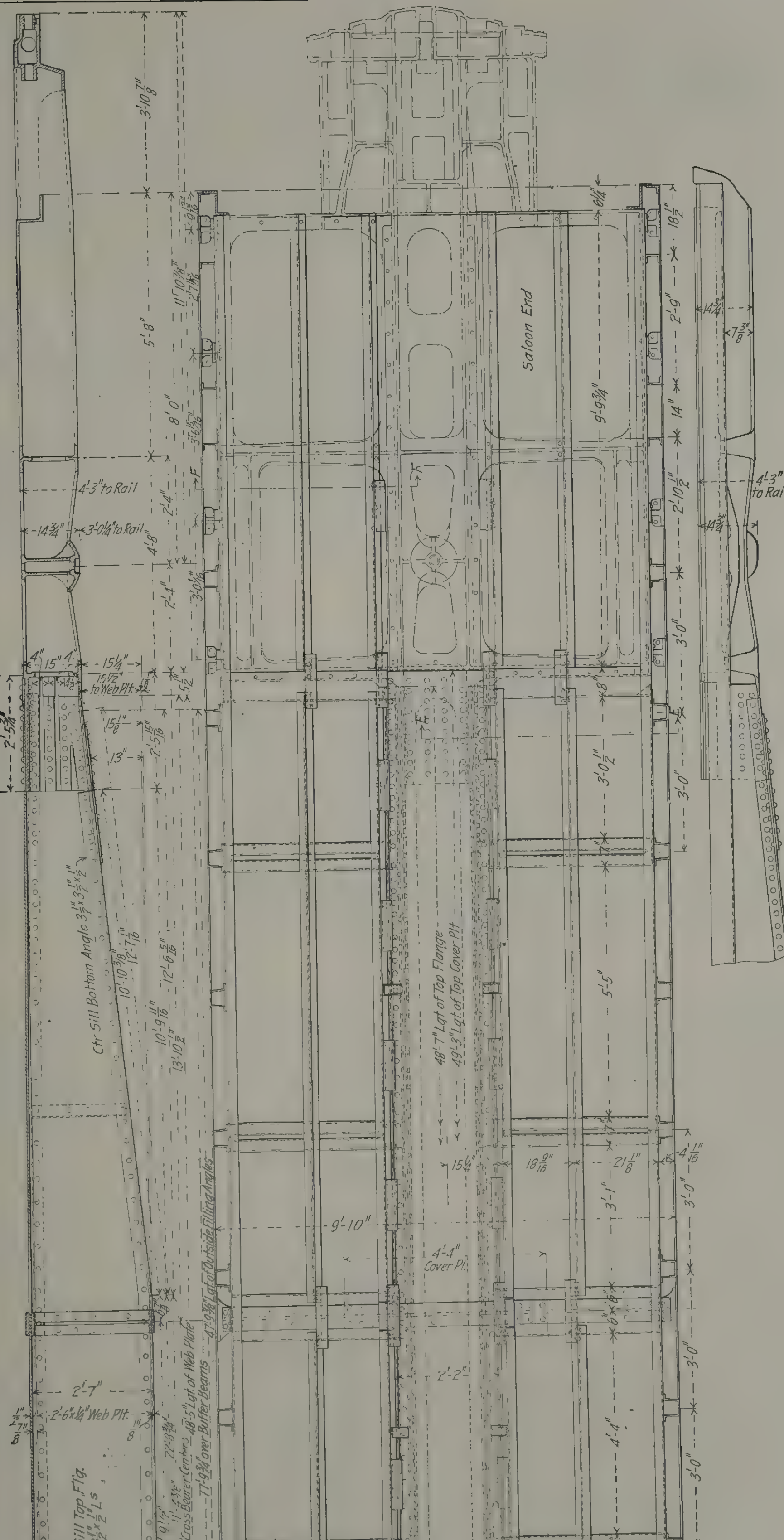


Fig. 489—Underframe of New York Central Steel Day Coach Shown in Fig. 488. Builder, American Car & Foundry Company.

Fig. 490—Steel Frame for Chicago, Rock Island & Pacific Box Car. Builder, Western Steel Car & Foundry Company.

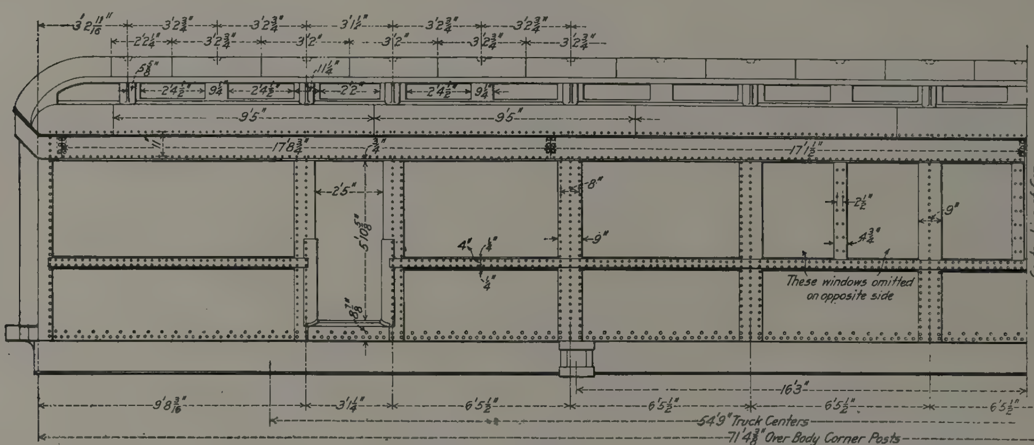


Fig. 491—Side Construction of Pennsylvania Railroad Steel Passenger Train Cars, Class M70.

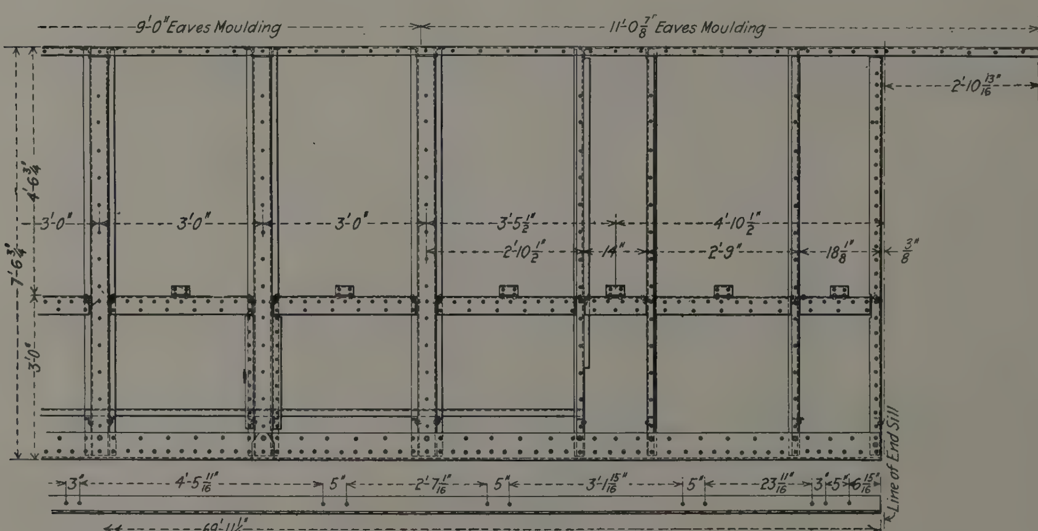
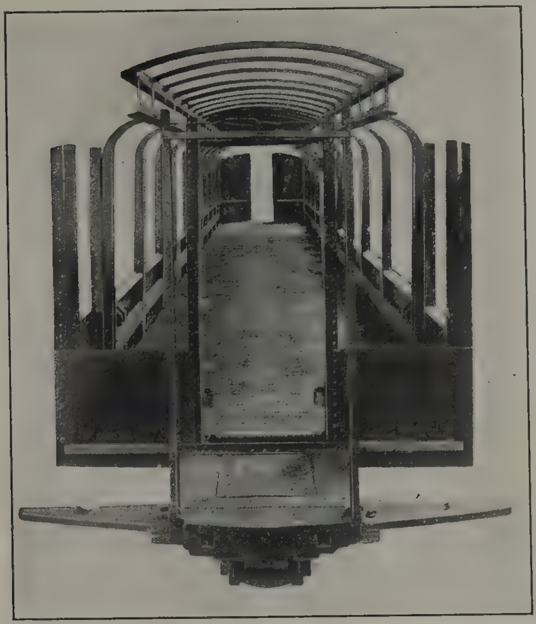


Fig. 492—Side Framing of New York Central Steel Day Coach Shown in Figs. 488 and 489.



Figs. 493 and 494—Steel Frame for Pennsylvania Railroad Day Coach.

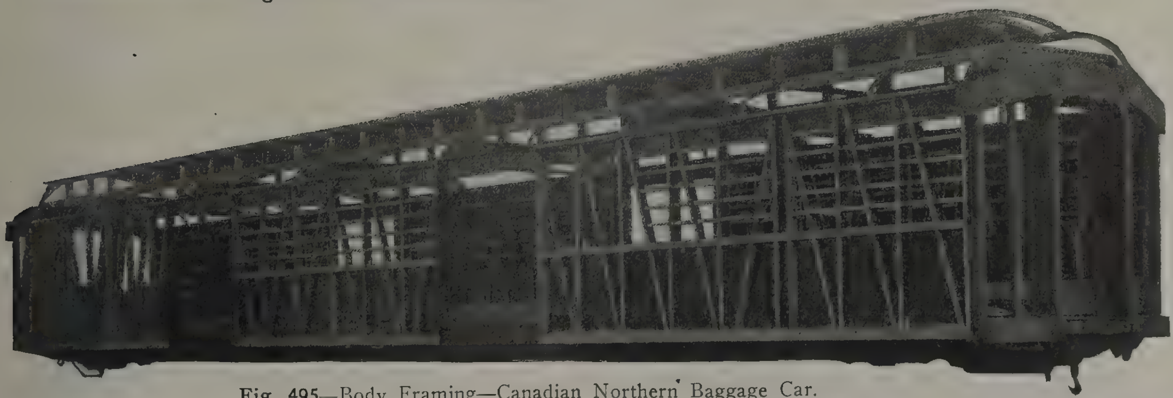


Fig. 495—Body Framing—Canadian Northern Baggage Car.

Fig. 496—Steel Frame for Observation Car. Builder, The Barney & Smith Car Company.

Fig. 497—Interior of Steel Frame for Sleeping Cars. The Pullman Company.

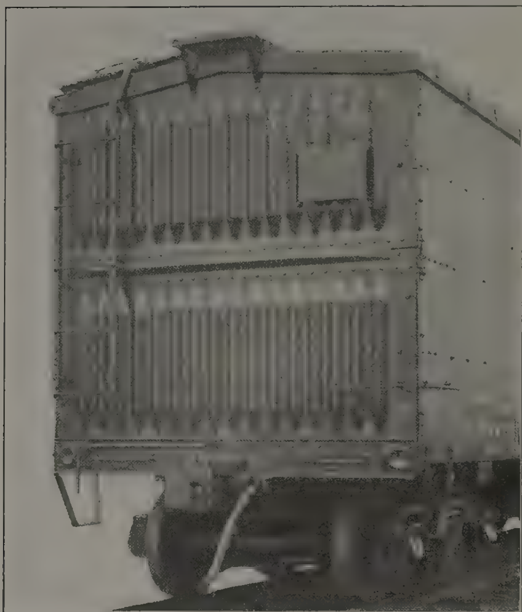


Fig. 498—American Car & Foundry Company Two-Piece Steel End of ¼-in. Plate.

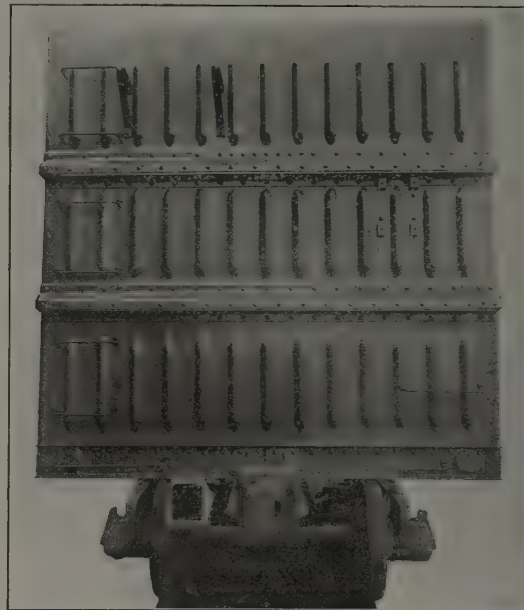


Fig. 499—American Car & Foundry Company Three-Piece Steel End.

Fig. 500—Corrugated Steel End for Box Cars. The Pressed Steel Manufacturing Company.

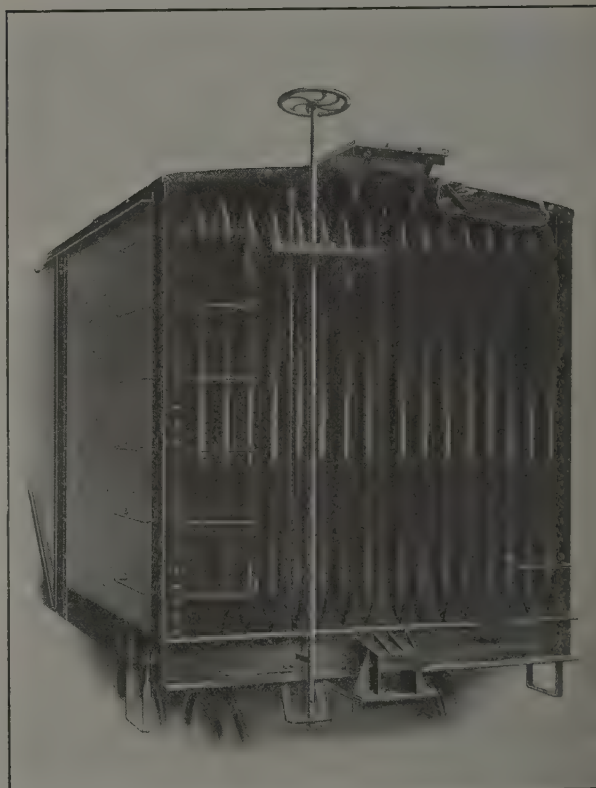


Fig. 501—Vulcan All-Steel End for Box Cars. Chicago-Cleveland Car Roofing Company.

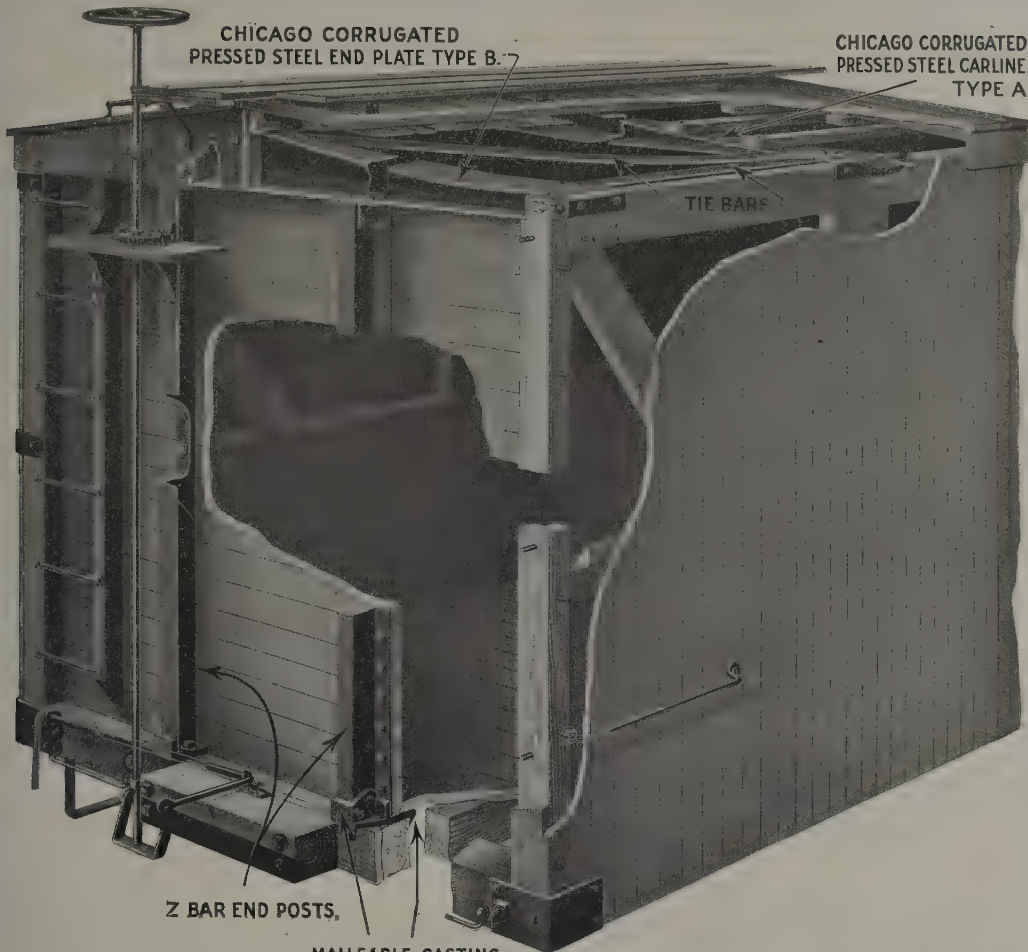


Fig. 502—Indestructible Steel Reinforced End for Box Cars. Chicago-Cleveland Car Roofing Company.

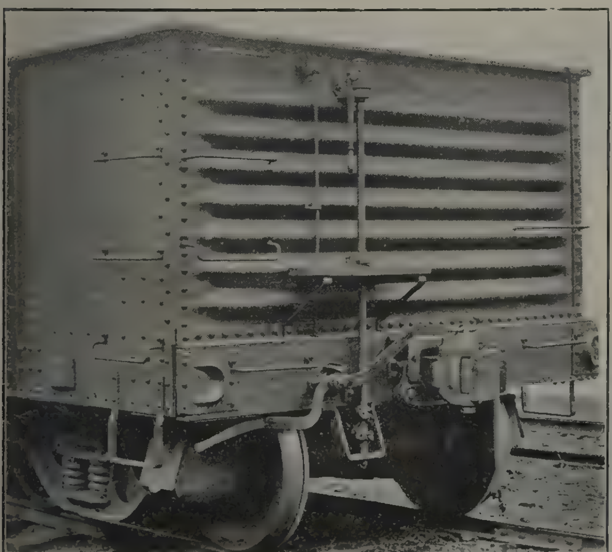


Fig. 503—Corrugated Steel End for Gondola Car. The Pressed Steel Manufacturing Company.

Fig. 504—"Mogul" Car End. The Pressed Steel Manufacturing Company.

Fig. 505—Commonwealth Steel Company's Upright End Frame in One Piece, and Commonwealth Combined Platform and Double Body Bolster for Vestibuled Cars.

Fig. 506—Commonwealth Steel Company's Cast Steel End Sill for Freight Cars, with Flory Carry Iron.

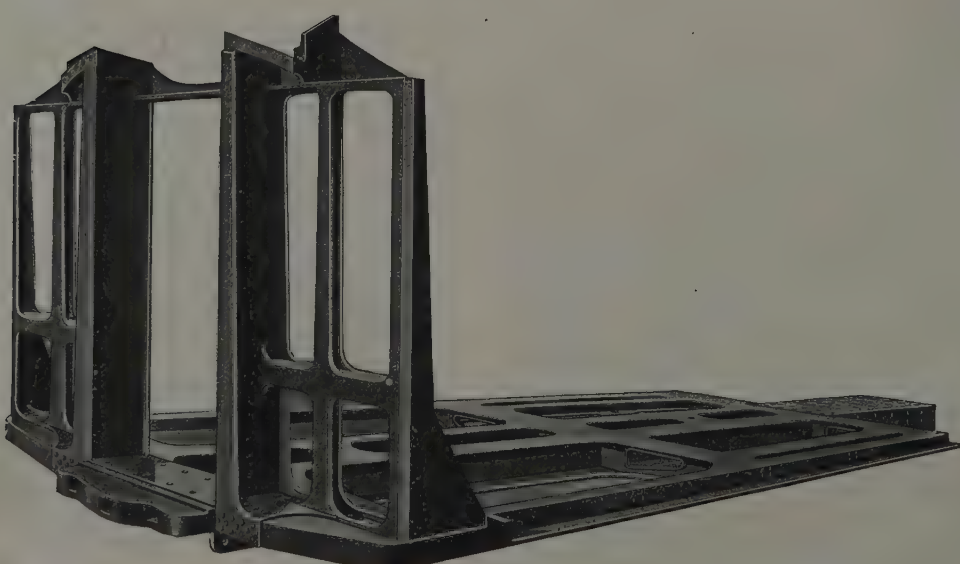


Fig. 507—Commonwealth Steel Company's Upright End Frame in One Piece, and Commonwealth Combined Platform and Double Body Bolster for Non-Vestibule Cars.

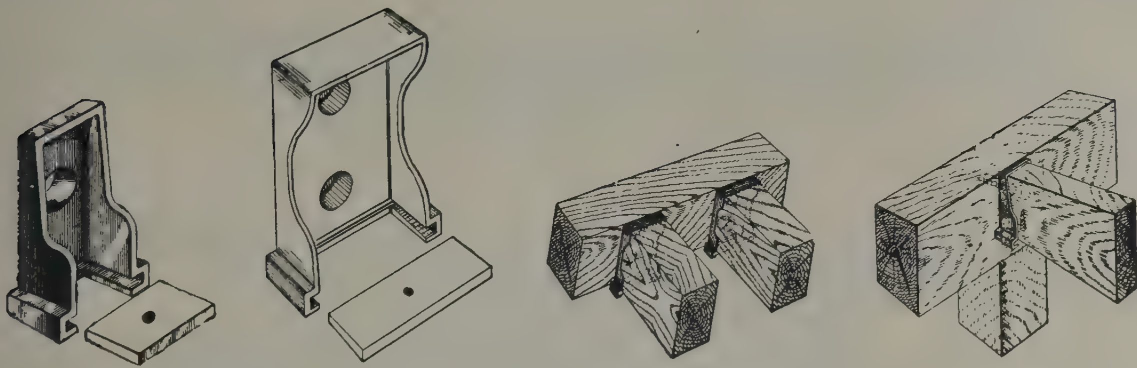


Fig. 508—Timber Pockets and Their Application. Western Railway Equipment Company.

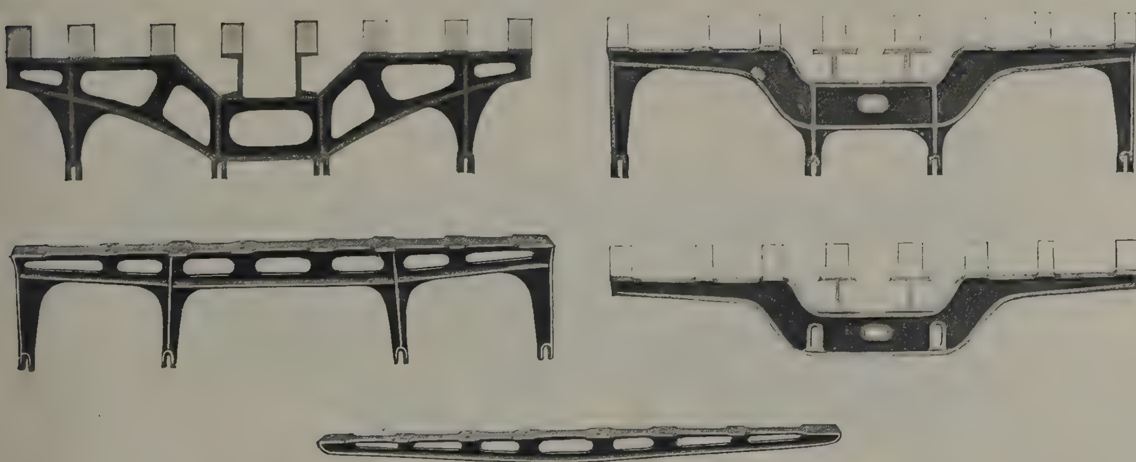


Fig. 509—Cast Steel Needle Beams. Commonwealth Steel Company.

Fig. 510—Monitor Body Bolster. Chicago Railway Equipment Company.

Fig. 511—One-piece Cast Steel Double Body Bolster for Passenger Train Cars. Commonwealth Steel Company

Fig. 512—Cast Steel I-Section Body Bolster. American Steel Foundries.

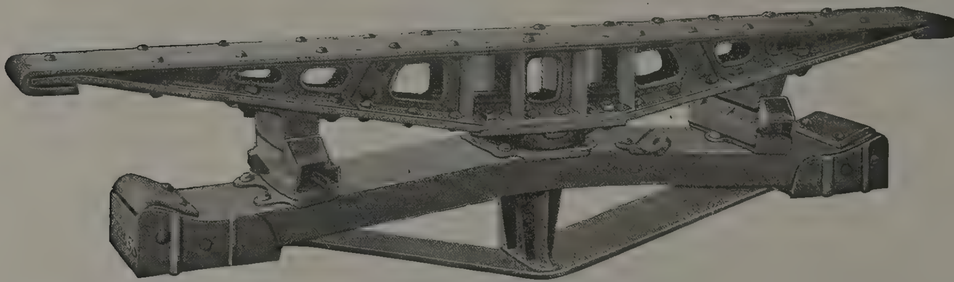


Fig. 513—Simplex Body Bolster with Cast Steel Web Filler, in Position on Simplex Truck Bolster with Susemihl Roller Side Bearings. American Steel Foundries.

Fig. 514—Simplex Body and Truck Bolsters for Freight Cars with Long Draft Sills and Deep Side Sills. American Steel Foundries.

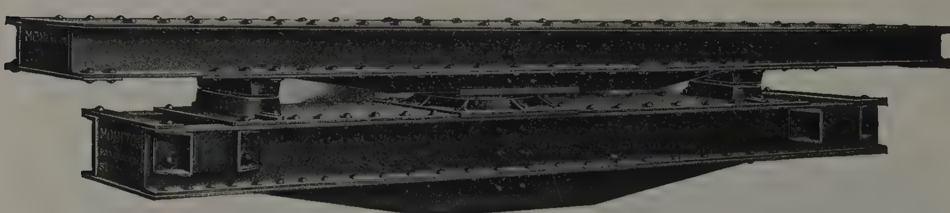


Fig. 515—Monitor Body Bolster in Position on Monitor Truck Bolster. Chicago Railway Equipment Company.

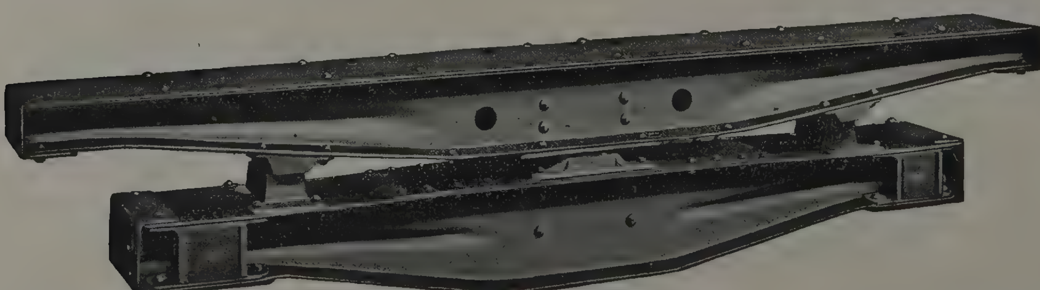


Fig. 516—Bettendorf Body Bolster in Position on Bettendorf Truck Bolster. The Bettendorf Company.

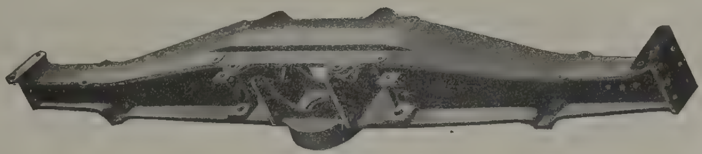


Fig. 517—Commonwealth Steel Company's Cast Steel Separable Body Bolster for Steel Freight Cars.

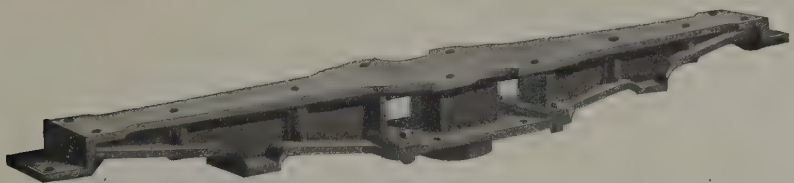


Fig. 518—Commonwealth Steel Company's Cast Steel Separable Body Bolster for Wooden Freight Cars.

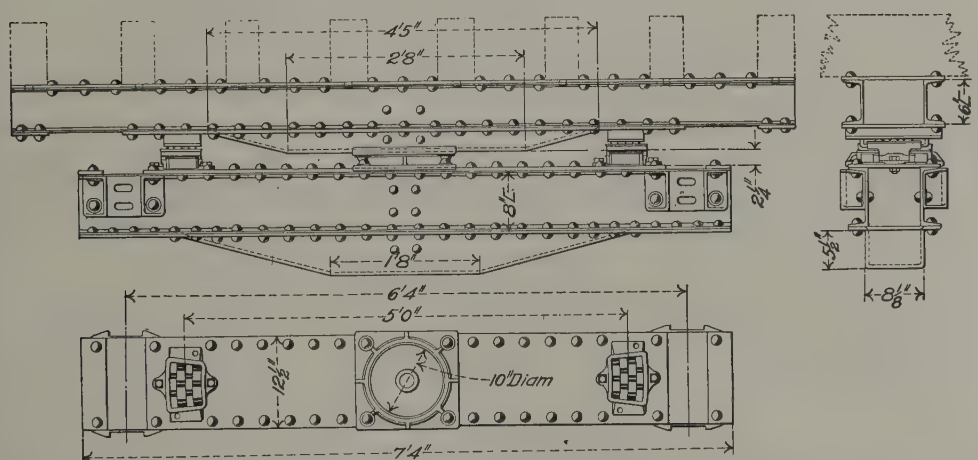


Fig. 519—Monitor Body and Truck Bolsters with Creco Side Bearings. Chicago Railway Equipment Company.

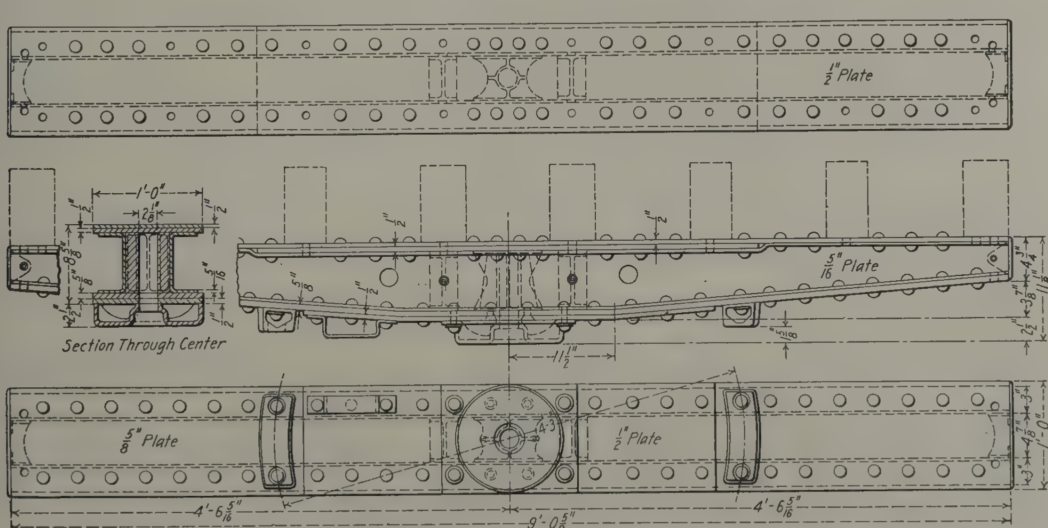


Fig. 520—American Car & Foundry Company's Body Bolster for 40-Ton Capacity Cars.

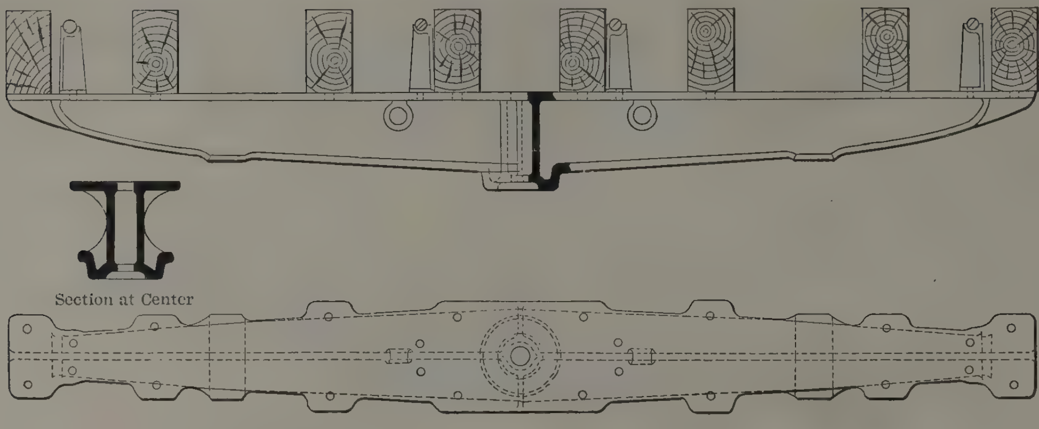


Fig. 521—Cast Steel I-Section Body Bolster. American Steel Foundries.

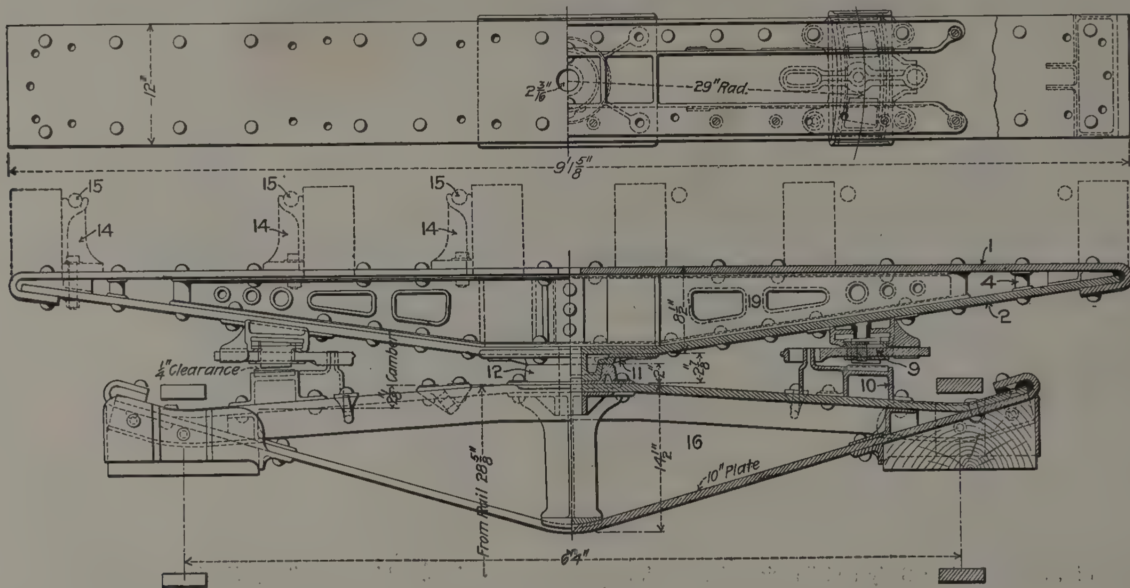


Fig. 522—"Simplex" Body and Truck Bolsters with Susemihl Roller Side Bearings. American Steel Foundries.

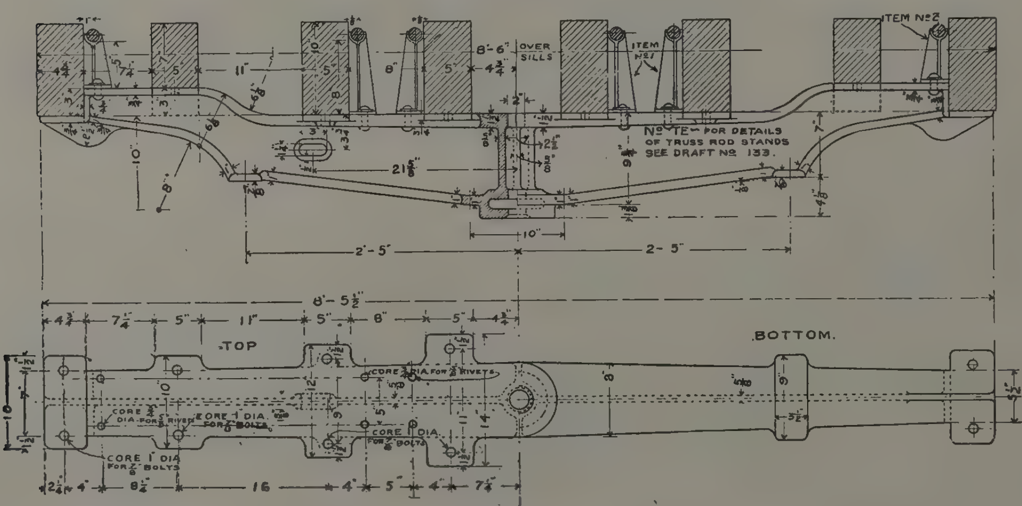


Fig. 523—Cast Steel Body Bolster for Wooden Gondola Car. American Steel Foundries.

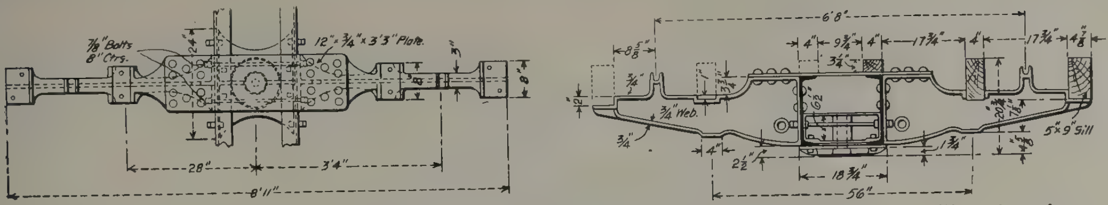


Fig. 524—Two-Piece Cast Steel Body Bolster for Freight Cars with Channel Center Sills. American Steel Foundries.

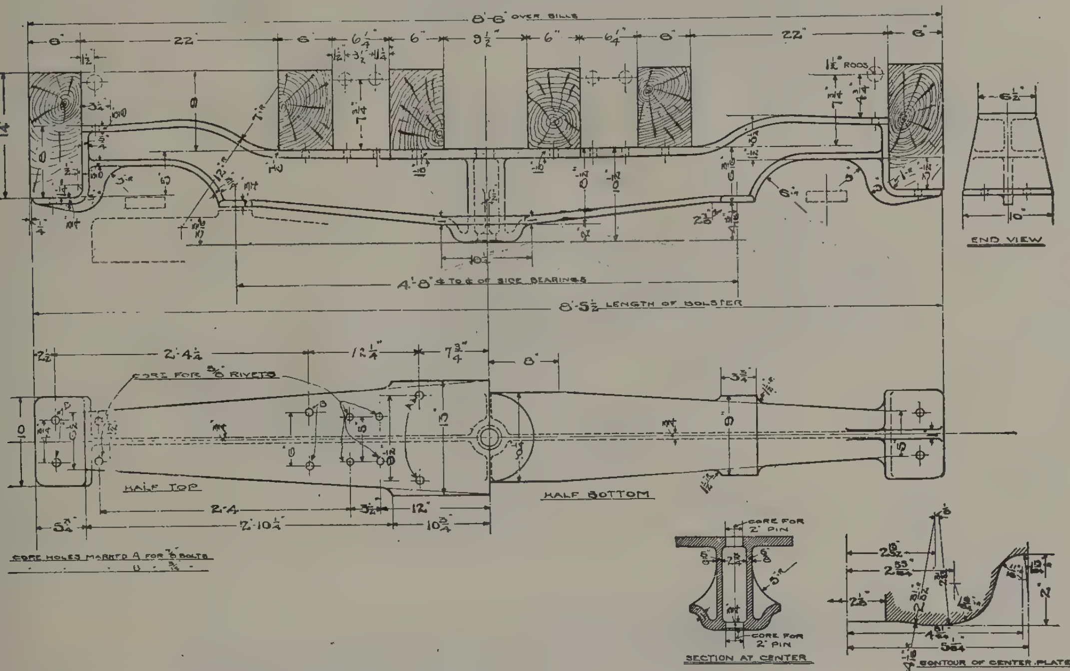


Fig. 525—Cast Steel Body Bolster for Wooden Underframe Flat Car. American Steel Foundries.

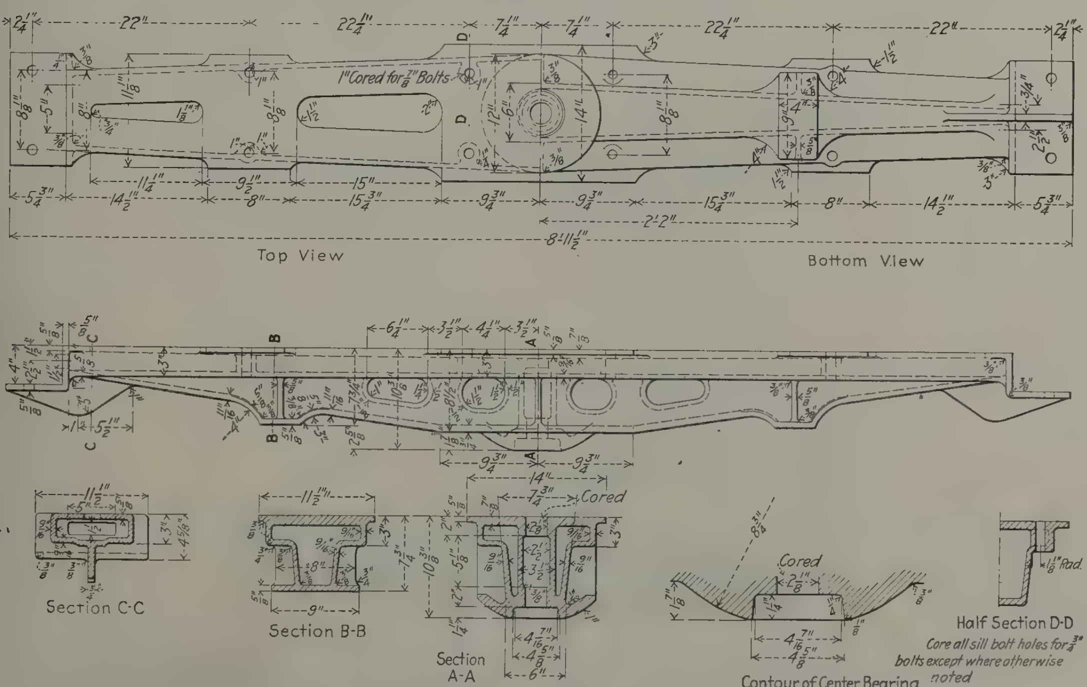


Fig. 526—Cast Steel "Z" Body Bolster for Rodger Ballast Car. Gould Coupler Company.

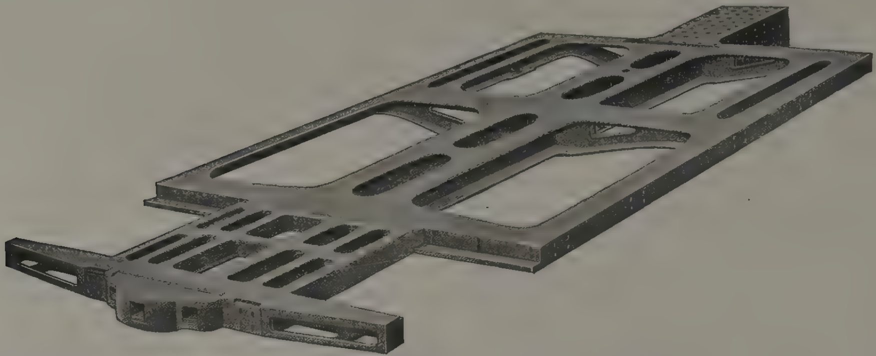


Fig. 527—Commonwealth Steel Company's Combined Cast Steel Platform and Double Body Bolster for Vestibuled Steel Cars

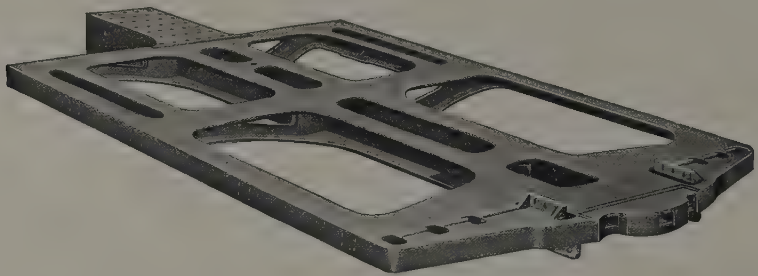


Fig. 528—Commonwealth Steel Company's Cast Steel Combined Platform and Double Body Bolster for Non-Vestibuled Steel Cars.

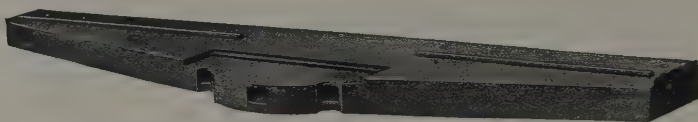


Fig. 529—Commonwealth Steel Company's Cast Steel Combined End and Buffer Sill.

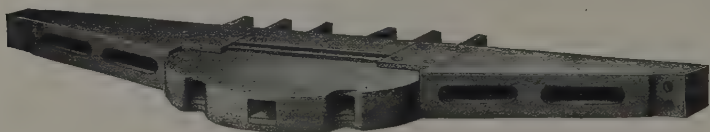


Fig. 530—Commonwealth Steel Company's Cast Steel Buffer Sill for Passenger Train Cars.

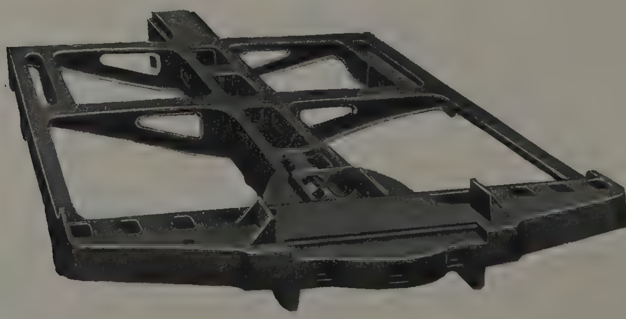


Fig. 531—Commonwealth Steel Company's Cast Steel Combined Platform and Double Body Bolster for Non-Vestibuled Cars with Combined Wood and Steel Underframe.

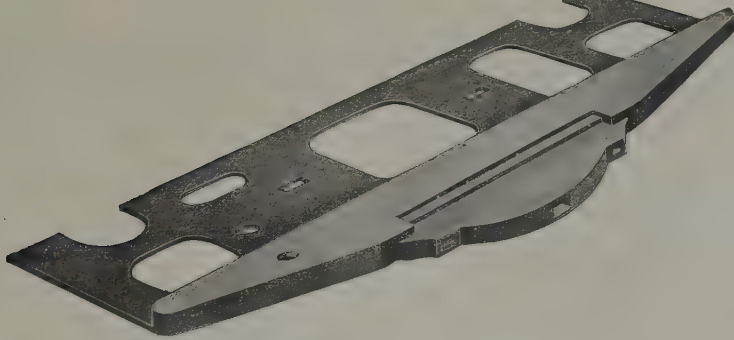


Fig. 532—Commonwealth Steel Company's One-Piece Cast Steel Buffer Sill and Anti-Telescoping Plate for Non-Vestibuled Cars.

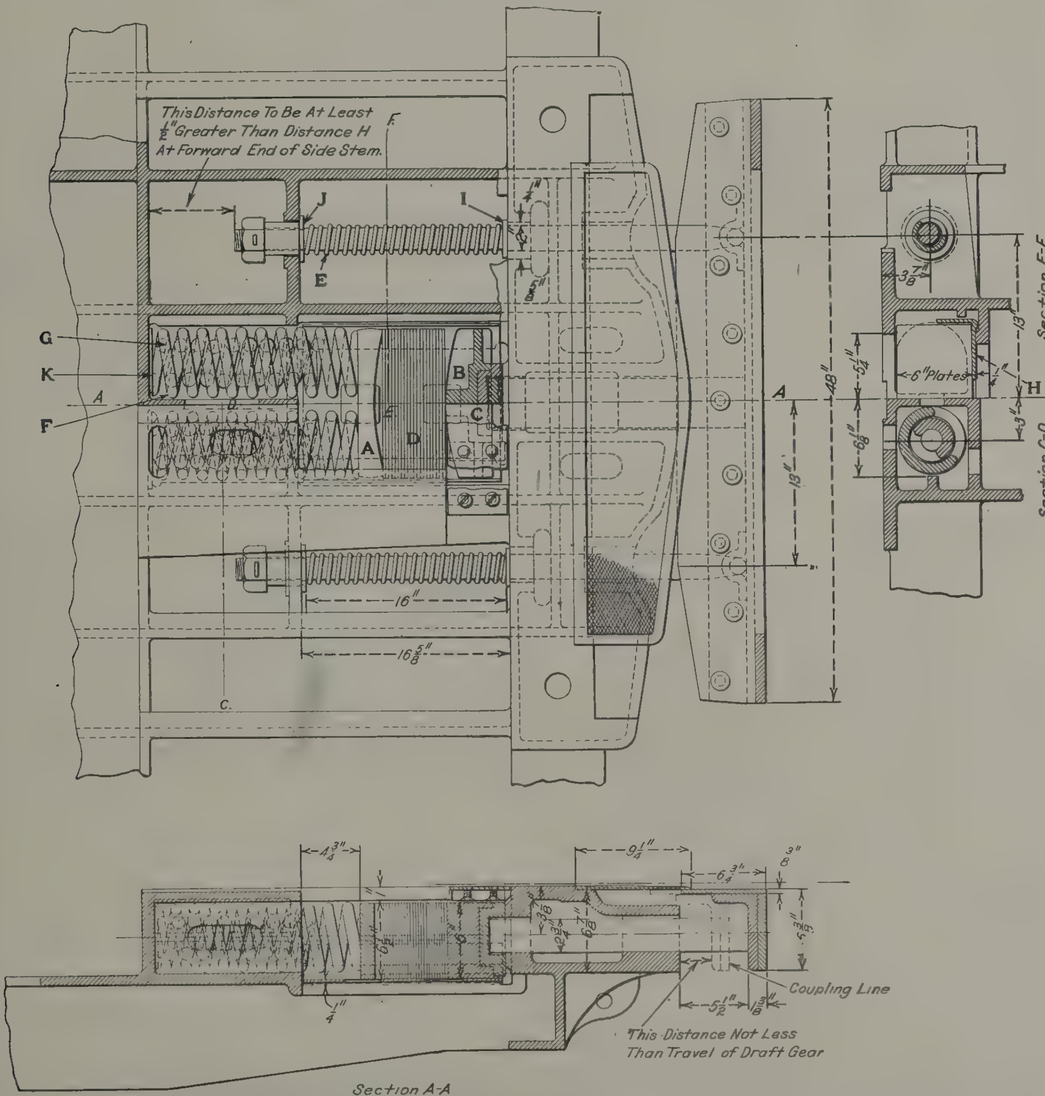


Fig. 533—Waugh-Forsyth High Capacity Buffing Device Applied to Cast Steel Platform. Waugh Draft Gear Company.

Parts of Waugh-Forsyth Buffing Device Shown in Fig. 533.

A *Concave Followers*	E *Side Stem Spring No.* 53	I *Side Stem Spring Washer*
B *Convex Followers*	F *Outside Springs No.* 50	J *Side Stem Spring Thimble*
C *Interlock Followers*	G *Inside Springs No.* 51	K *Main Spring Washers*
D *2 Complete Sets of Friction Plates*	H *Bottom Wear Plates*	

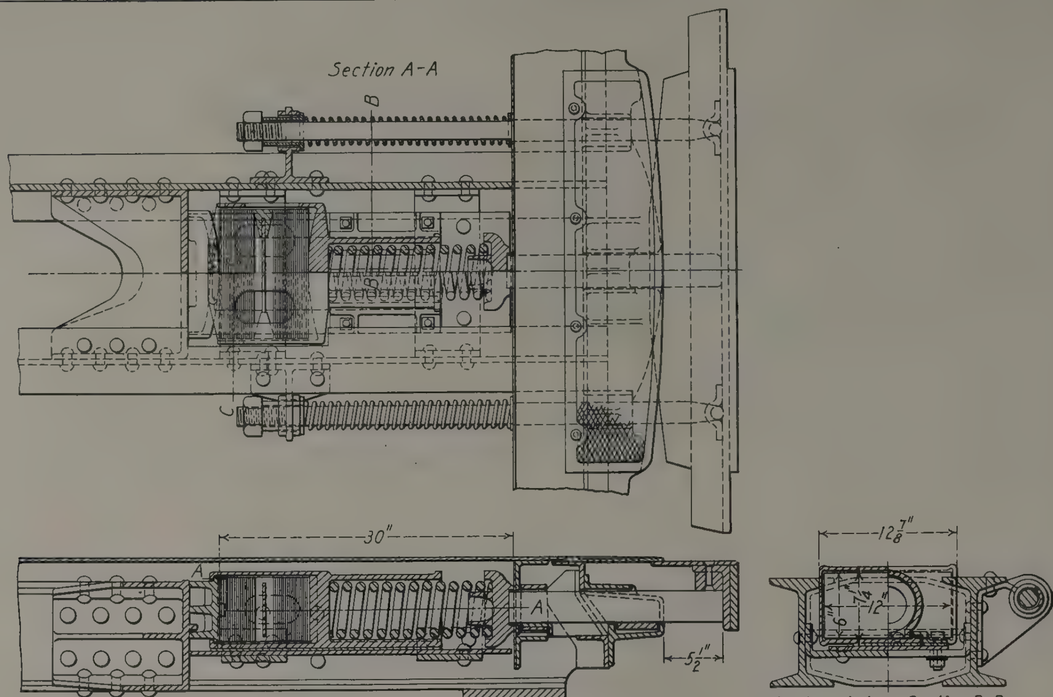


Fig. 534—Waugh Buffing Device Arranged for Steel Passenger Train Cars. Waugh Draft Gear Company.

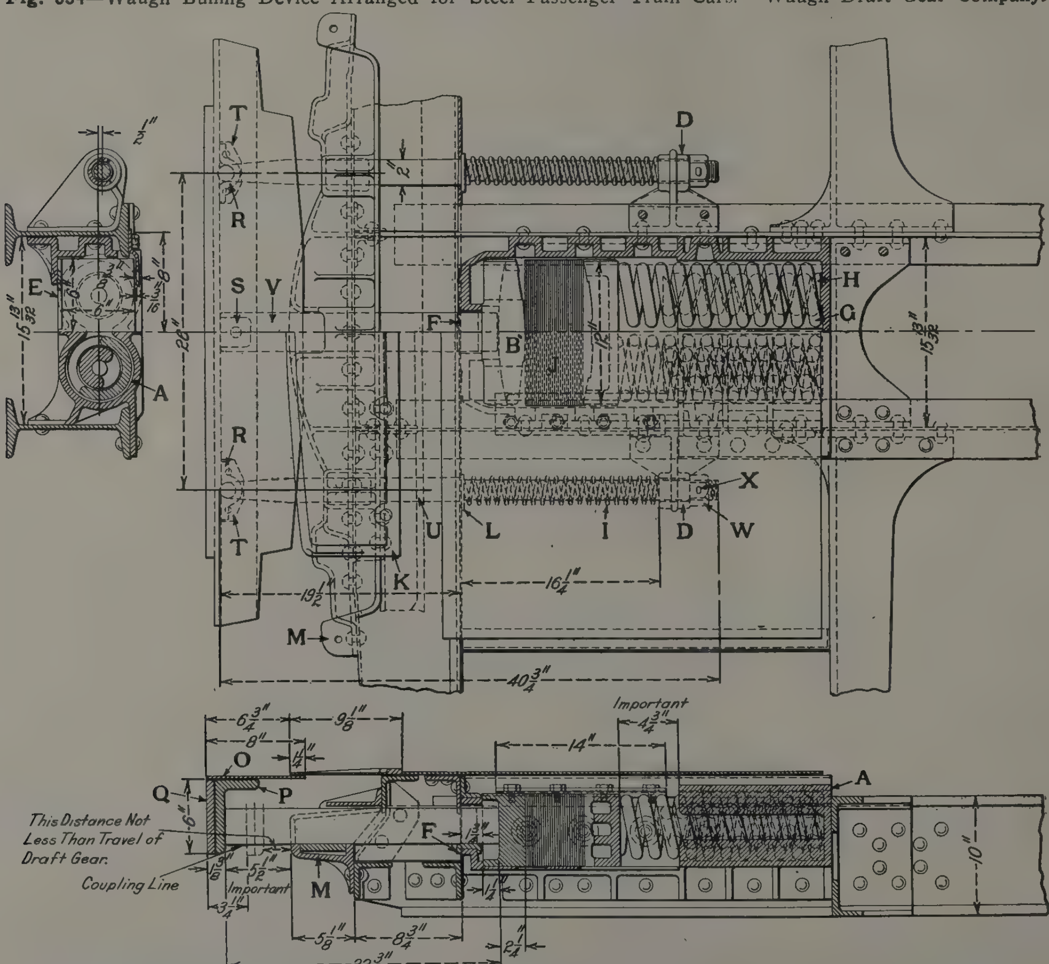


Fig. 535—Waugh-Forsyth High Capacity Buffing Device Applied to Built Up Steel Platform. Waugh Draft Gear Company.

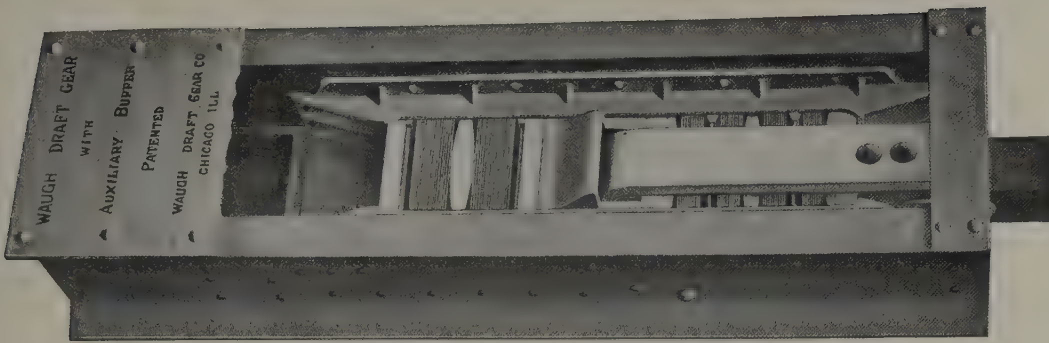


Fig. 536—Waugh Draft Gear with Auxiliary Buffer.
Waugh Draft Gear Company.

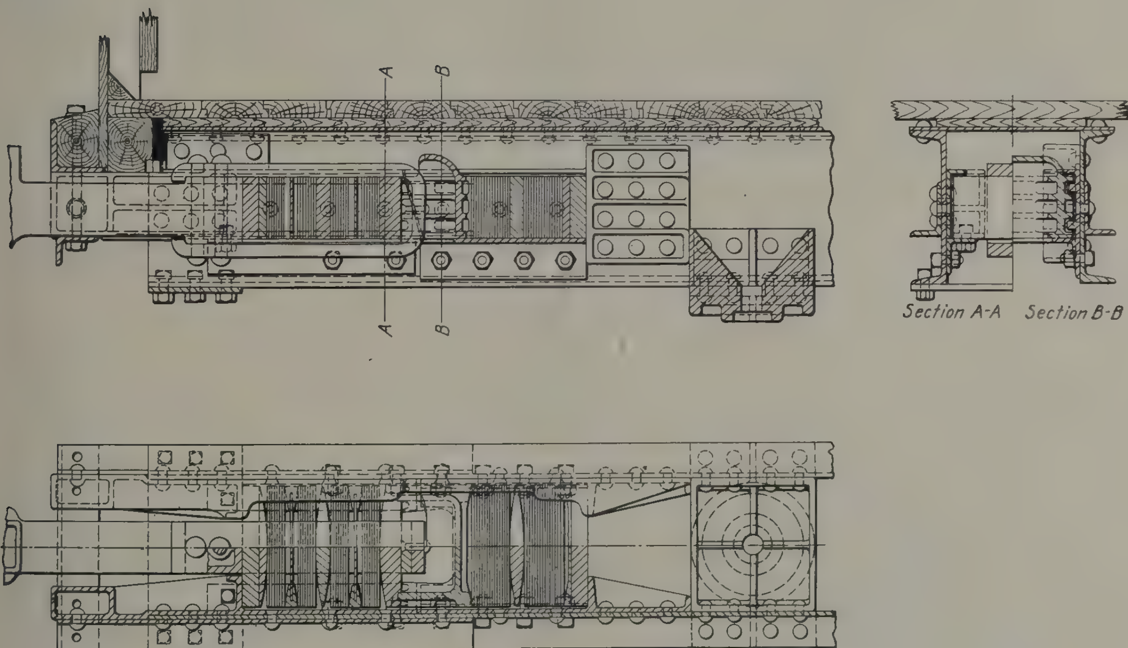


Fig. 537—Waugh Auxiliary Buffer in Combination with Waugh Draft Gear.
Waugh Draft Gear Company.

Parts of Waugh-Forsyth Buffing Device Shown in Fig. 535

A *Housing Casting*
B *Convex Follower*
C *Concave Follower*
D *Side Stem Brackets*
E *Bottom Wear Plates*
F *Chafing Plates, Center Stem*
G *No. 50 Spring*
H *No. 51 Spring*
I *No. 53 Spring*
J *Spring Friction Plates*
K *Tread Plates*
L *Side Stem Spring Washer*
M *Buffer Face Casting with Inserts—Vestibule End Only*
N *Buffers*
O *Buffer Tread Plate*
P *Buffer Angle*
Q *Buffer Face Plate*
R *Hinge Plate*
S *Center Stem Chafing Block*
T *Side Stem Chafing Block*
U *Vestibule End Side Stems*
V *Vestibule End Center Stems*
W *1¾-inch Hexagon Nut*
X *¼-inch Cotter Pin*

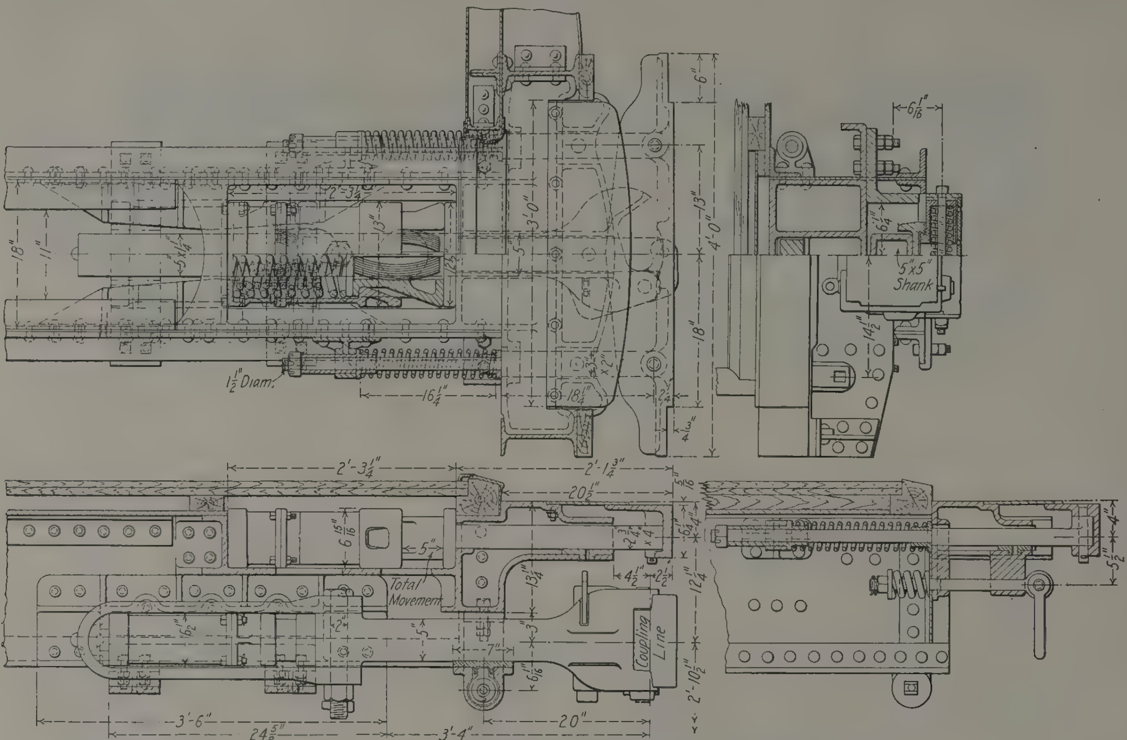


Fig. 538—Cast Steel End Sill Buffer, Coupler Centering Device and Draft Gear for U. S. Postal Car. Gould Coupler Company.

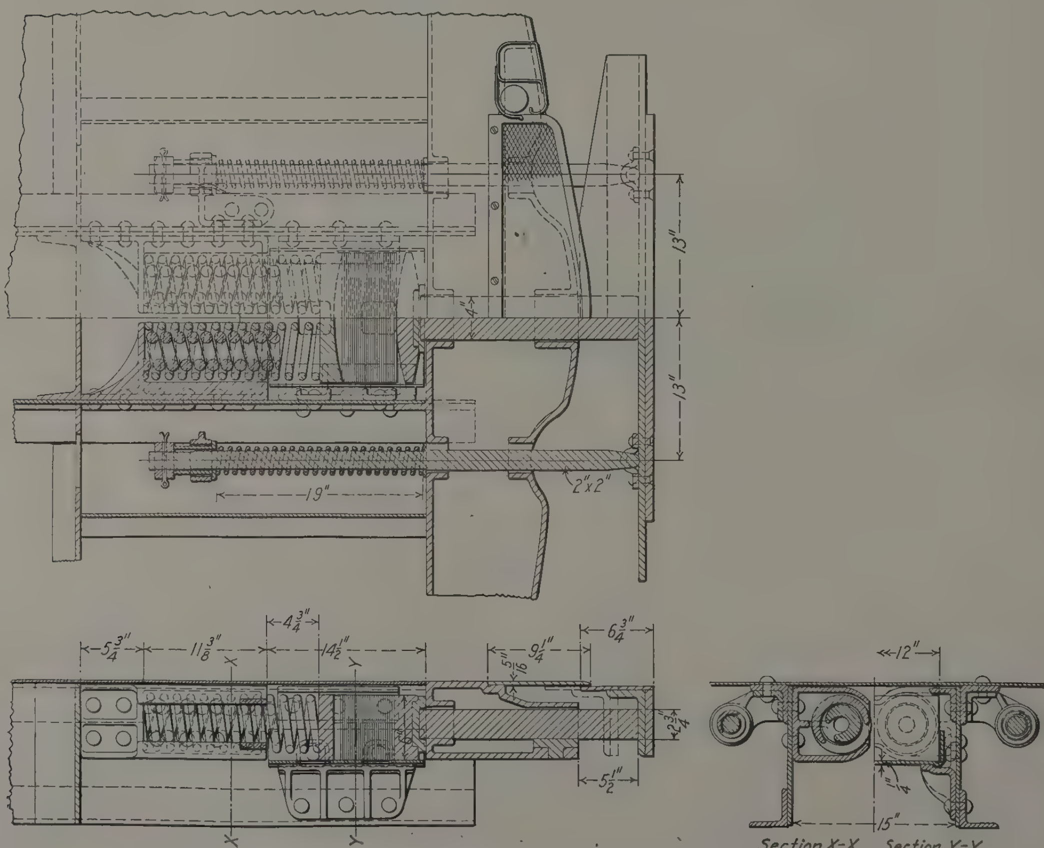


Fig. 539—Waugh-Forsyth Buffing Device, Type D. Waugh Draft Gear Company.

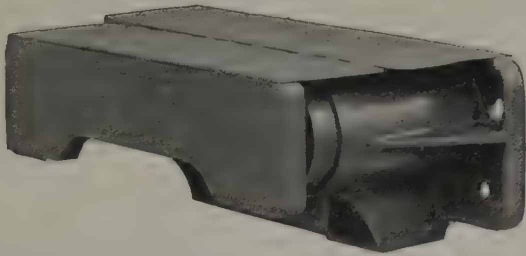


Fig. 540—Gould Spring Buffer for Express Refrigerator and Freight Cars. Gould Coupler Company.

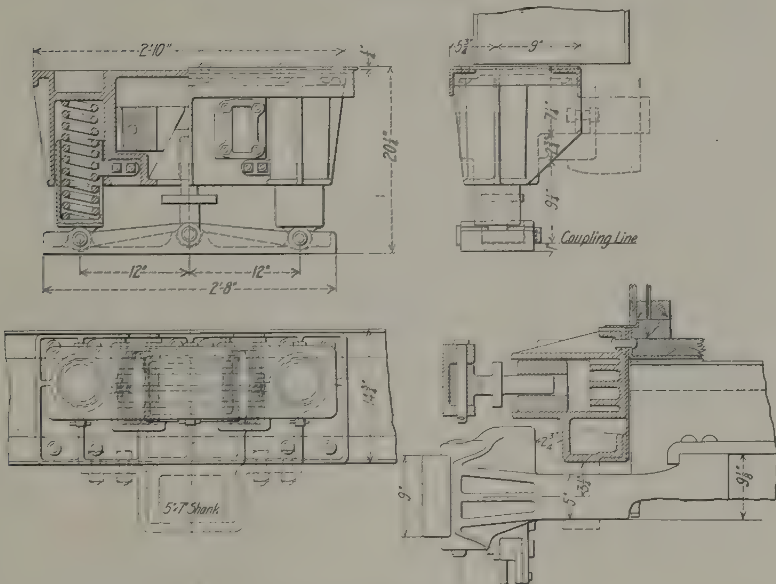


Fig. 541—Gould Spring and Friction Buffer. Gould Coupler Company.

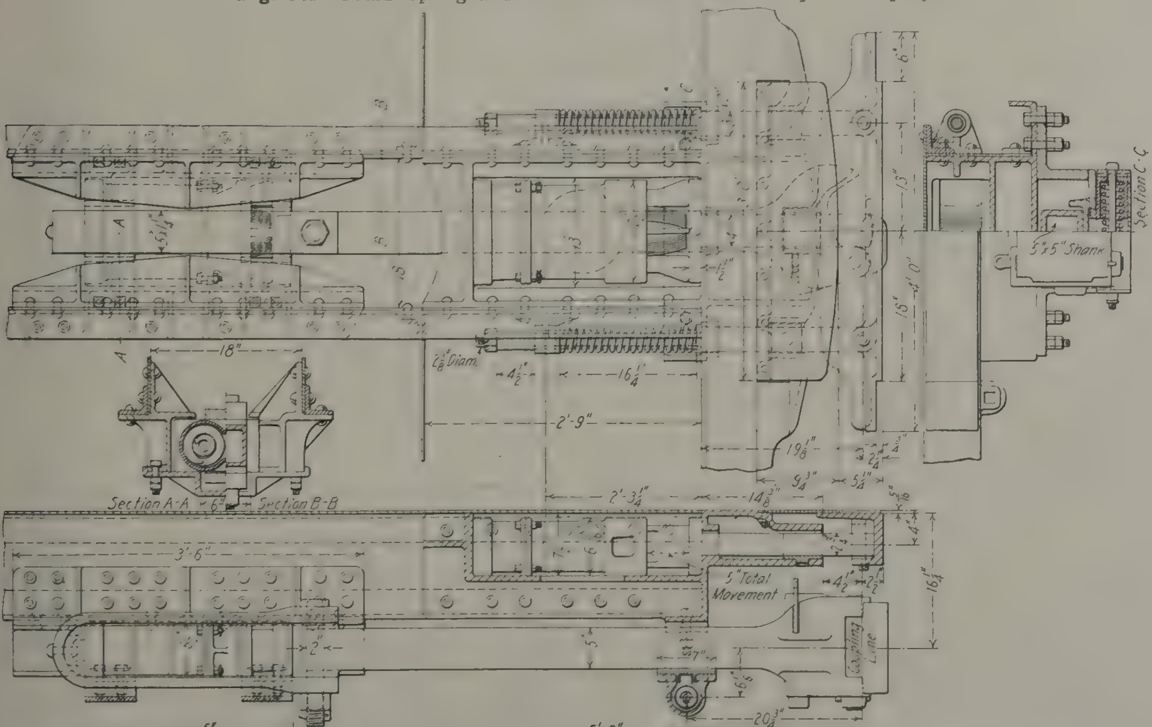


Fig. 542—Wide Vestibule Steel Platform with Cast Steel End Sill, Buffer, Coupler, Coupler Centering Device and Draft Gear. Gould Coupler Company.

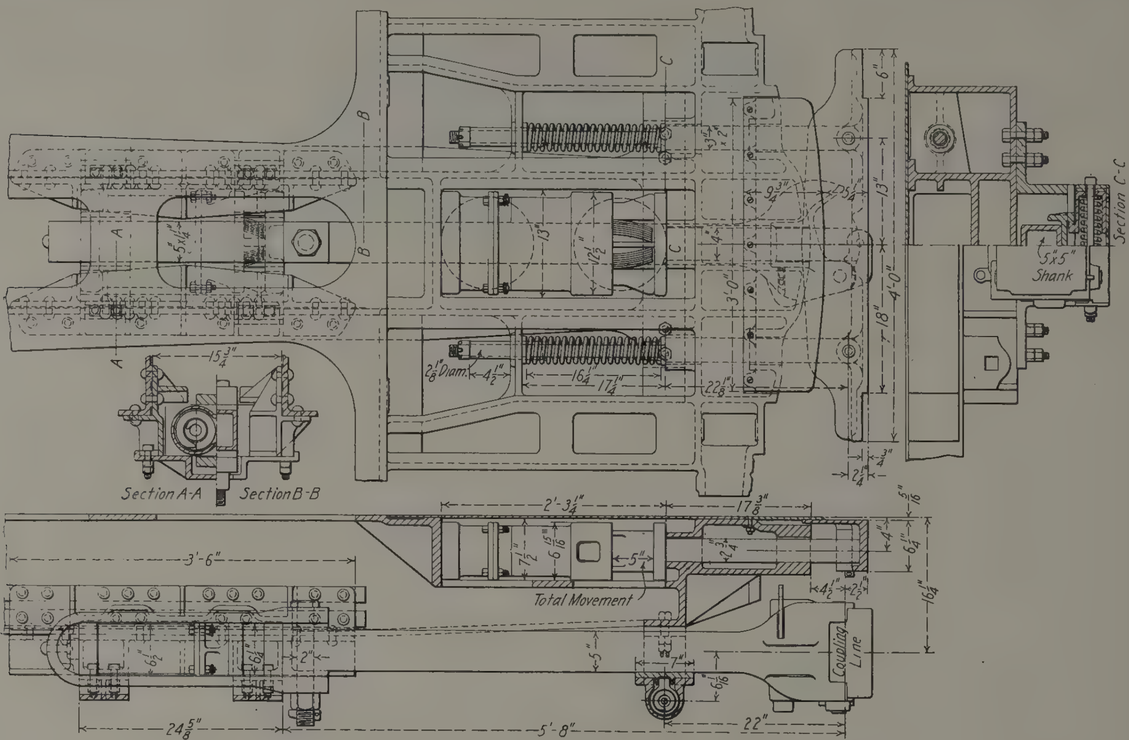


Fig. 543—Wide Vestibule Steel Platform with Cast Steel End Sill, Buffer, Coupler Centering Device and Draft Gear. Gould Coupler Company.

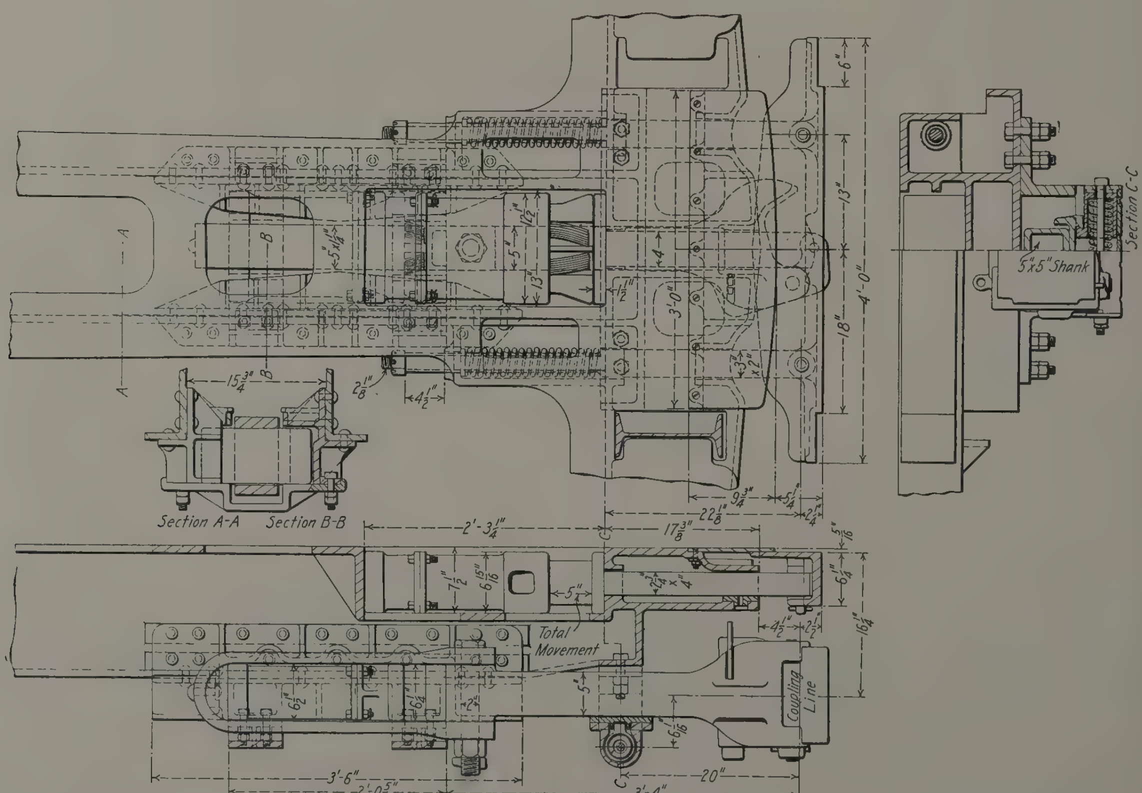
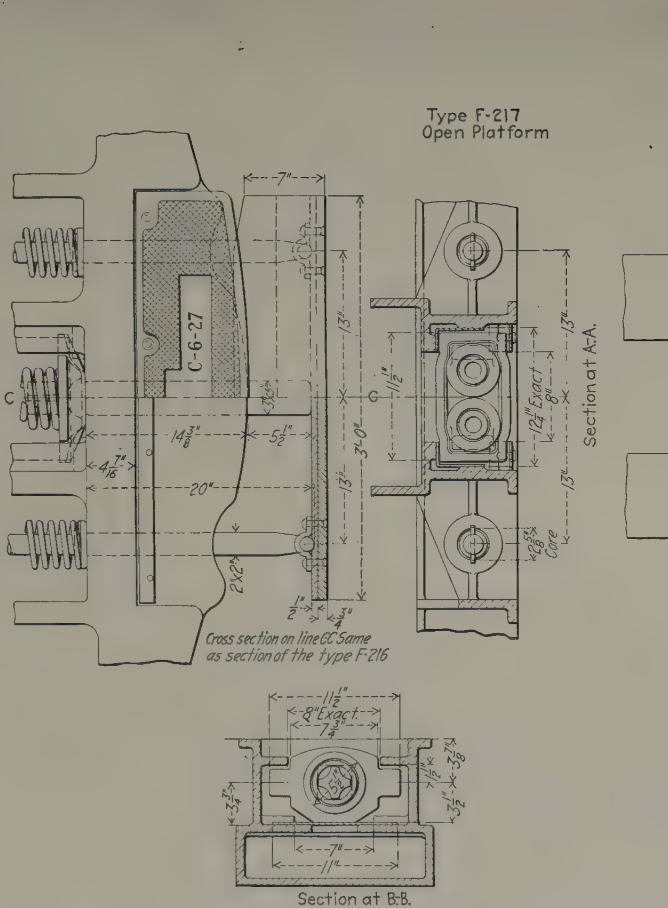
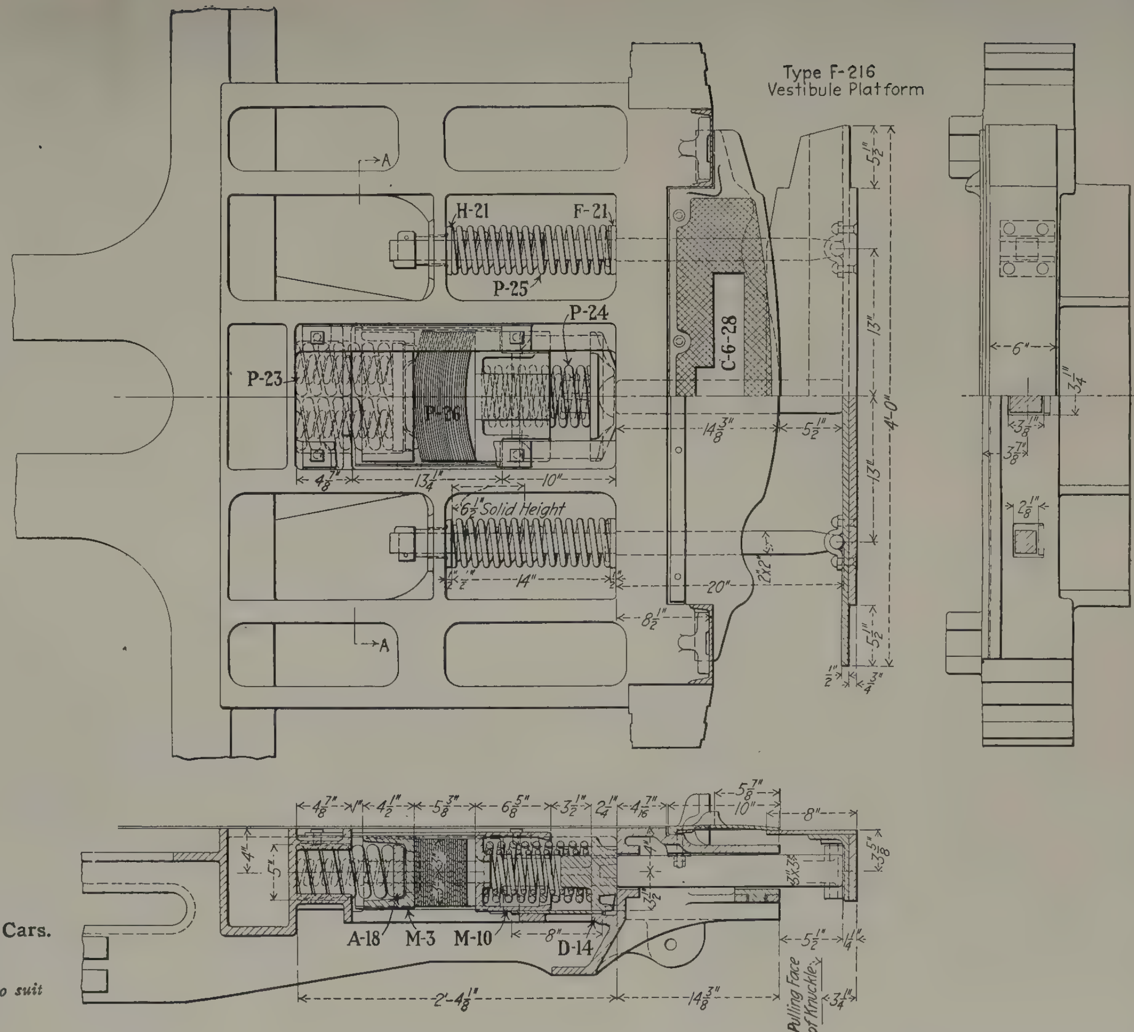


Fig. 544—Friction Buffer, Draft Gear, Coupler and Coupler Centering Device Applied to Stub or Dummy End Cast Steel Platform. Gould Coupler Company.

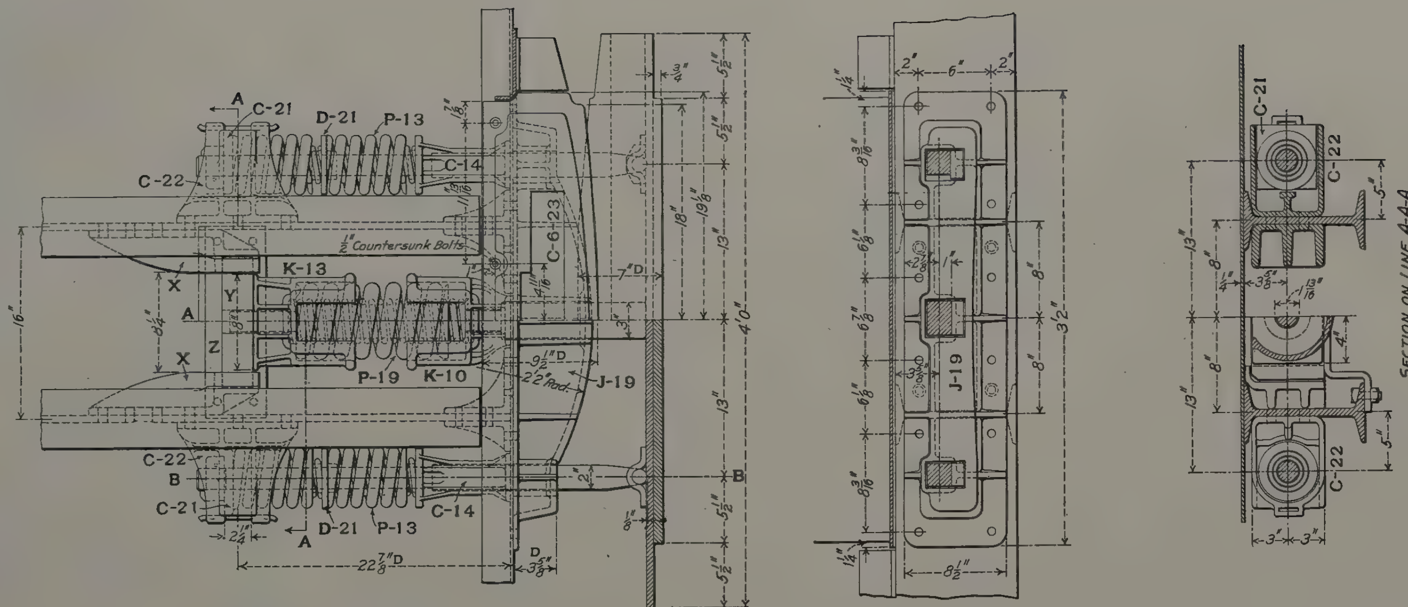


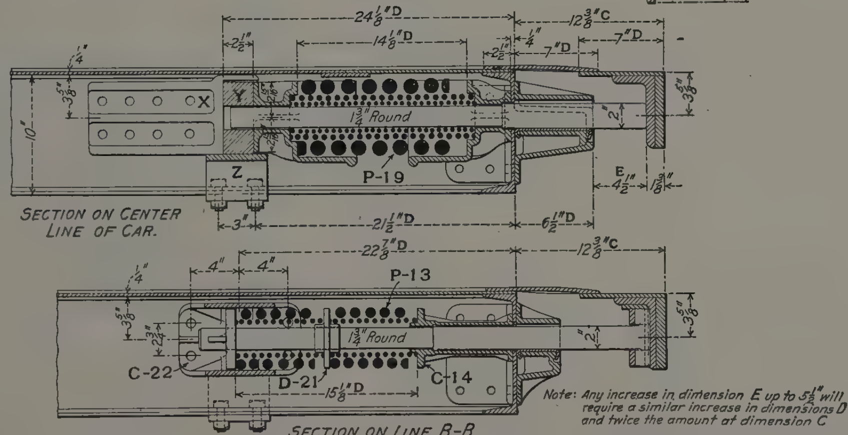


Parts of Standard Steel Buffers, Type F-216 and F-217 for Steel Cars.

2 *Buffer Face Angles*
2 *Buffer Face Plates*
2 *Buffer Tread Plates*
4 *Buffer Stems (side)*
4 *Buffer Stem Keys and Cotters*
4 *Buffer Stem Hinge Plates*
2 *Buffer Stems (center)*
2 *Front Followers D-14*
2 *Back Followers A-18*
2 *Front Spring Cups M-10*
2 *Back Spring Cups M-13*
4 *Washers F-21*
4 *Washers H-21*
2 *Name Plates C-6-27, C-6-28, or to suit*
2 *Chafing Plates*
4 *Cover Plates*
4 *Angle Plates*
4 *Buffer Springs D.C. P-23*
2 *Buffer Springs D.C. P-24*
4 *Buffer Springs D.C. P-25*
2 *Buffer Springs P-26*

Fig. 545—Application of Standard Steel Buffers to Cast Steel Platforms. Standard Coupler Company.



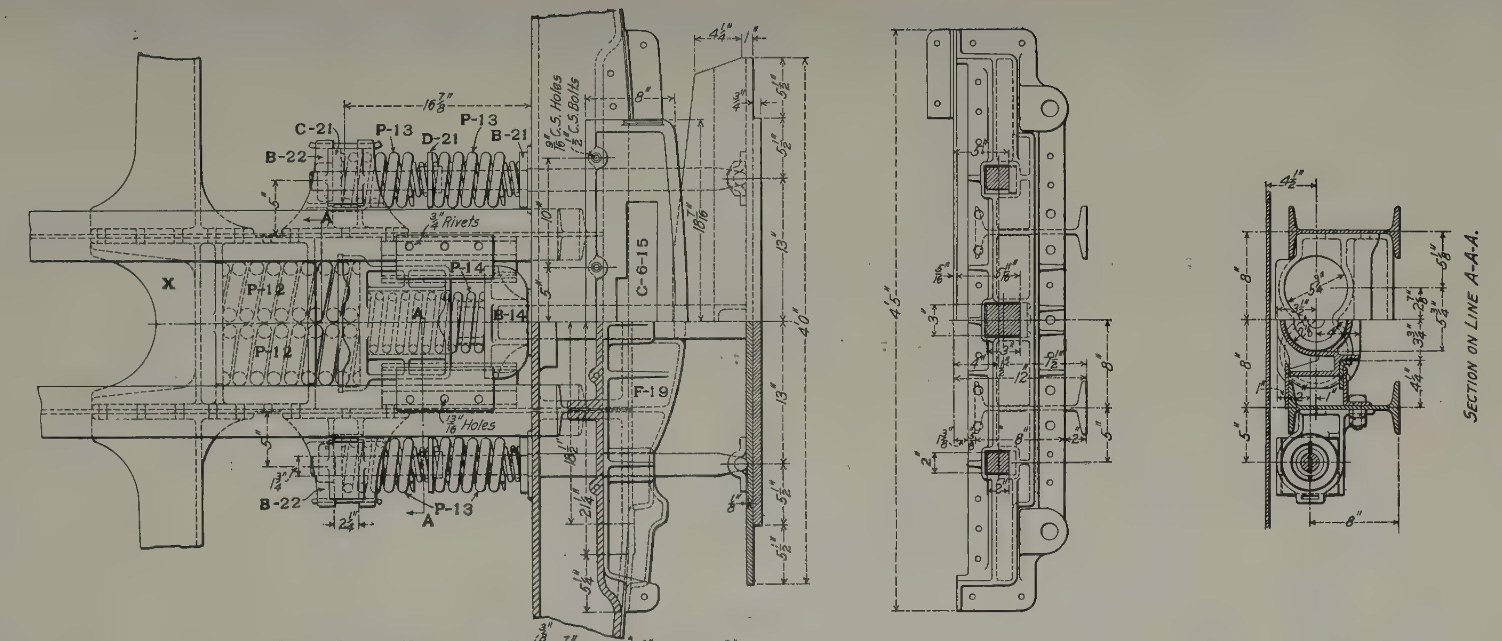


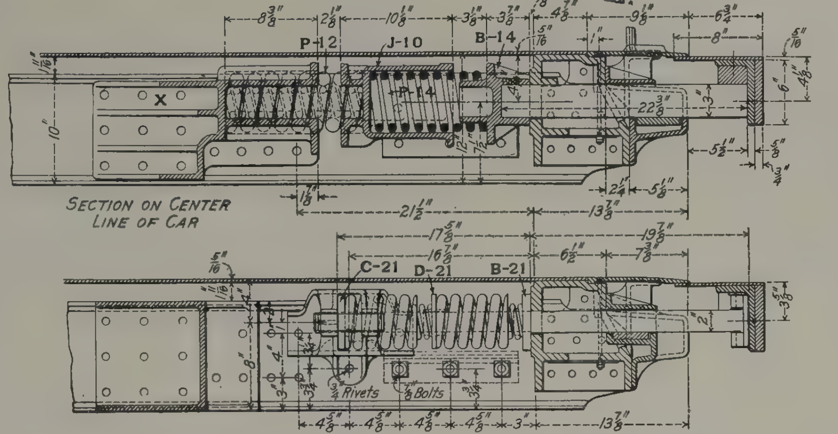
Parts of Standard Steel Platform Buffers Adapted to Steel Cars, Type E-126

2 *Buffer Beam Extensions and Inserts, J-19*
2 *Name Plates, C-6-23*
2 *Front Spring Cups, K-10*
2 *Back Spring Cups, K-13*
4 *Side Stem Brackets with Keys, C-22*
4 *Side Stem Washers, C-21*
4 *Side Stem Washers, D-21*
4 *Side Stem Followers, C-14*
2 *Buffer Center Stems*
2 *Buffer Face Angles*
2 *Buffer Face Angles Plate*
2 *Buffer Tread Plates*
4 *Buffer Side Stems*
4 *Side Stem Keys and Cotters*
4 *Hinge Plates*
8 *Double Coil Buffer Springs, P-13*
2 *Triple Coil Buffer Springs, P-19-A*

Back Stops "X," "Y," "Z," Furnished by Car Builder.

Fig. 546—Standard Steel Platform Buffers for Steel Cars. Standard Coupler Company.



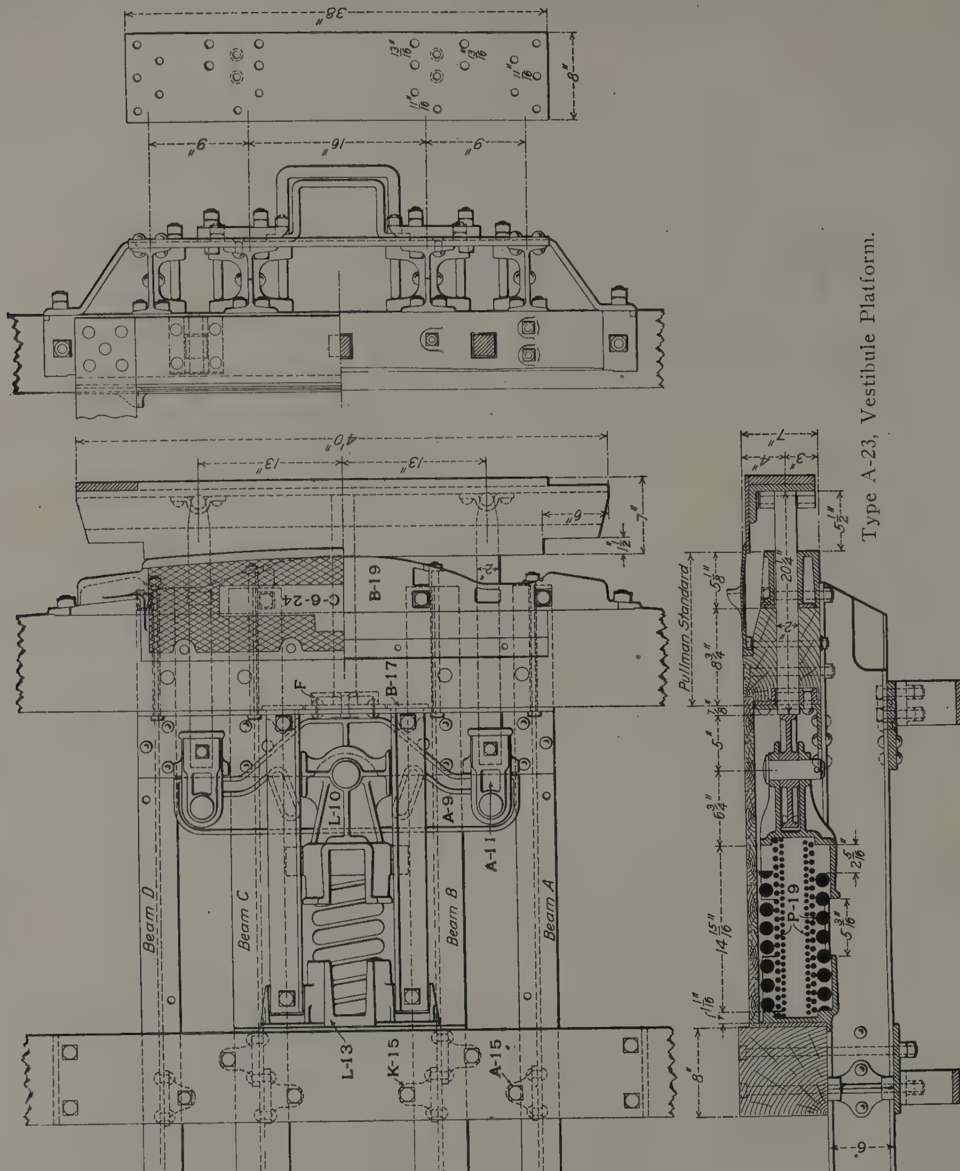


Parts of Standard Steel Platform Buffers Adapted to Steel Cars, Type D-126

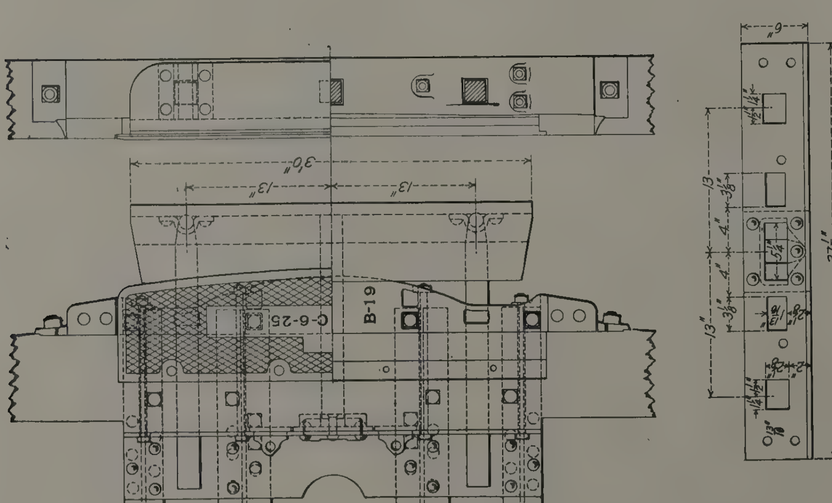
2 *Buffer Beam Extensions with Inserts, F-19*	4 *Buffer Center Stems*
2 *Name Plates, C-6-15*	2 *Buffer Face Angles*
2 *Buffer Spring Followers, B-14*	2 *Buffer Face Plates*
2 *Buffer Spring Casings, J-10*	2 *Buffer Tread Plates*
4 *Side Stem Brackets with Keys, B-22*	4 *Buffer Side Stems*
4 *Side Stem Washers, C-21*	4 *Side Stem Keys and Cotters*
4 *Side Stem Washers, B-21*	4 *Hinge Plates*
4 *Side Stem Washers, D-21*	2 *Single Coil Buffer Springs, P-14*
2 *Buffer Center Stems*	4 *Double Coil Buffer Springs, P-12*
	8 *Double Coil Buffer Springs, P-13*

Back Spring Cups "X" Furnished by Car Builder.

Fig. 547—Standard Steel Platform Buffers for Steel Cars. Standard Coupler Company.



Type A-23, Vestibule Platform.



Type A-25, Open Platform.

Fig. 548—Standard Steel Platforms for Vestibuled and Open End Cars. Standard Coupler Company.

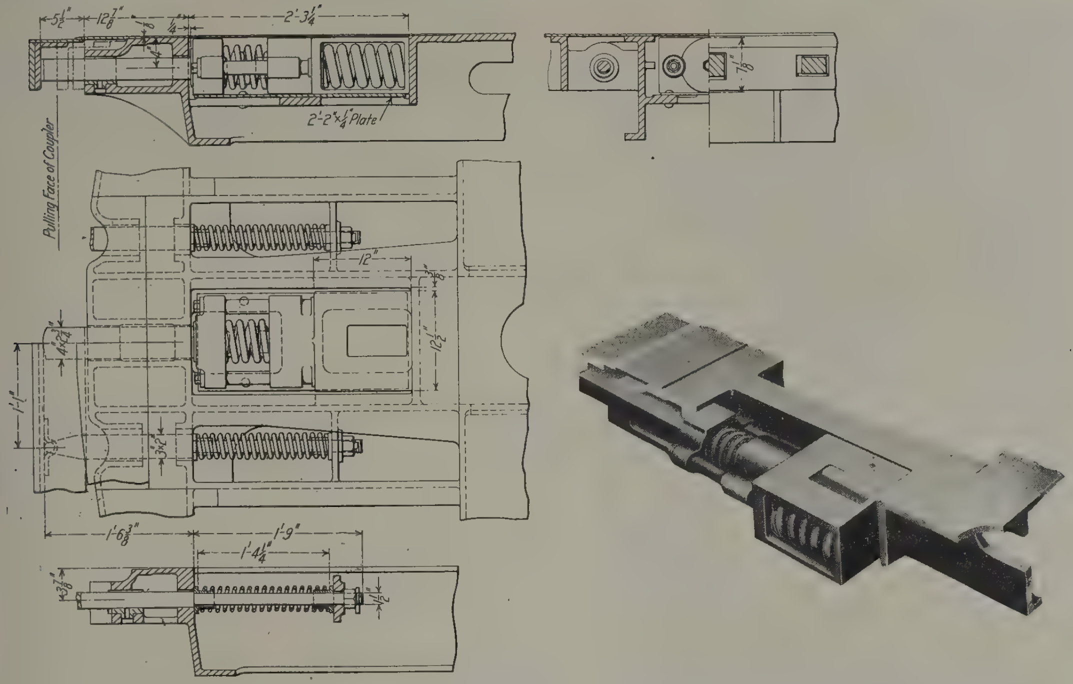


Fig. 549—Miner Friction Buffer for Passenger Equipment with Cast Steel Platforms. W. H. Miner.

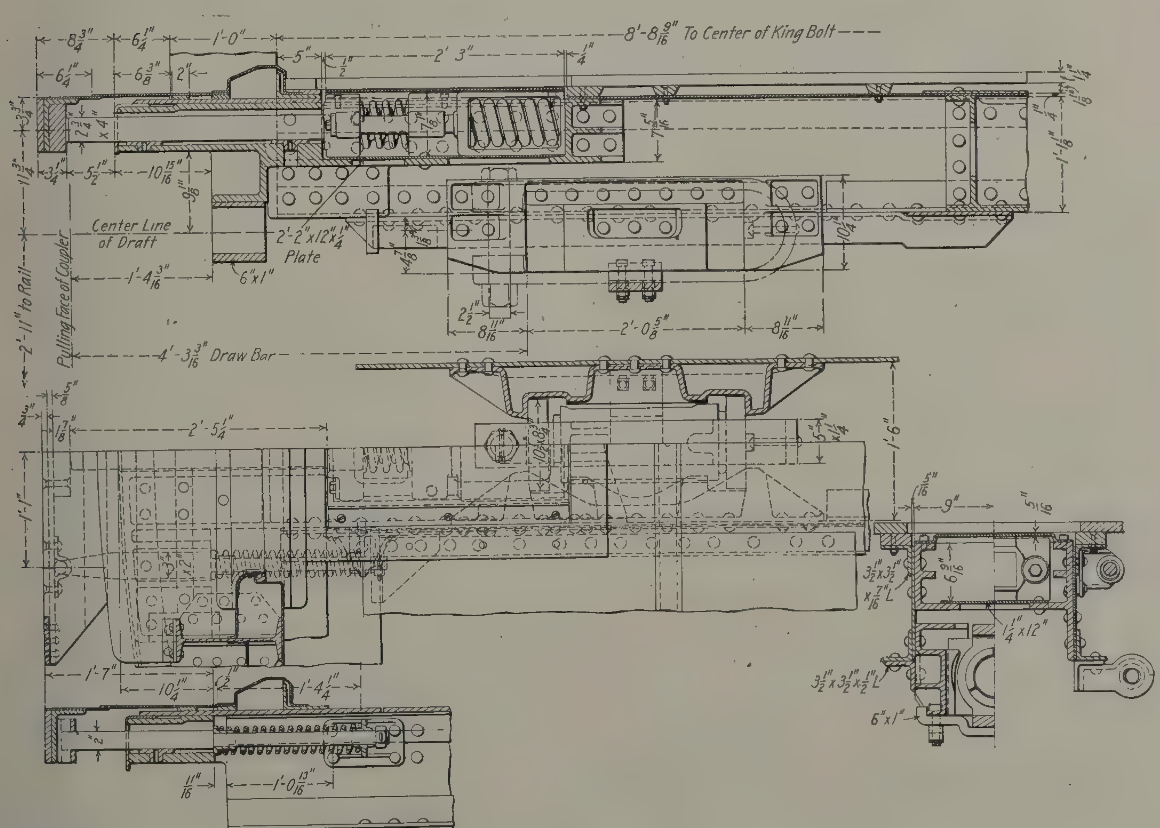


Fig. 550—Miner Friction Buffer and Miner Friction Draft Gear for New York, New Haven & Hartford Steel Baggage Cars. W. H. Miner.

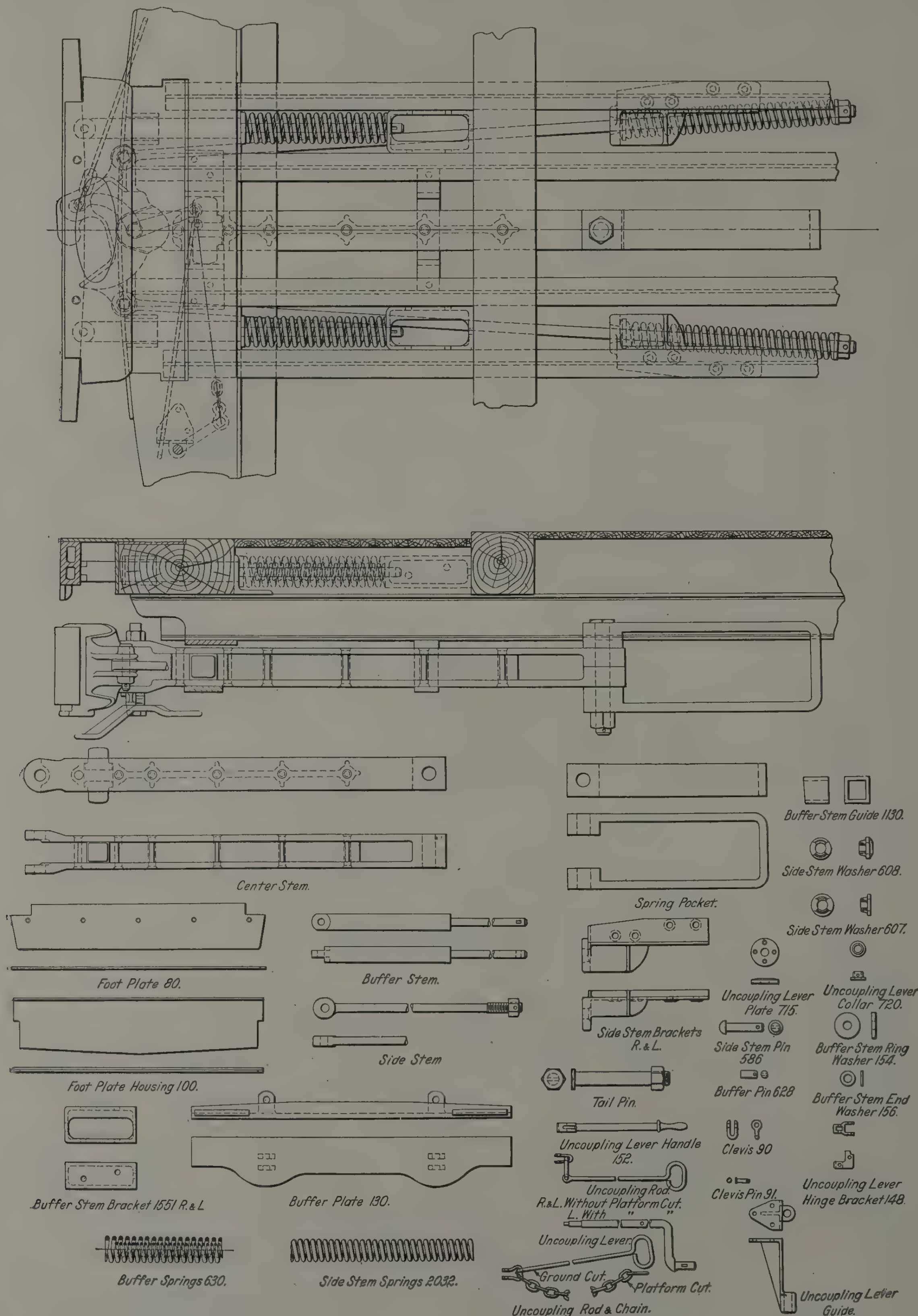


Fig. 551—Buhoup Three-Stem Equipment and Parts for Passenger Train Car Platforms. The McConway & Torley Company.

Parts of Buhoup Wide Vestibule. See Figs. 552-555.

4	*Foot Plate*
6	*Spanner Bar, Lower*
8	*Curtain Plate, Front*
9	*Curtain Plate, Rear*
10	*Curtain Roller*
11	*Curtain*
12NP	*Post Plate, L and R*
20	*Curtain Bearing, Lower*
20A	*Curtain Bearing, Lower, Used with Standard Steel Platform*
21	*Curtain Bearing, Upper*
23	*Curtain Socket*
40	*Patent Plate*
44	*Curtain Spring, L and R*
45	*Curtain Roller Plug*
46	*Arch Plate and Buffer Spring*
49	*Arch Plate Band*
50	*Shield*
52	*Curtain Spring Plug, Large*
53	*Curtain Spring Plug, Small*
54	*Piston Stem*
79	*Buffer Plate for Standard Steel Platform*
80	*Foot Plate for Standard Steel Platform*
81	*Buffer Plate Spring*
91	*Arch Plate*
94	*Spanner Bar, Upper*
95	*Angle Connection, Top, R*
96	*Angle Connection, Top, L*
100	*Foot Plate Housing*
101	*Bulb Angle*
111	*Spanner Bar Bolt*
115	*Angle Connection, Bottom, R*
116	*Angle Connection, Bottom, L*
119	*Piston Stem Bracket*
120	*Piston Stem Guide*
123	*Accordion Hood Band*
124	*Accordion Hood*
125	*Hood Brace Bracket, Front, R*
126	*Hood Brace Bracket, Front, L*
127	*Hood Brace Bracket, Rear, R*
128	*Hood Brace Bracket, Rear, L*
129	*Hood Brace*
130	*Buffer Plate*
134	*Foot Plate Bolt*
154	*Piston Stem Spring*
155	*Piston Stem Washer*
156	*Piston Stem Ferrule*
628	*Buffer Plate Pin*

Fig. 552—Buhoup Wide Vestibule. The McConway & Torley Company.

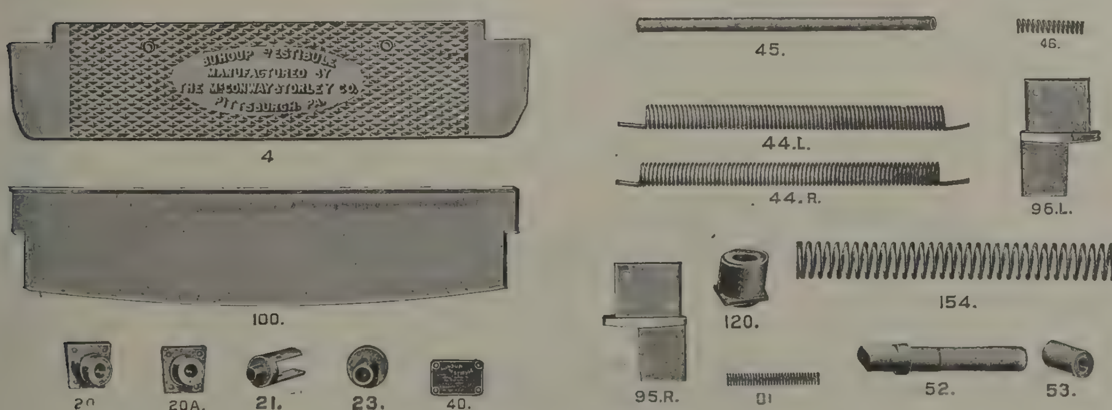


Fig. 553—Details of Buhoup Wide Vestibule. See also Figs. 552, 554 and 555 and Names of Parts on this Page.

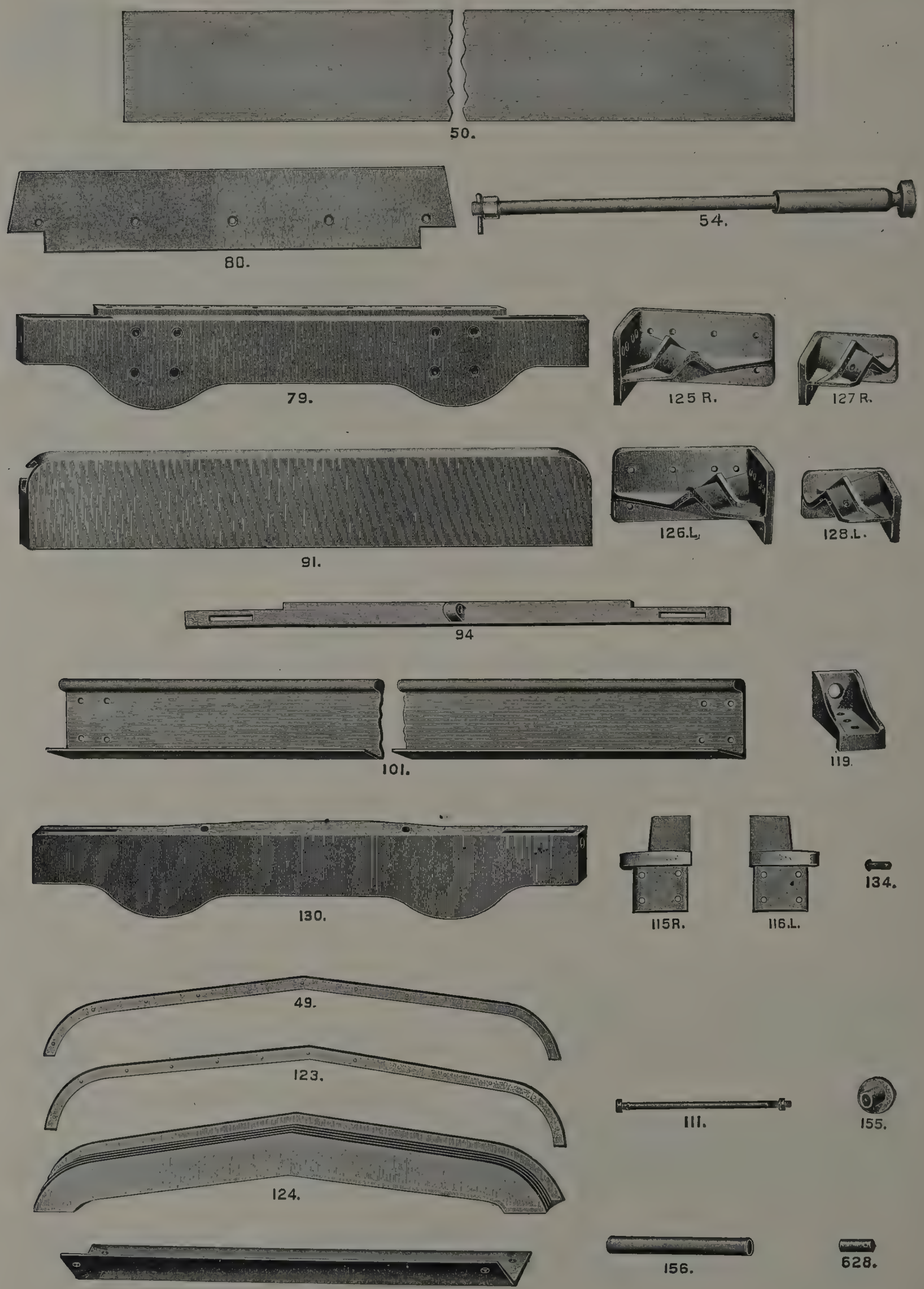


Fig. 554—Details of Buhoup Wide Vestibule. See also Figs. 552, 553 and 555 and Names of Parts on Page 473. The McConway & Torley Company.

Fig. 555—Details of Buhoup Wide Vestibule. See also Figs. 552-554 and Names of Parts on Page 473.

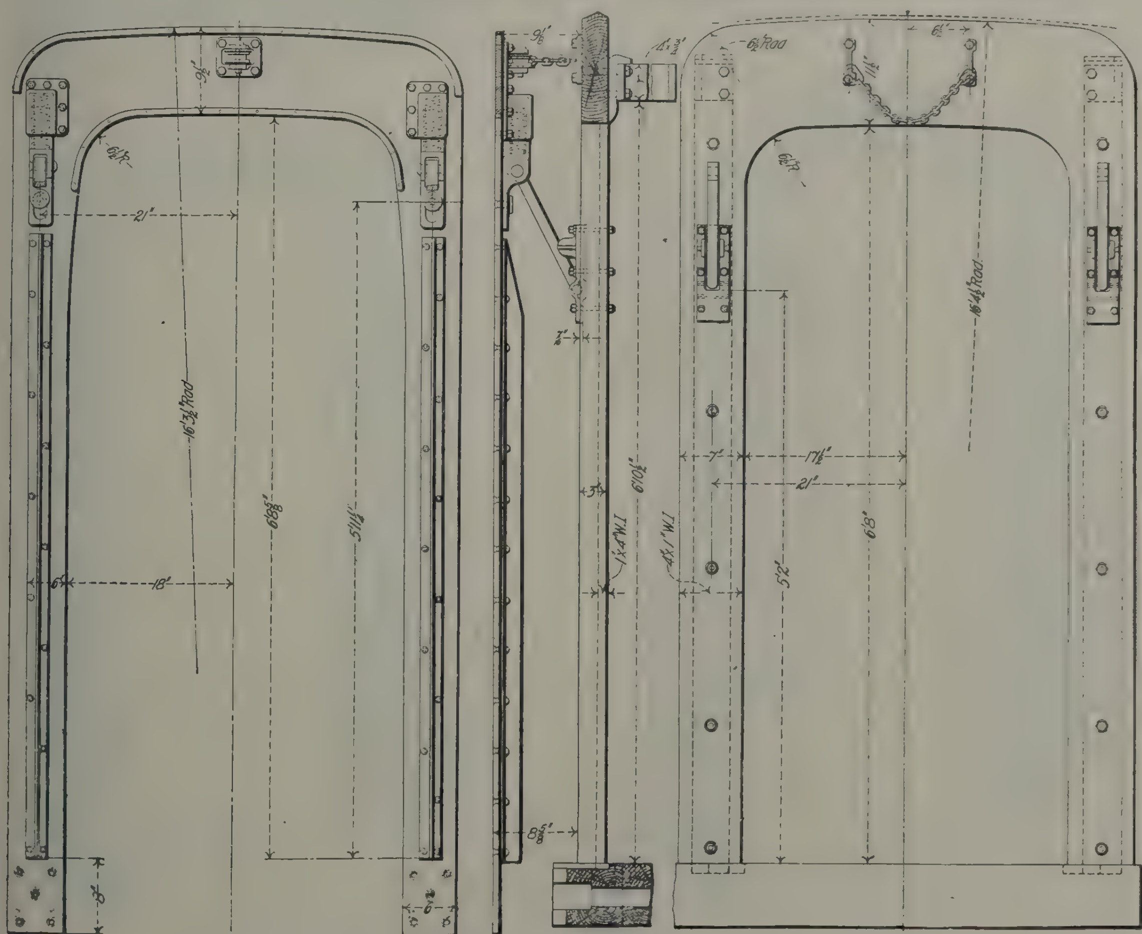


Fig. 556—Gould Vestibule Face Plate. Gould Coupler Company.

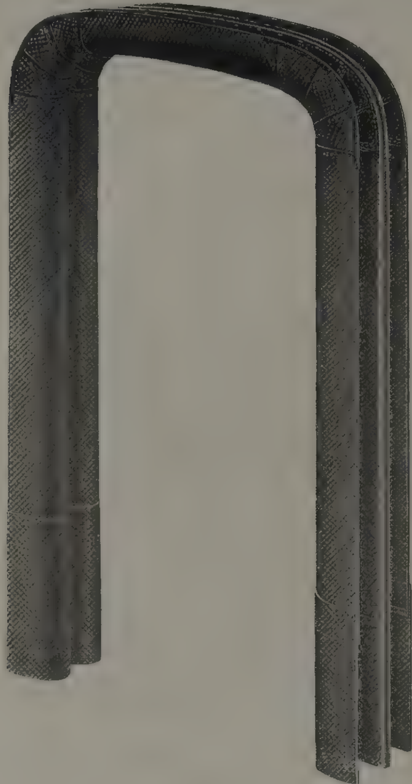


Fig. 557—Dunbar Special "T" Iron Diaphragm.

Fig. 558—Flexible Joint of Dunbar Diaphragm Attachment.

Fig. 559—Acme Vestibule Diaphragm.

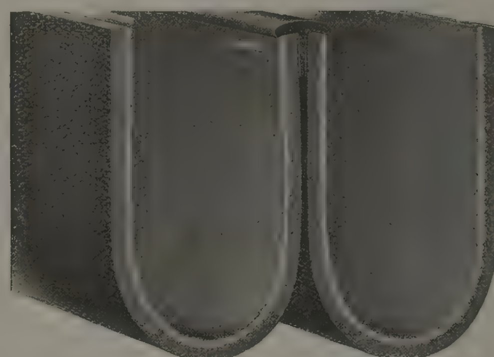


Fig. 560—Section Through Top of Dunbar Special "T" Iron Diaphragm (Double Fold)

Fig. 561—Dunbar Special Apex "T" Iron Diaphragm.

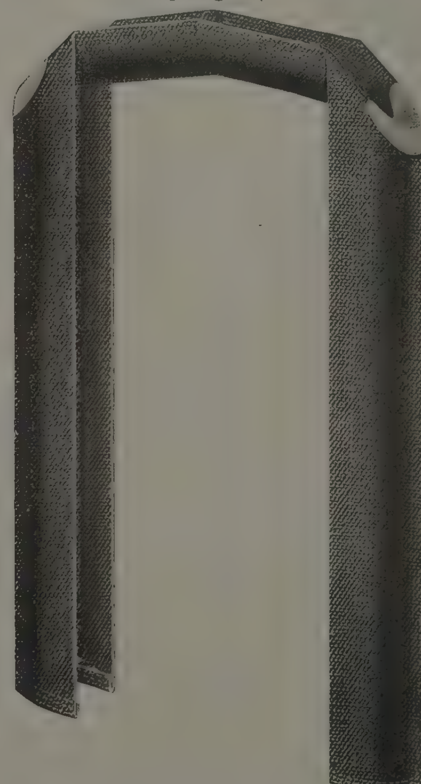


Fig. 562—Dunbar Reverse Unifold Diaphragm.

Dunbar Manufacturing Company.

Fig. 563—Section Through Top and Sides of Rex Diaphragm.

Fig. 564—CSCO Standard Six Plait Vestibule Diaphragm, Fire and Waterproofed.

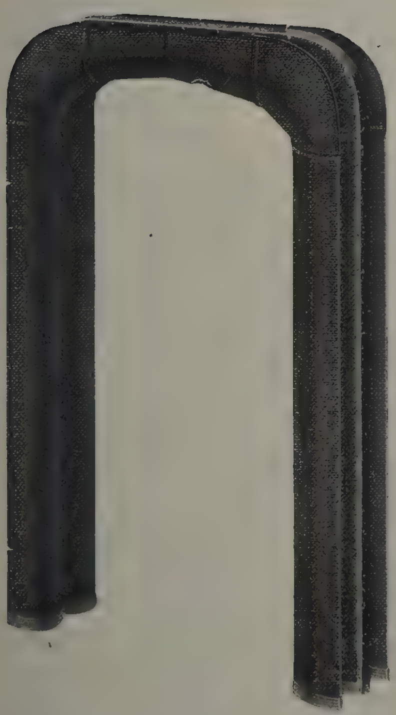


Fig. 565—Rex U-Shape Sloping Top Vestibule Diaphragm, Fire and Waterproofed.

Fig. 566—Rex U-Shape Diaphragms with Open Plait to Swing Out with Face Plates.

Fig. 567—Rex U-Shape Flat Top Vestibule Diaphragm, Fire and Waterproofed.

The Curtain Supply Company.

Fig. 568—Fowler Upper Buffer Spring. Imperial Appliance Company.

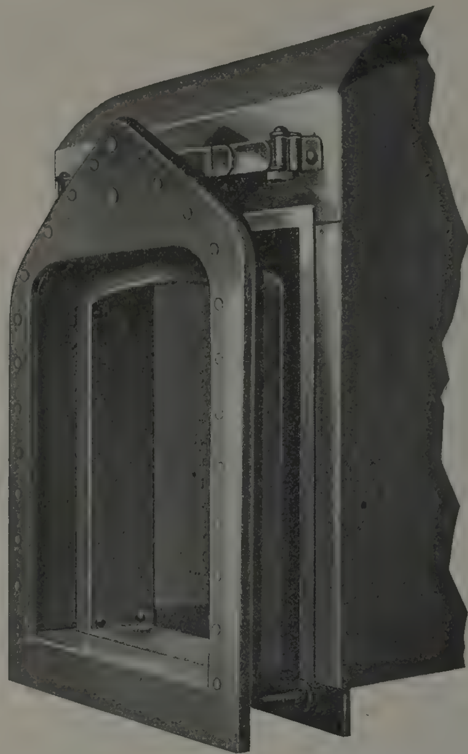


Fig. 570—Rex Steel Vestibule Diaphragm and Rex Upper Buffer Spring. Curtain Supply Company.

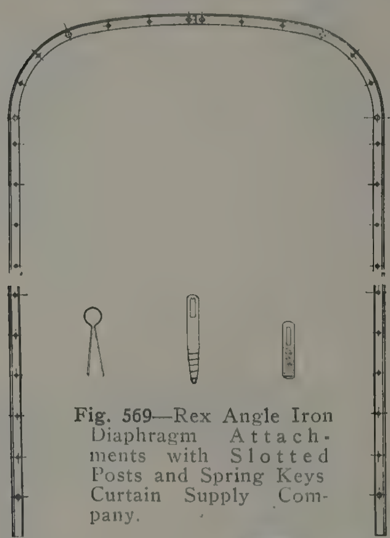


Fig. 569—Rex Angle Iron Diaphragm Attachments with Slotted Posts and Spring Keys Curtain Supply Company.

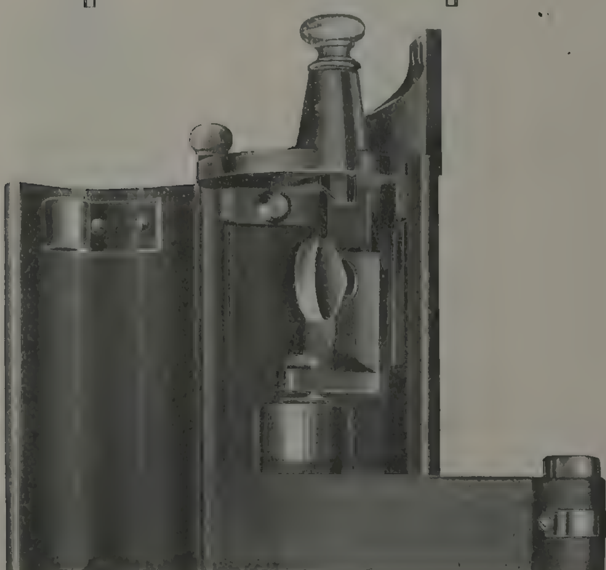


Fig. 571—Rex Opening Shield for Vestibule Curtains with Adjustable Roller Brackets. Curtain Supply Company.

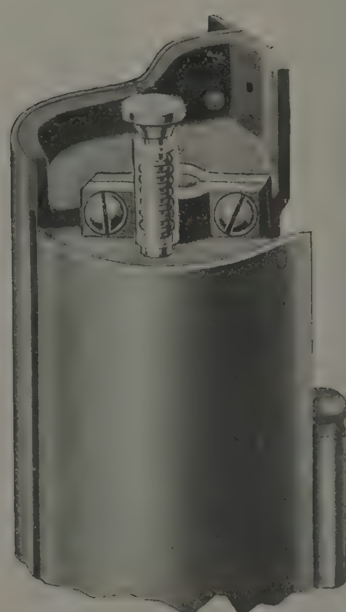


Fig. 572—Acme Revolving Vestibule Curtain Shield; Top View of Casing with Revolving Shield Closed. Dunbar Manufacturing Company.

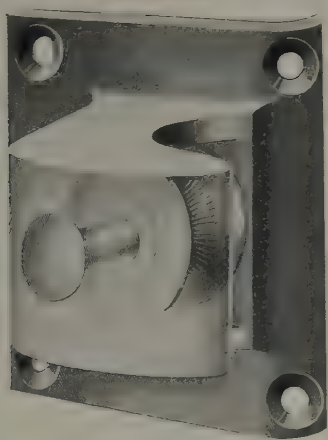


Fig. 573—Vestibule Curtain Hook for Wood Posts. The Curtain Supply Company.

Fig. 574—Vestibule Curtain Hook for Steel Posts. The Curtain Supply Company.

Fig. 575—Ajax Adjustable Vestibule Curtain Fixtures. The Q & C Company.

Fig. 576—Rex All - Metal Roller Reinforced for Vestibule Curtains.

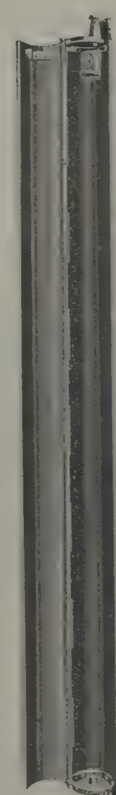


Fig. 577—Rex Opening Shield for Vestibule Curtains.

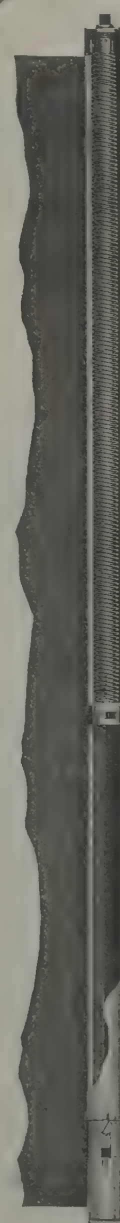


Fig. 578—Rex All - Metal Roller with Steel Barrel and Depressed Groove.

The Curtain Supply Company.

Fig. 579—Acme Vestibule Type C Curtain Handle.

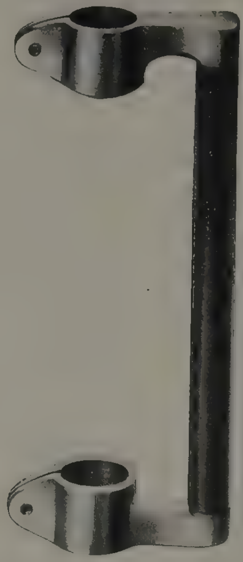


Fig. 580—Acme Vestibule Type B Curtain Handle.

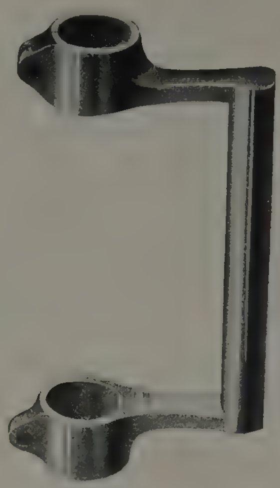


Fig. 581—Acme Vestibule Type A Curtain Handle.

Dunbar Manufacturing Company.

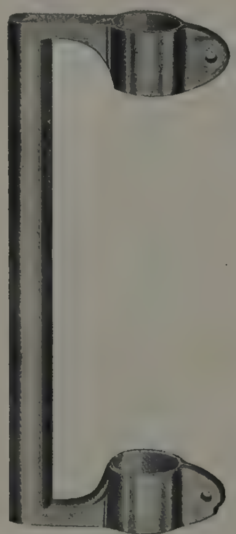


Fig. 582—Solid Handle, No. 5, for Vestibule Curtains. Curtain Supply Company.

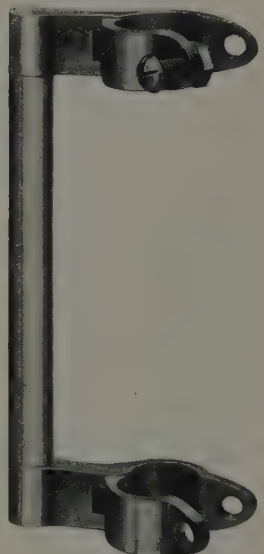


Fig. 582A—Solid Vestibule Curtain Handle, No. 6, with Swivel Attaching Clamps. Curtain Supply Company.

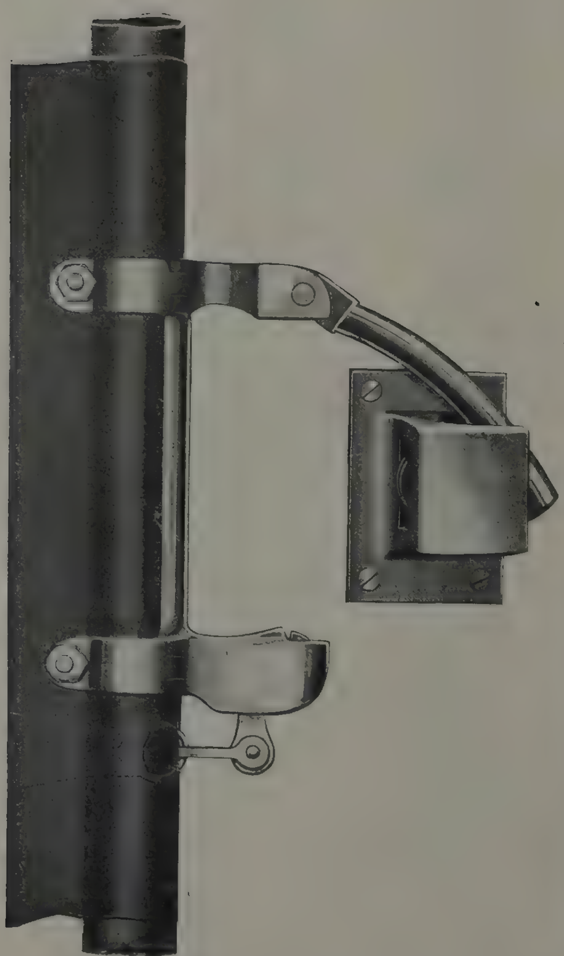


Fig. 583—Rex Automatic Release Handle for Vestibule Curtains. Curtain Supply Company.

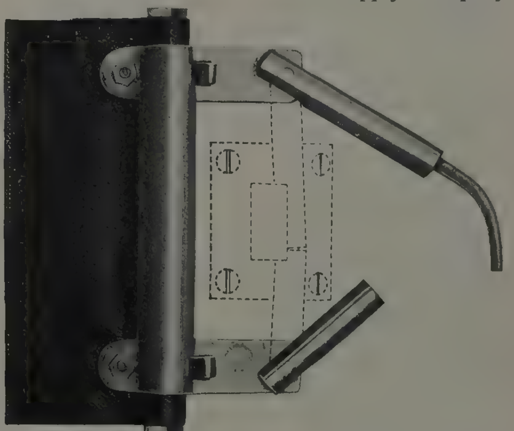


Fig. 584—Rycco Vestibule Curtain Release Handle, Open. Railway Supply & Curtain Company.

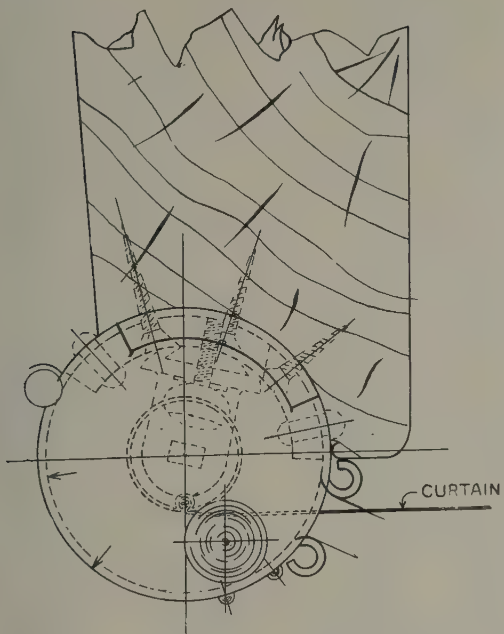


Fig. 585—Typical Application of Rex Opening Shield with Wood Posts. Curtain Supply Company.

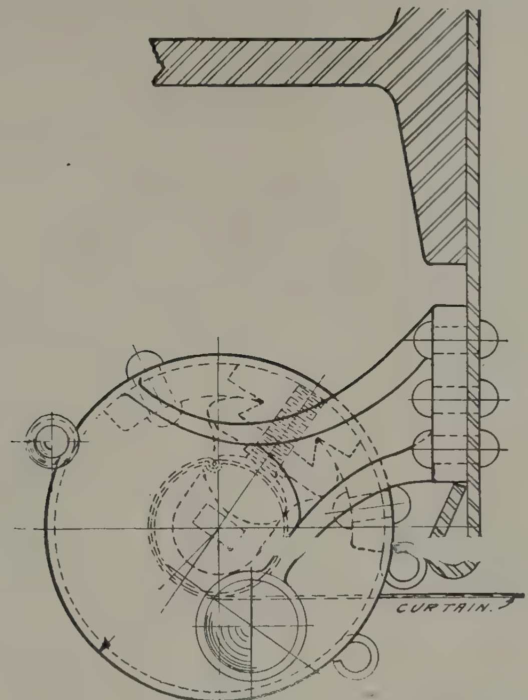


Fig. 586—Typical Application of Rex Opening Shield with Steel Posts. Curtain Supply Company.

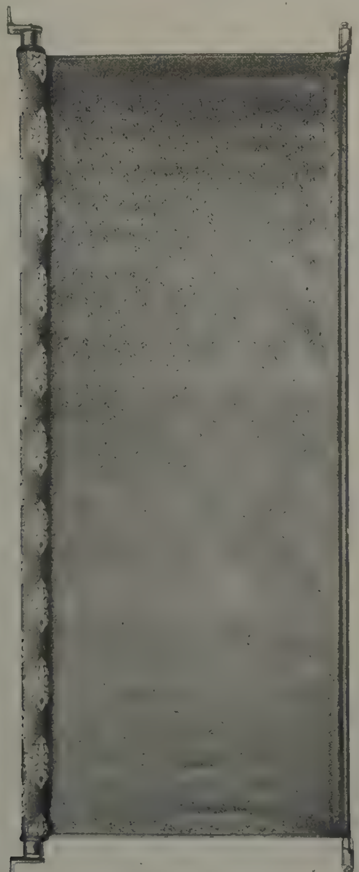


Fig. 587—Sliding Door Curtain. Railway Supply & Curtain Company.

Fig. 588—Rex Vestibule Curtain Outfit Complete. Curtain Supply Company.

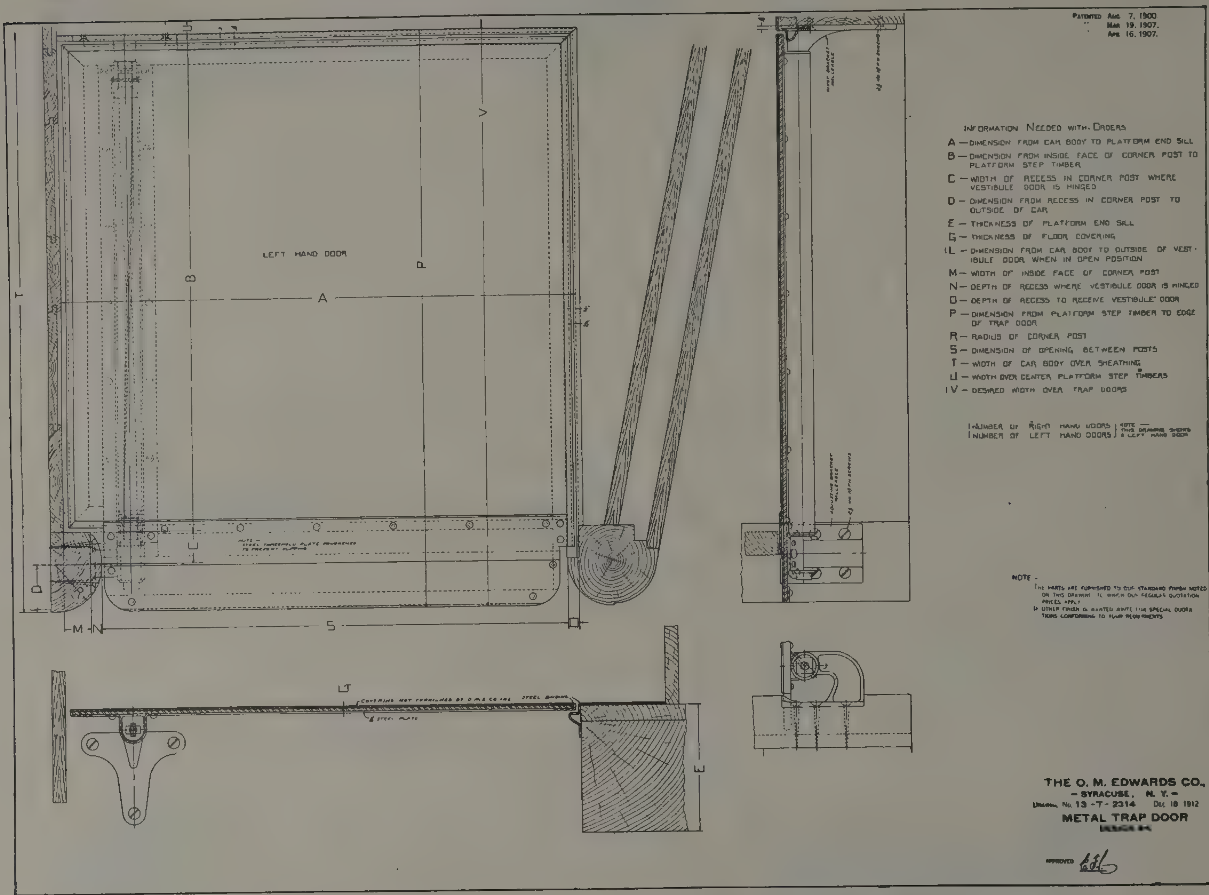


Fig. 589—Edwards Trap Door for Elevated Station Platforms. O. M. Edwards Company.

Fig. 590—Edwards Metal Trap Door for Elevated Station Platforms; Door Open.

Fig. 591—Edwards Metal Trap Door for Elevated Station Platforms; Door Closed.

O. M. Edwards Company.

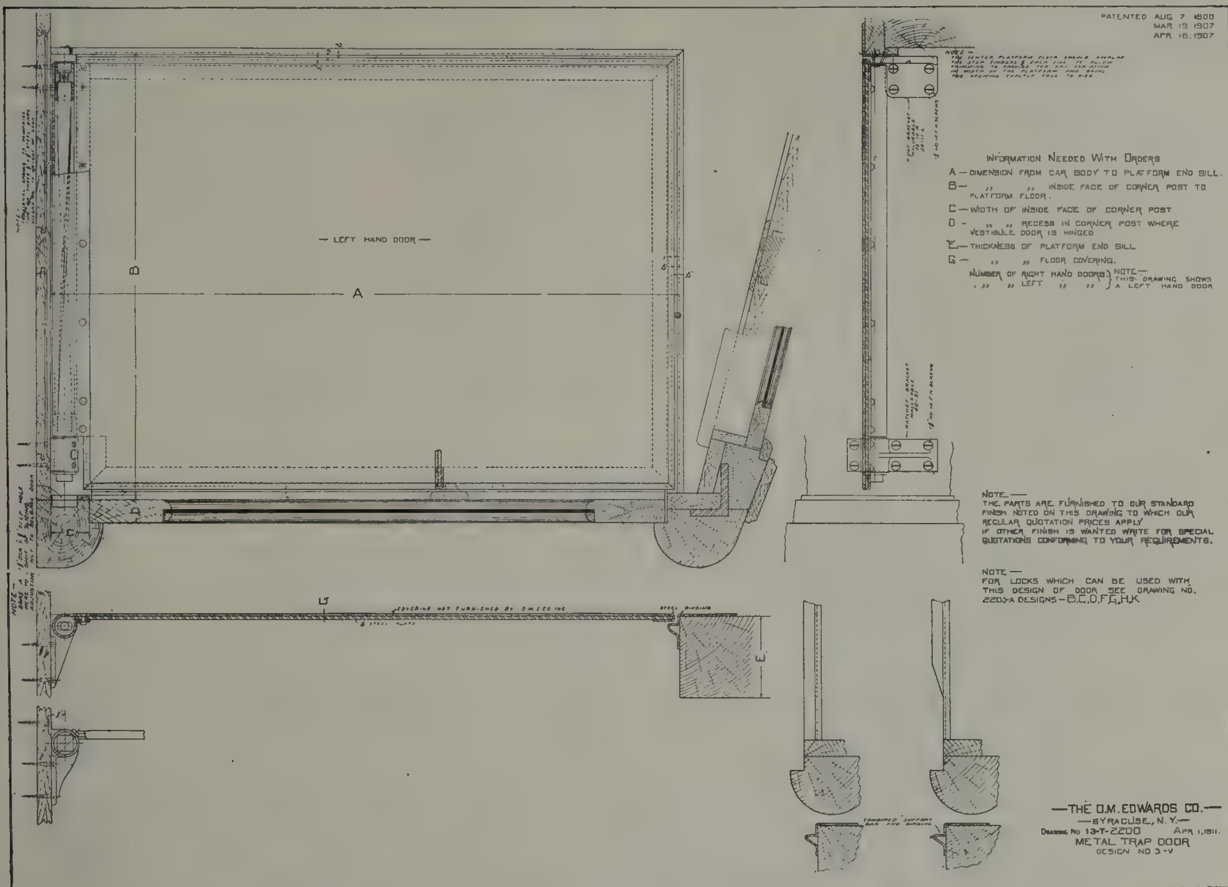


Fig. 592—Edwards Metal Trap Door for Grade Level Platforms. O. M. Edwards Company, Inc.

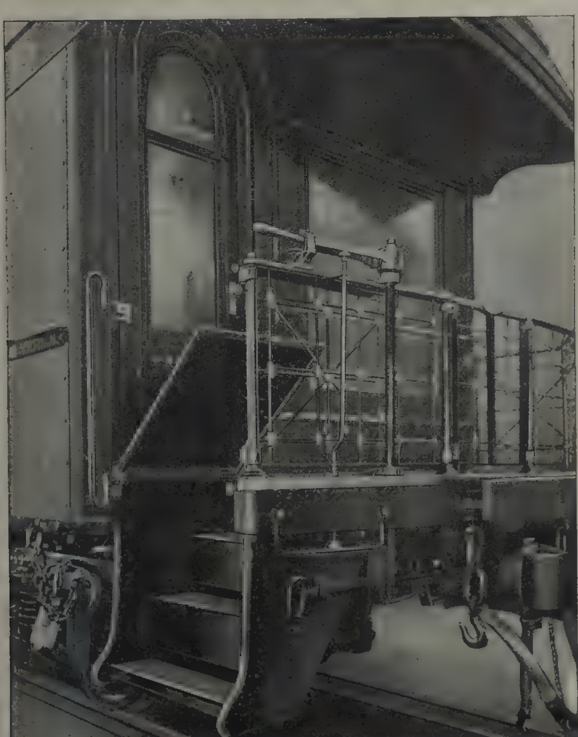


Fig. 593—Edwards Trap Door, Design 3-0, Applied to Observation Platform. O. M. Edwards, Inc.

Fig. 594—Edwards Metal Trap Door, Grade Level Type. O. M. Edwards Company, Inc.

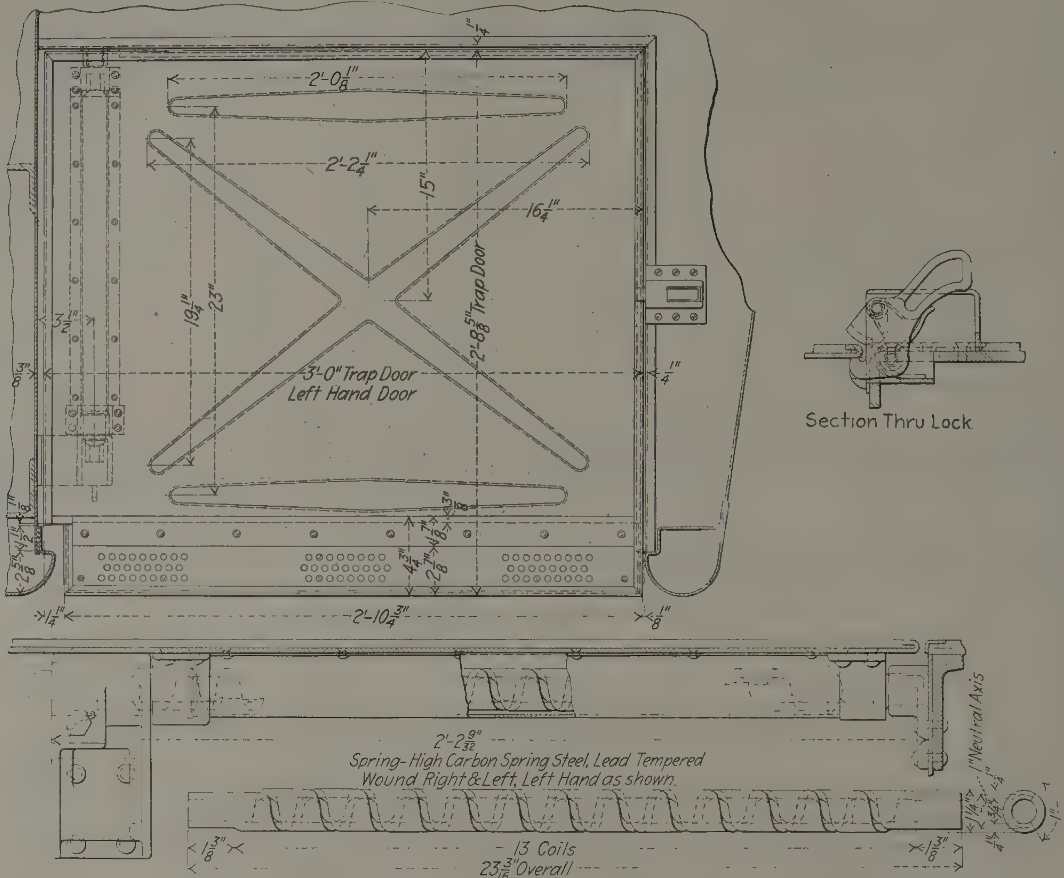


Fig. 595—Universal Trap Door and Lifting Device. Tuco Products Corporation.

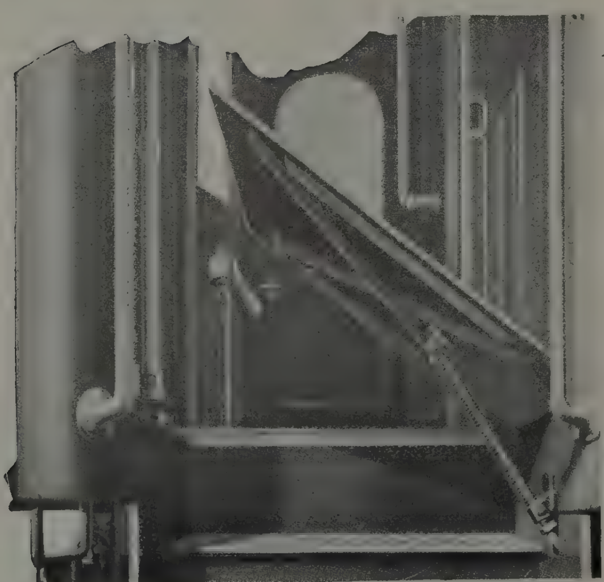


Fig. 596—National Steel Trap Door, Grade Level Platform Type. Tuco Products Corporation.

Fig. 597—National Steel Trap Door and Lifting Device, with Door Raised to 45 Degrees. Tuco Products Corporation.

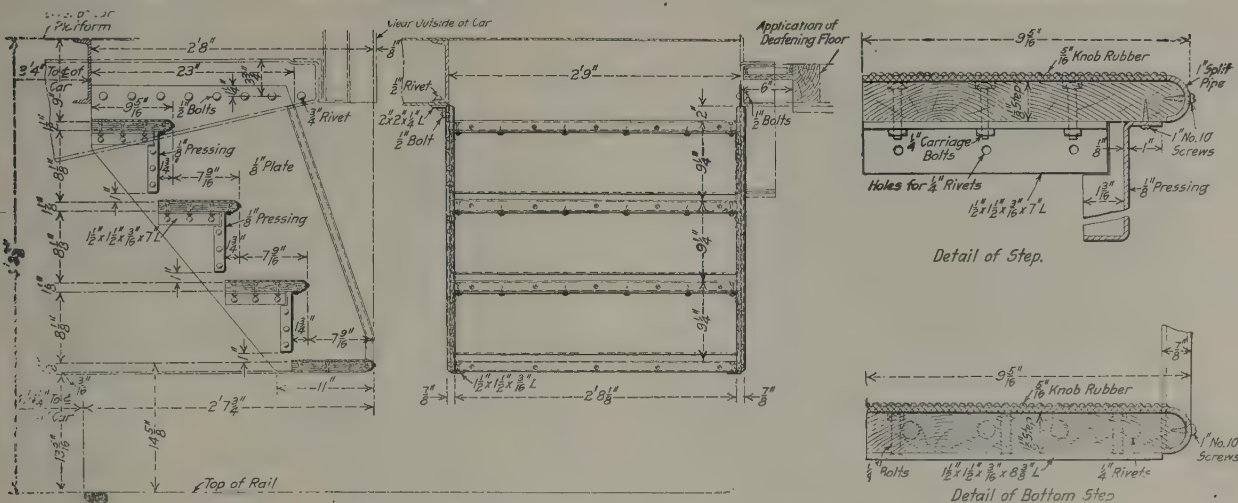


Fig. 598—Four-Tread Coach Step Used on the Grand Trunk.

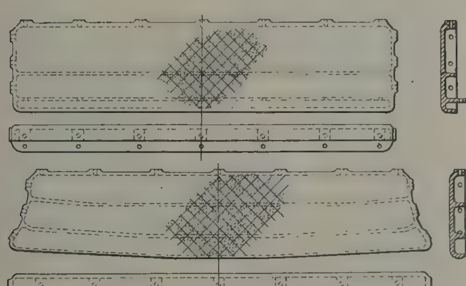


Fig. 599—Feralun Safety Treads. Pennsylvania Railroad.

Fig. 600—Feralun Safety Tread Applied to Car Steps.

American Abrasive Metals Company.

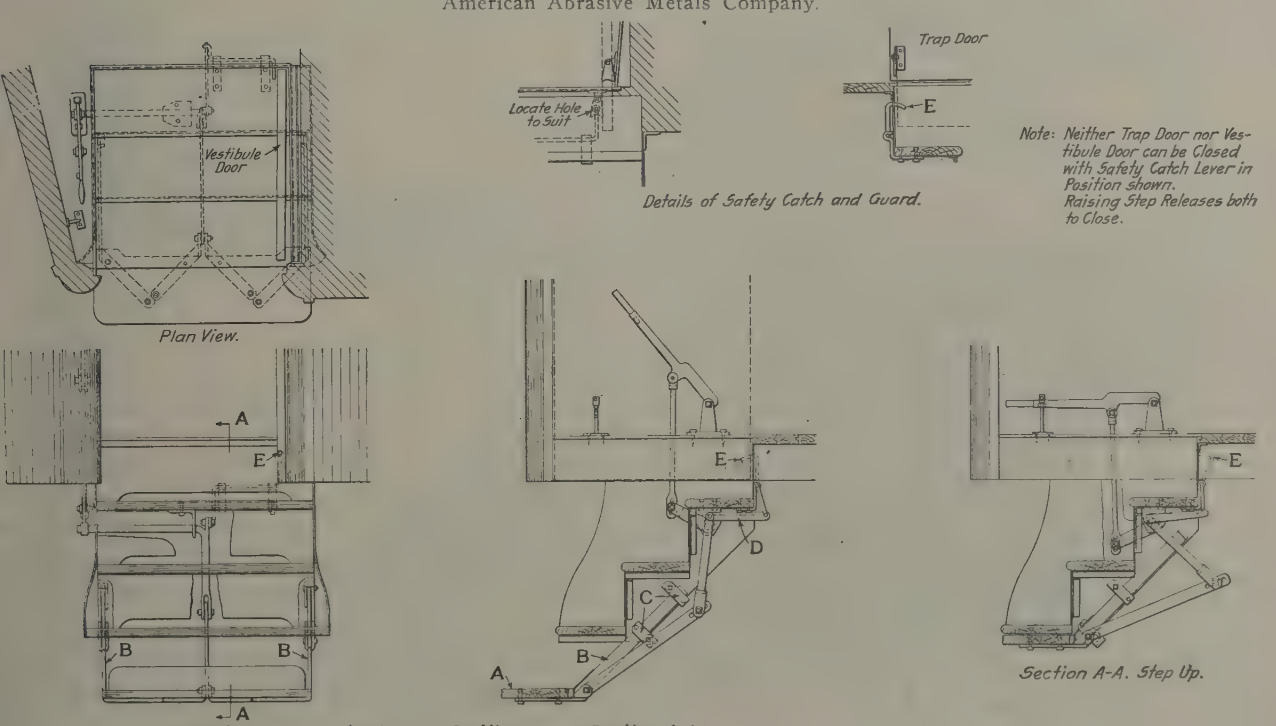


Fig. 601—"Rodenbur" Extension Step for Duluth, Missabe & Northern Passenger Cars.

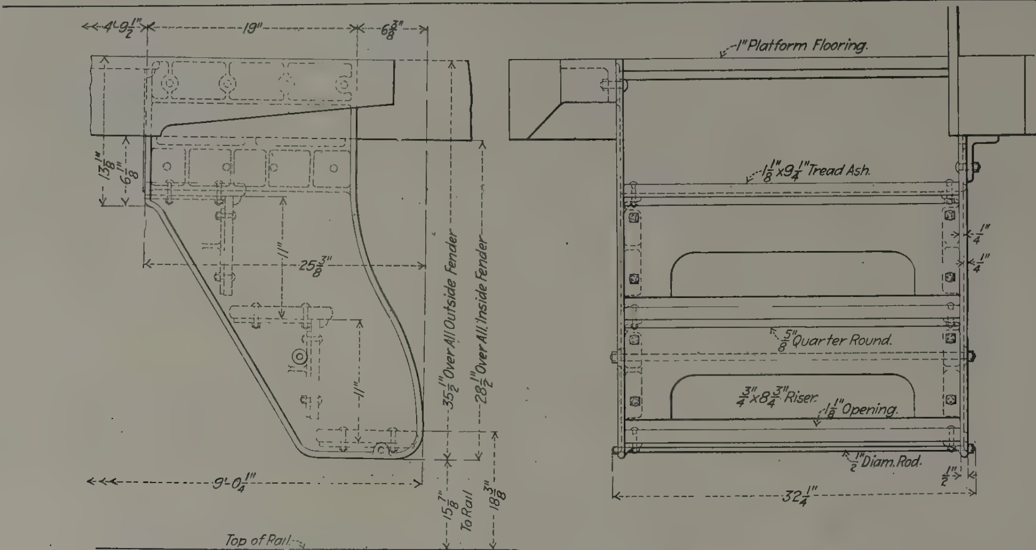


Fig. 603—Central Railroad of New Jersey Passenger Car Step with Malleable Iron Fenders.

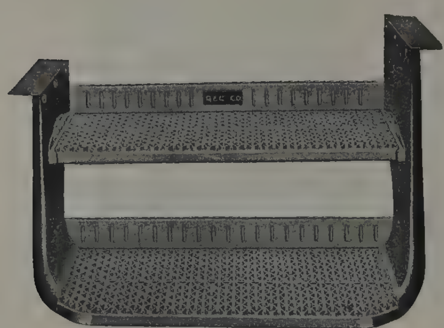
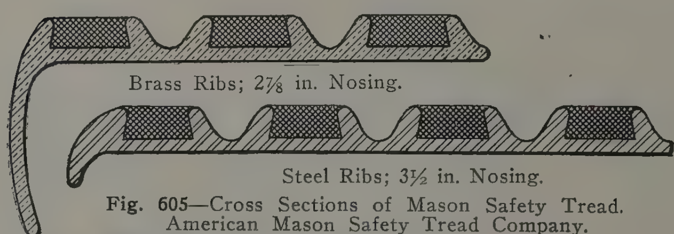


Fig. 604—Stanwood Self-Cleaning, Non-Slipping, Double Car Step. American Mason Safety Tread Company.

Fig. 604A—Stanwood Self-Cleaning, Non-Slipping, Triple Car Step. American Mason Safety Tread Company.



Brass Ribs; 2⅞ in. Nosing.

Steel Ribs; 3½ in. Nosing.

Fig. 605—Cross Sections of Mason Safety Tread. American Mason Safety Tread Company.

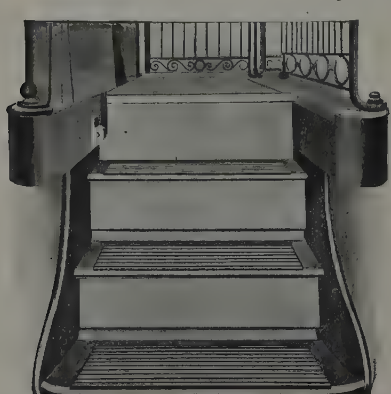


Fig. 606—Mason Safety Tread Applied to Steps of Pullman Car. American Mason Safety Tread Company.

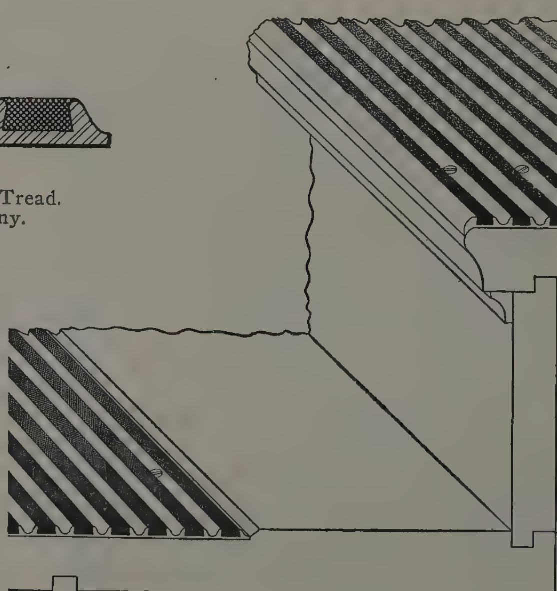


Fig. 607—Mason Safety Tread Applied to Wooden Car Steps. Upper Tread Carborundum Filled; Lower Tread Lead Filled. American Mason Safety Tread Company.

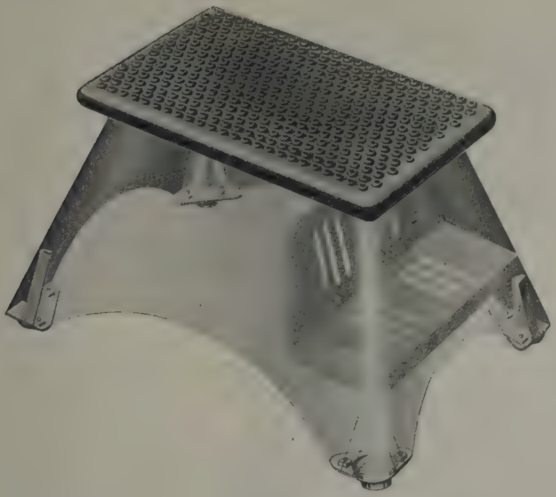


Fig. 608—Dunbar Safety Step Box Furnished with or without Compartment. Dunbar Manufacturing Company.

Fig. 609—Steel Step Equipped with Kass Safety Treads. Dunbar Manufacturing Company.

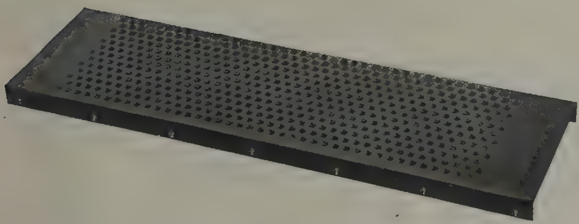


Fig. 610—Kass Safety Tread with Straight Drop Front and Back. Dunbar Manufacturing Company.

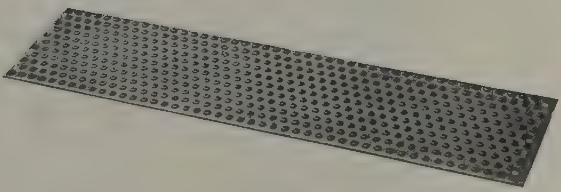


Fig. 611—Kass Safety Tread Step for Application to Steps Now in Service. Dunbar Manufacturing Company.

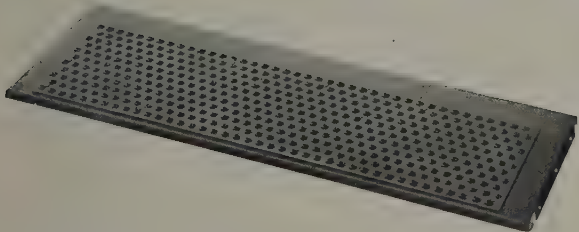


Fig. 612—Kass Safety Tread Step with Round Nose. Dunbar Manufacturing Company.

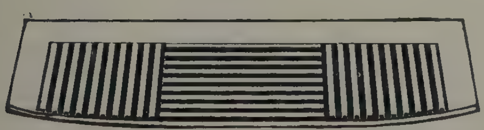


Fig. 613—Universal Safety Tread. Universal Safety Tread Company.

Fig. 614—Firmtread Steel Floor Plate for Vestibule Car Steps, Running Boards, etc. Joseph T. Ryerson & Sons.

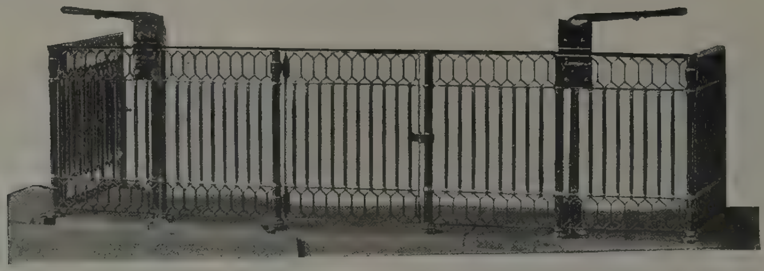


Fig. 615—Observation Platform Railing. Adams & Westlake Company.

Fig. 616—Observation Platform Railing. Adams & Westlake Company.

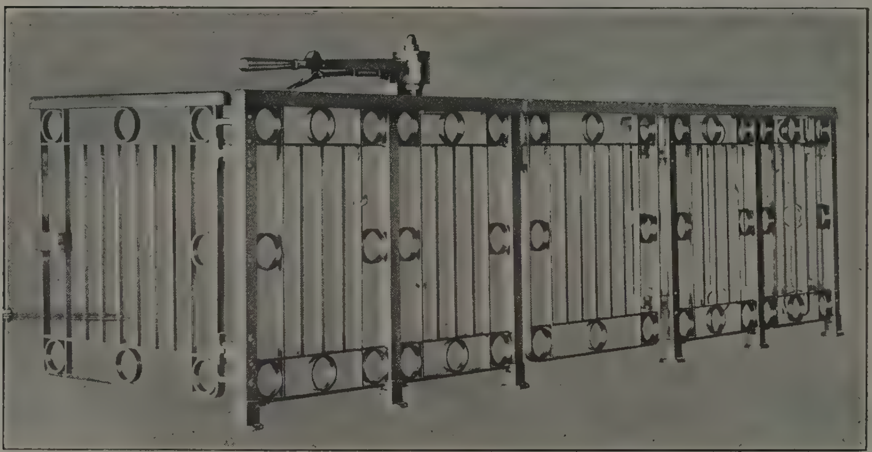


Fig. 617—Observation Platform Railing. James L. Howard Company.

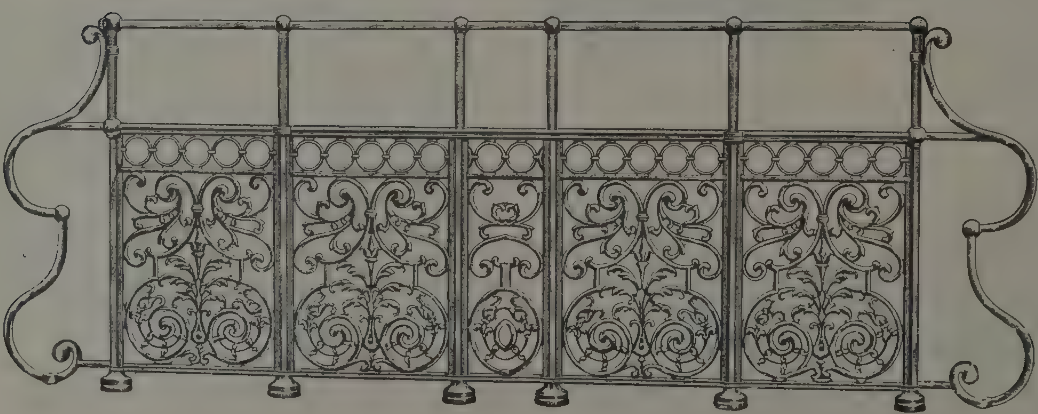


Fig. 618—Platform End Railing. Dayton Manufacturing Company.

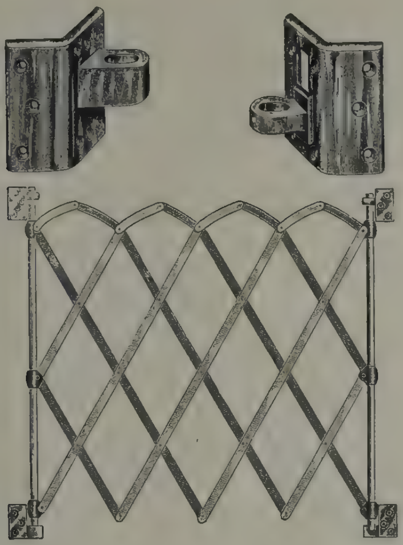


Fig. 619—Tail Gate and Fixtures. Dayton Manufacturing Company.

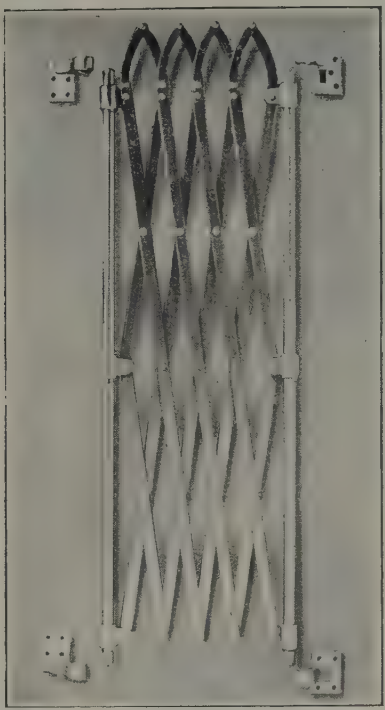


Fig. 620—Standard Tail Gate and Brackets for New York, New Haven & Hartford. James L. Howard & Company.

Fig. 621—Platform Gate Panel. Adams & Westlake Company

Fig. 622—Tail Gate Sockets. Adams & Westlake Company.

Fig. 623—Folding Tail Gate. Dunbar Manufacturing Company.

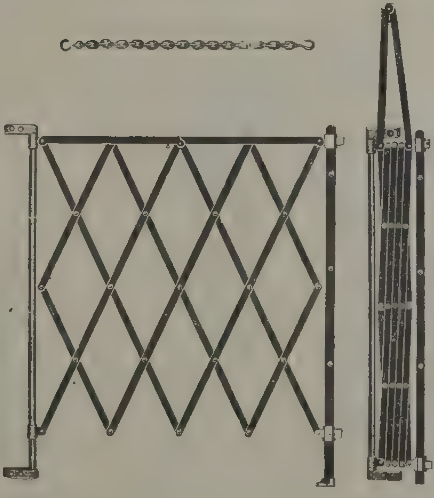


Fig. 624—Folding Platform Tail Gate. Adams & Westlake Company.

Fig. 625 — Drop Brake Handle. Dayton Manufacturing Company.

Brake Handle Parts—Fig. 626

15-A	*Handle Lever*
15-B	*Cap*
15-C	*Trigger with Pin*
15-D	*Floor Ratchet*
15-E	*Foot Pawl*
15-F	*Pawl Connection*
15-G	*Shaft Nut*
15-H	*Bracket for Vestibule Cars*
15-I	*Floor Plate*
15-J	*Shaft for Vestibule Cars or Open Platform Cars*
15-K	*Lever Ratchet*
15-L	*Handle Bumper*
15-M	*Chain Sleeve*
15-O	*Trigger Rod*
15-P	*Pawl Pin with Cotter*
15-Q	*Spring*
15-R	*Washer*
15-S	*Rod Pin with Cotter*
15-T	*Bracket Latch Strike with Pin*
15-U	*Bracket with Strike for Open Platform Cars*
15-V	*Handle Stop for Open Platform Cars*
15-W	*Lever Pawl*

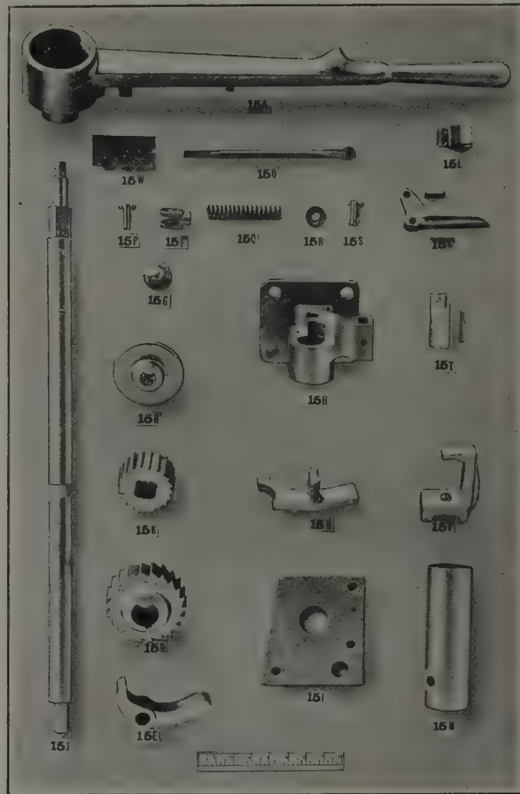


Fig. 626—Lindstrom Hand Brake. James L. Howard & Company.

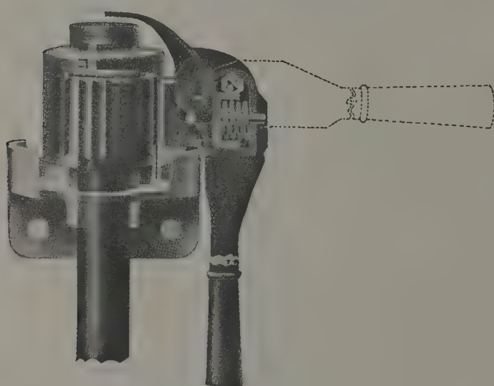


Fig. 627 — Improved Lindstrom Brake. Robert H. Blackall.

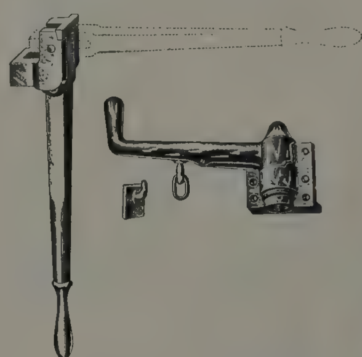


Fig. 628—Brake and Uncoupling Levers. Dayton Manufacturing Company.

Fig. 629—Type B Acme Brake for Vestibule and Dummy End Cars. Pittsburgh Railway Appliance Company.

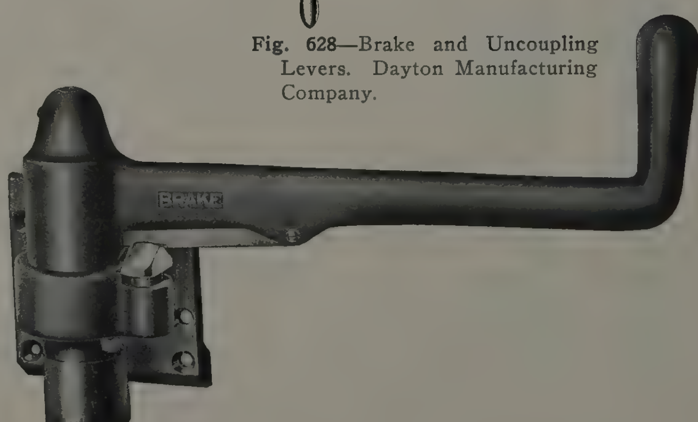


Fig. 630—Brake Handle. Adams & Westlake Company.

Fig. 631 — Brake Rod Floor Plate.

Fig. 632 — Uncoupling Rod Guide.

Fig. 633 — Uncoupling Rod Foot.

Adams & Westlake Company.

Fig. 634 — Trap Door Holders.

Fig. 635—Inside Hand Rail.

Fig. 636—Uncoupling Rod Guide.

Adams & Westlake Company.

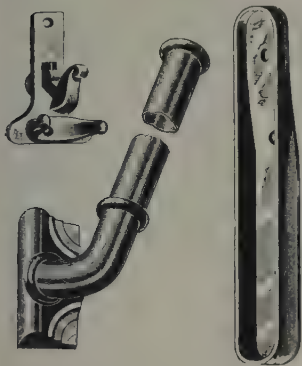


Fig. 637—Door Guard Drop Rod Catch and Pocket. Dayton Manufacturing Company.

Fig. 638—Door Holder.

Fig. 639—Mat Hook. Adams & Westlake Company.

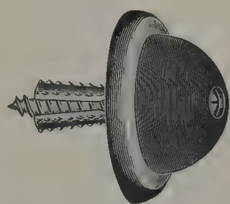


Fig. 640—Door Bumper. Russell & Erwin Manufacturing Company.

Fig. 641 — Trainman's Vestibule step. Adams & Westlake Company.

Fig. 642—Trap Door Bumper.

Fig. 643—Swinging Guard Rail. James L. Howard & Company.

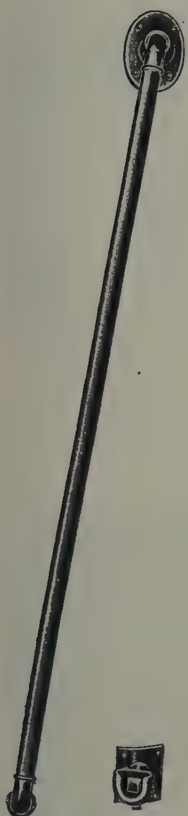


Fig. 644 — Vestibule Guard Rail and Fittings. Adams & Westlake Company.

Fig. 645—Trap Door Latch Operating Rod. Dayton Manufacturing Company.

Fig. 646—Corner Post Grab Handle. Adams & Westlake Company.

Fig. 647—Rod for Operating Trap Door Latch from Below Platform. Dayton Manufacturing Company.

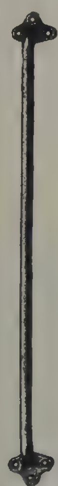


Fig. 648—Corner Post Grab Handle. Adams & Westlake Company.

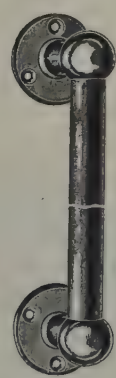
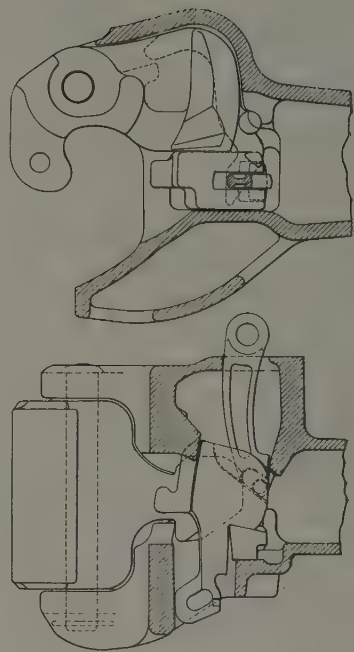
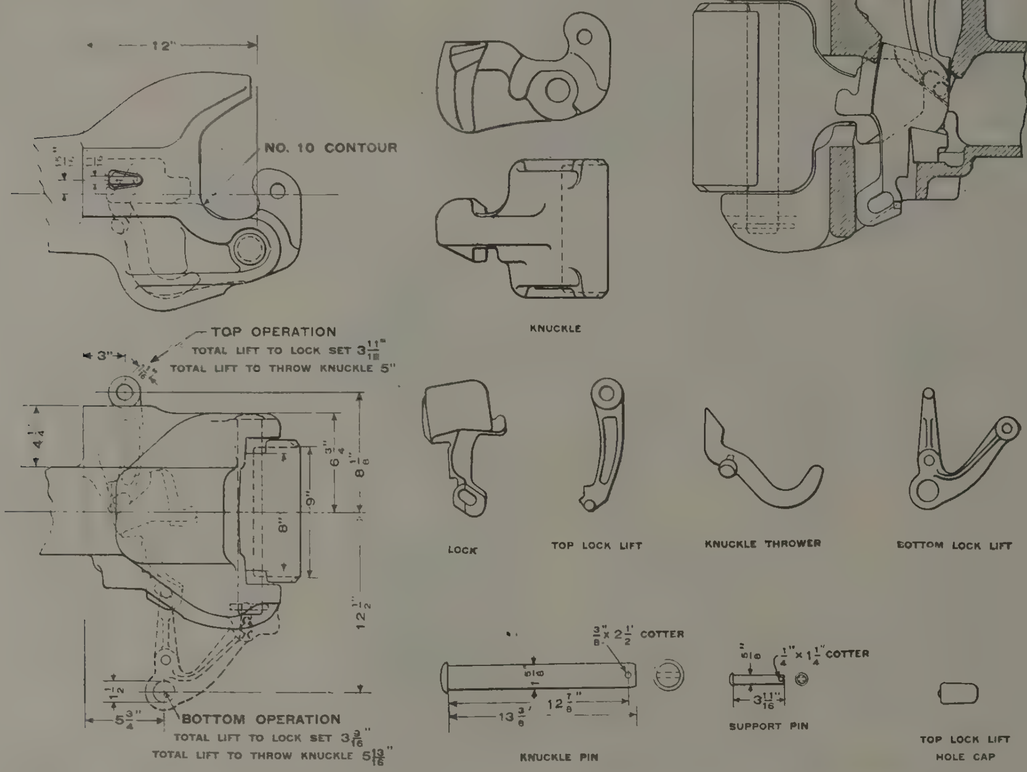


Fig. 649 — Trainman's Grab Handle. Adams & Westlake Company.

Top Operating, M. C. B. Standard "D" Coupler with Standard 6" x 8" Shank.





Knuckle Thrown

Bottom Operating "D" Coupler

Fig. 650—The M. C. B. Standard "D" Coupler and Parts. American Steel Foundries, Buckeye Steel Castings Company, Gould Coupler Company, Monarch Steel Castings Company, The McConway & Torley Company, National Malleable Castings Company.

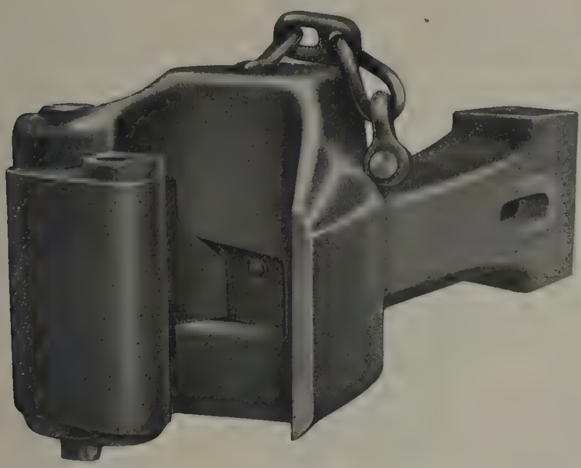


Fig. 651—Major Top Lift Freight Coupler.

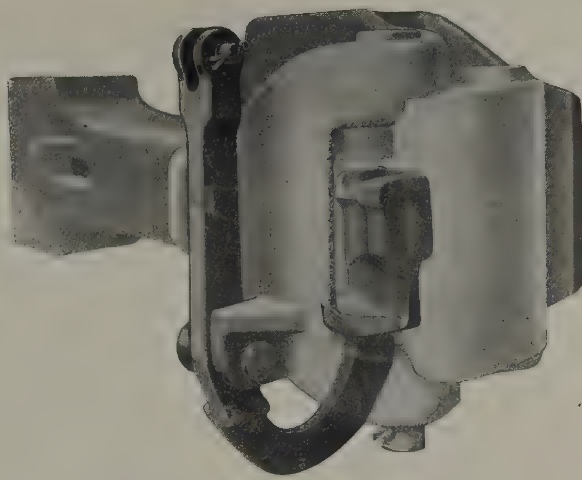


Fig. 652—Major Under Lift Freight Coupler

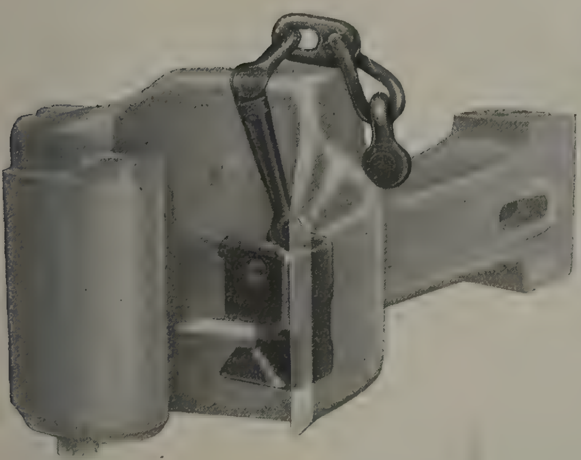


Fig. 653—Major Top Lift Coupler.

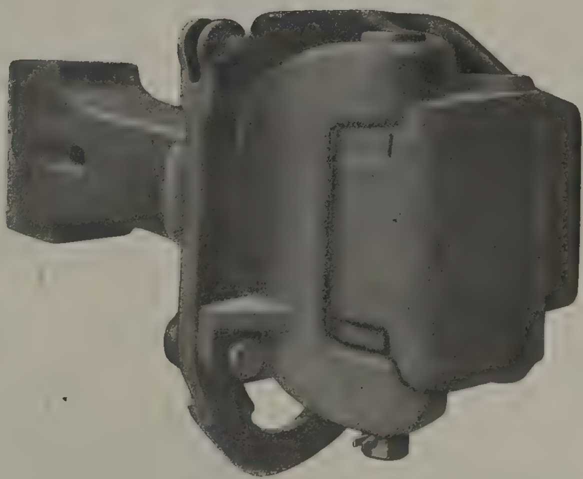


Fig. 654—Major Under Lift Coupler.

Bar.

Lock.

Knuckle.

Fig. 655—Parts of Major Coupler.

Buckeye Steel Castings Company.

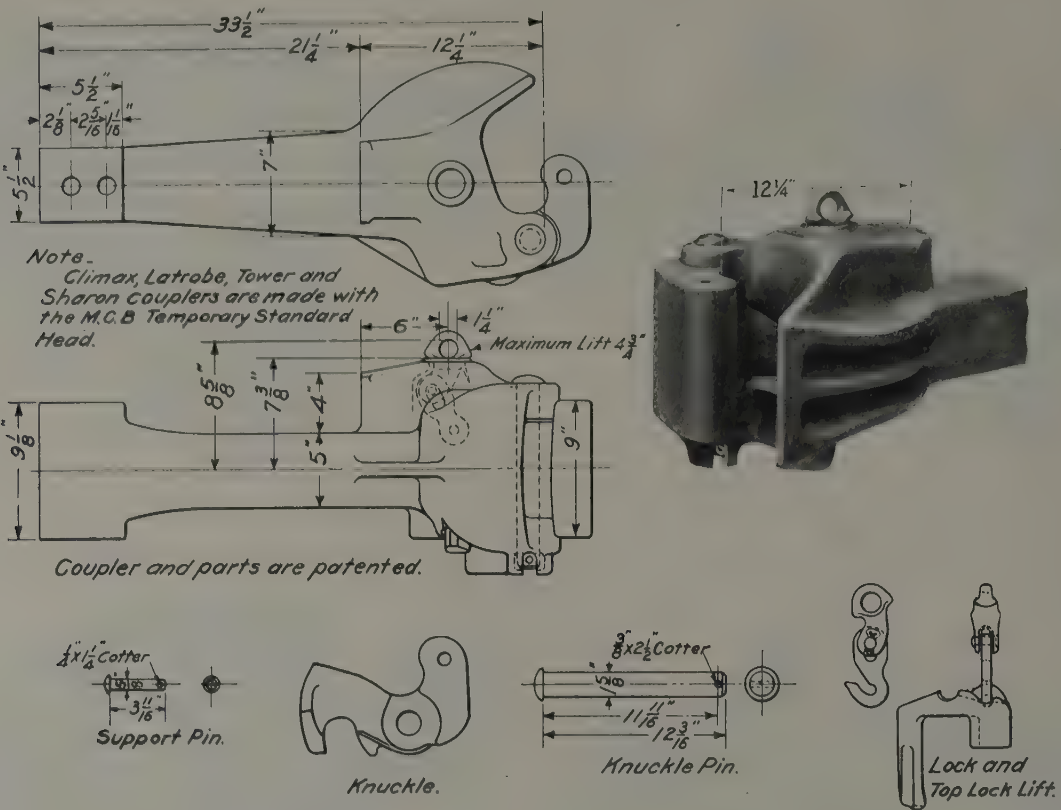


Fig. 656—Sharon M. C. B. Temporary Standard Coupler Head.

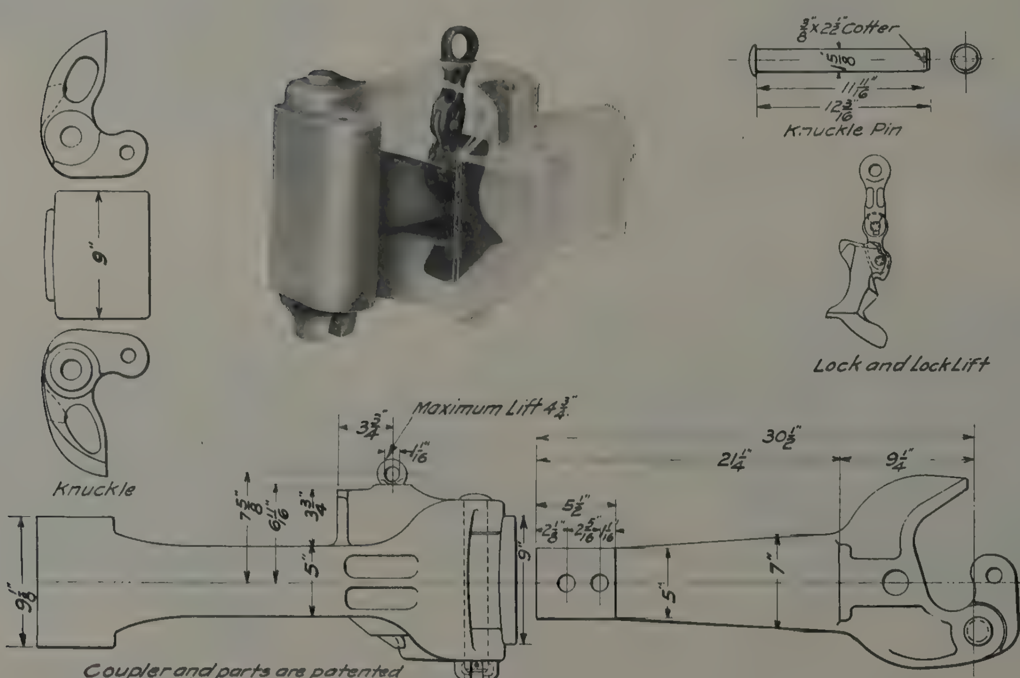


Fig. 657—Climax Freight Coupler and Parts.

National Malleable Castings Company.

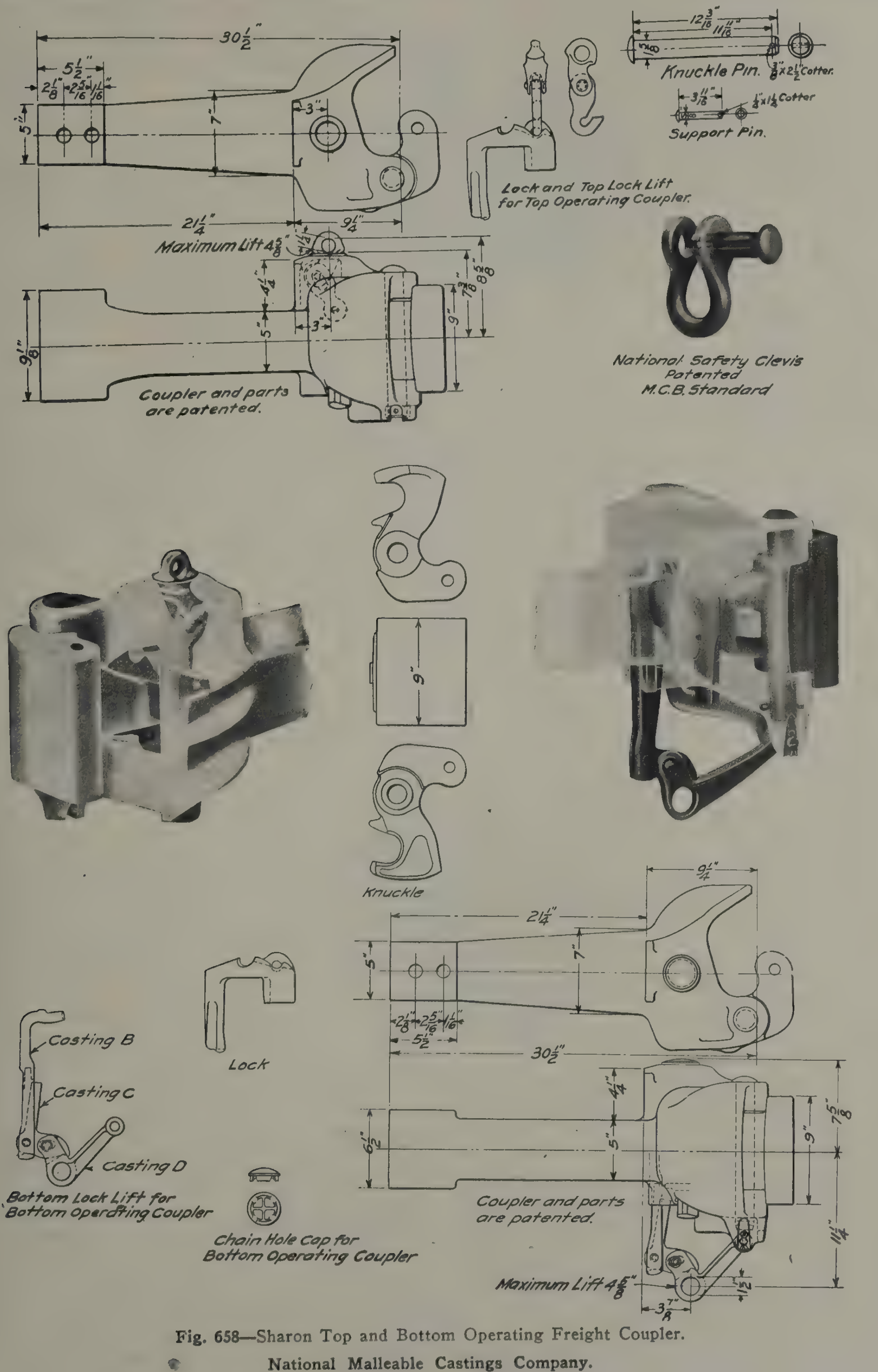


Fig. 658—Sharon Top and Bottom Operating Freight Coupler.

National Malleable Castings Company.

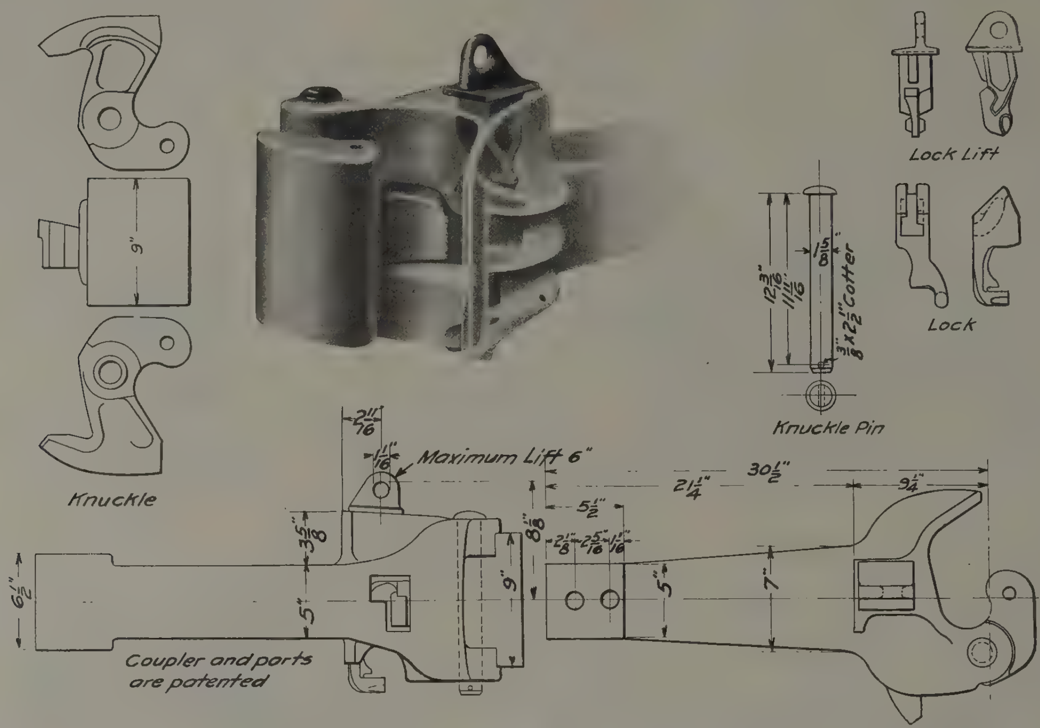


Fig. 659—Latrobe Freight Coupler and Parts.

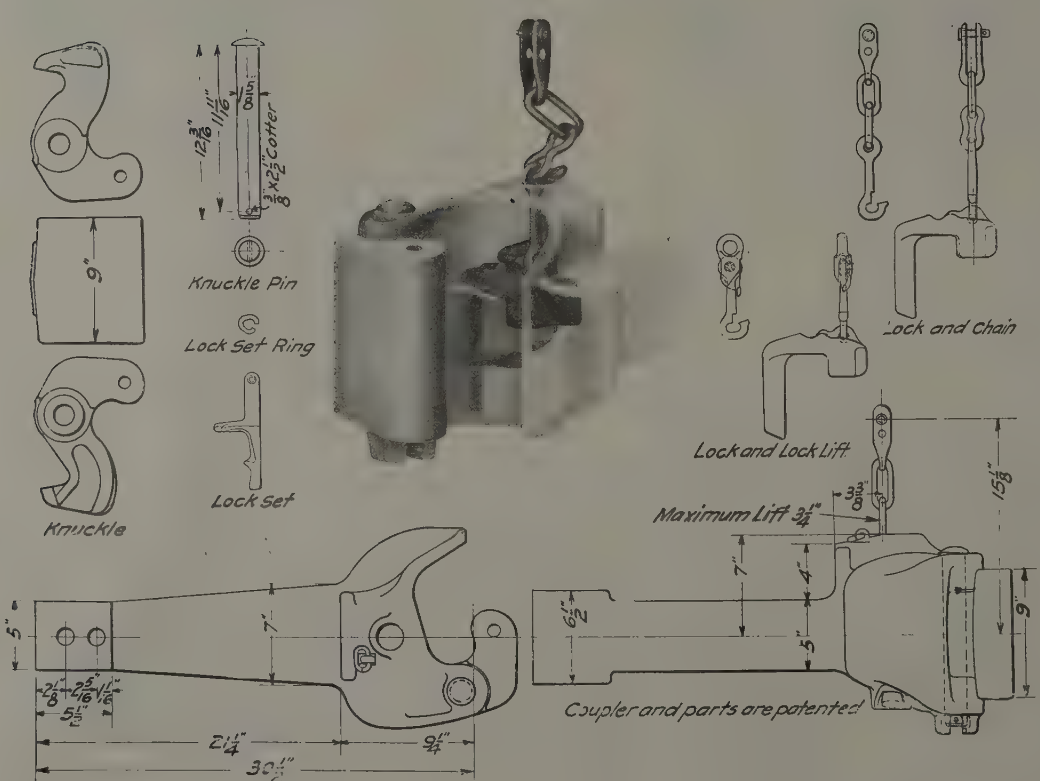


Fig. 660—Tower Freight Coupler and Parts.

National Malleable Castings Company.

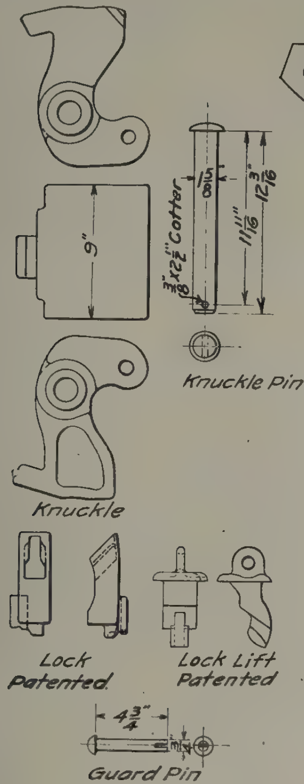


Fig. 661—Munton Freight Coupler Parts.

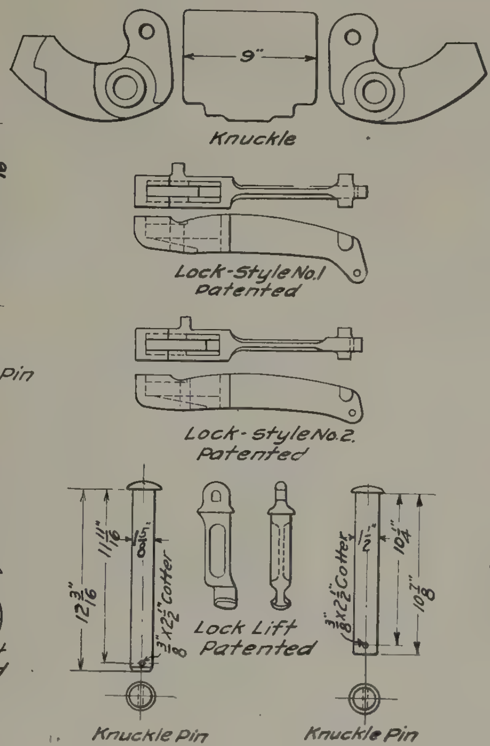


Fig. 662—Chicago Freight Coupler Parts.

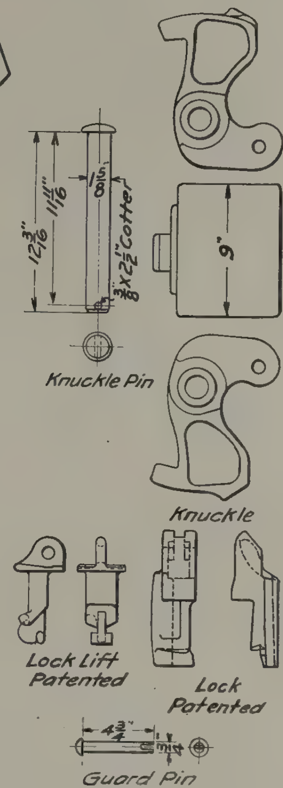


Fig. 663—Melrose Freight Coupler Parts.

National Malleable Castings Company.

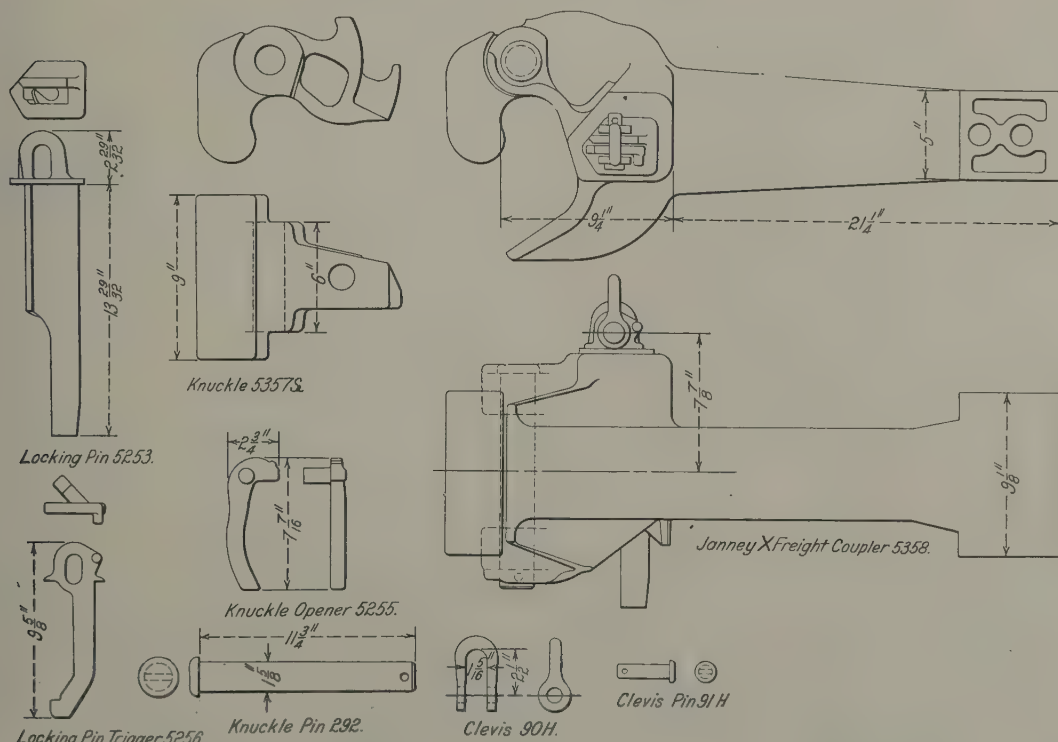


Fig. 664—Janney X Freight Coupler and Parts. The McConway & Torley Company.

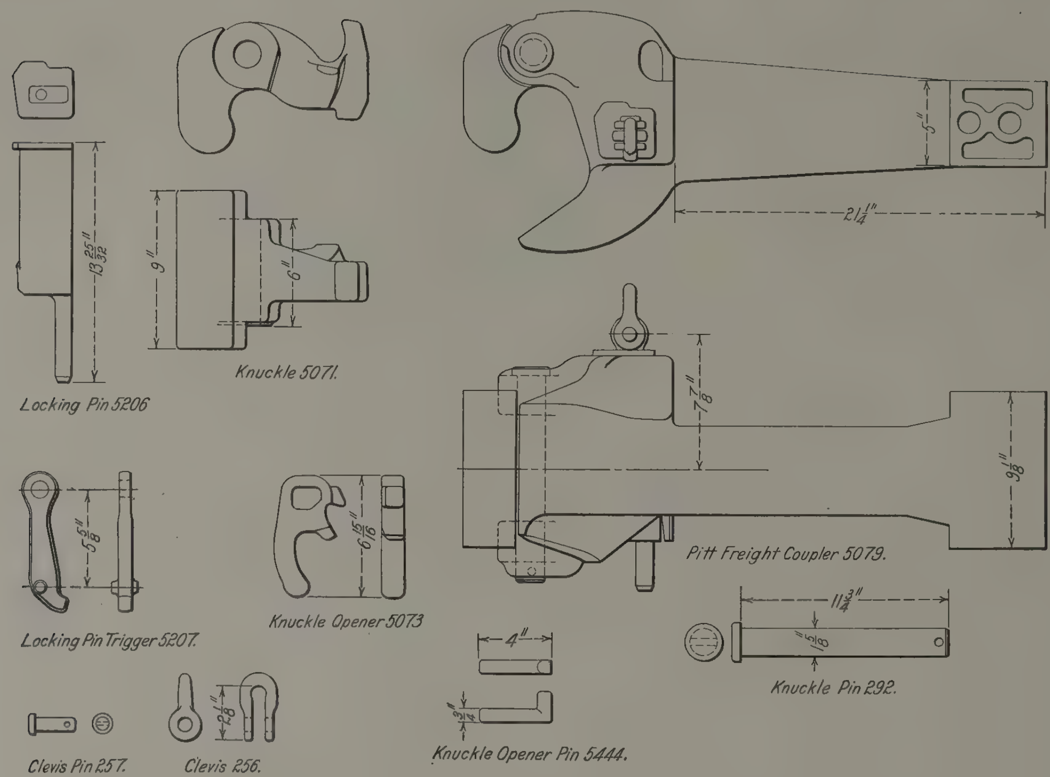


Fig. 665—Pitt Freight Coupler and Parts. The McConway & Torley Company.

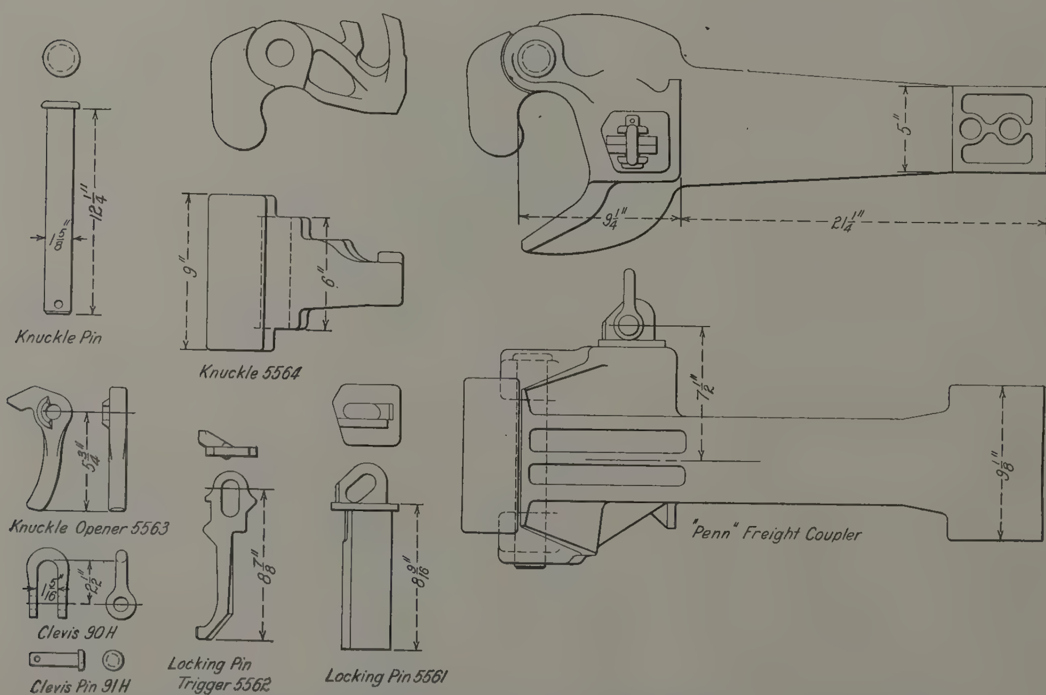


Fig. 666—Penn Freight Coupler and Parts. The McConway & Torley Company.

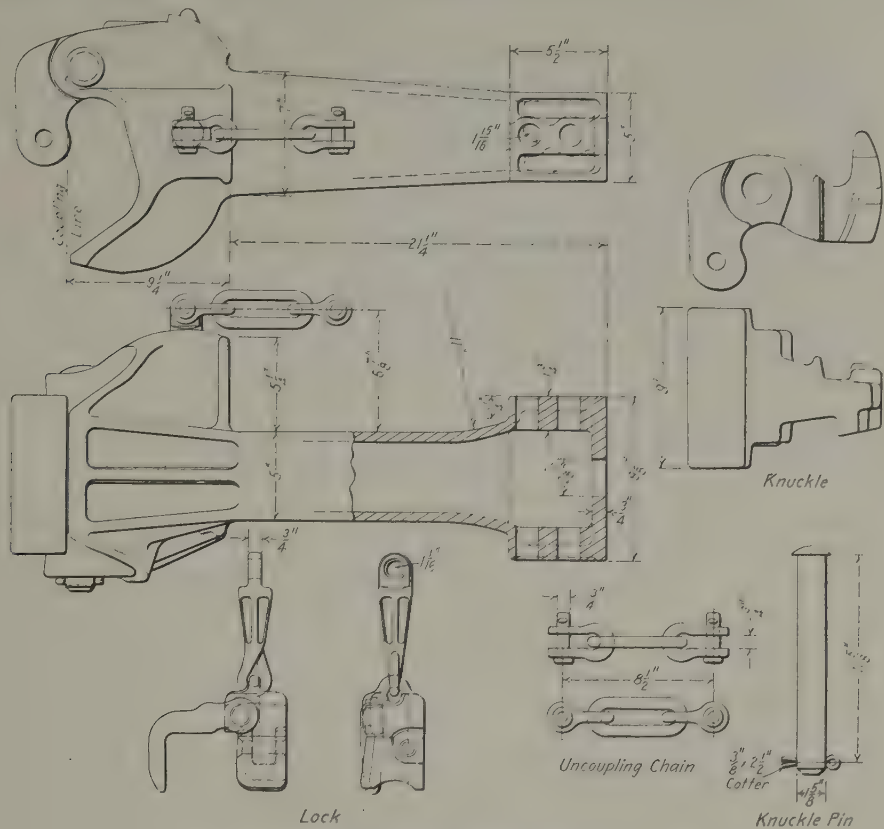


Fig. 667—Gould Freight Coupler Z201, and Parts.
Gould Coupler Company.

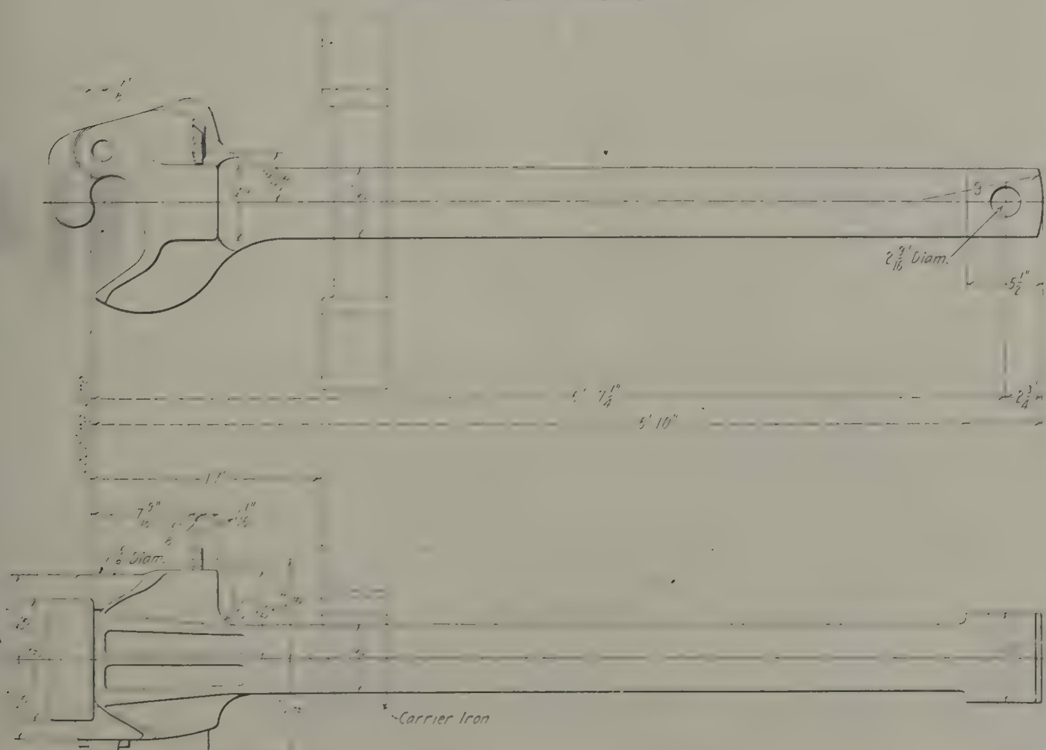


Fig. 668—Gould PIC Type Coupler with Integral Head.
Gould Coupler Company.

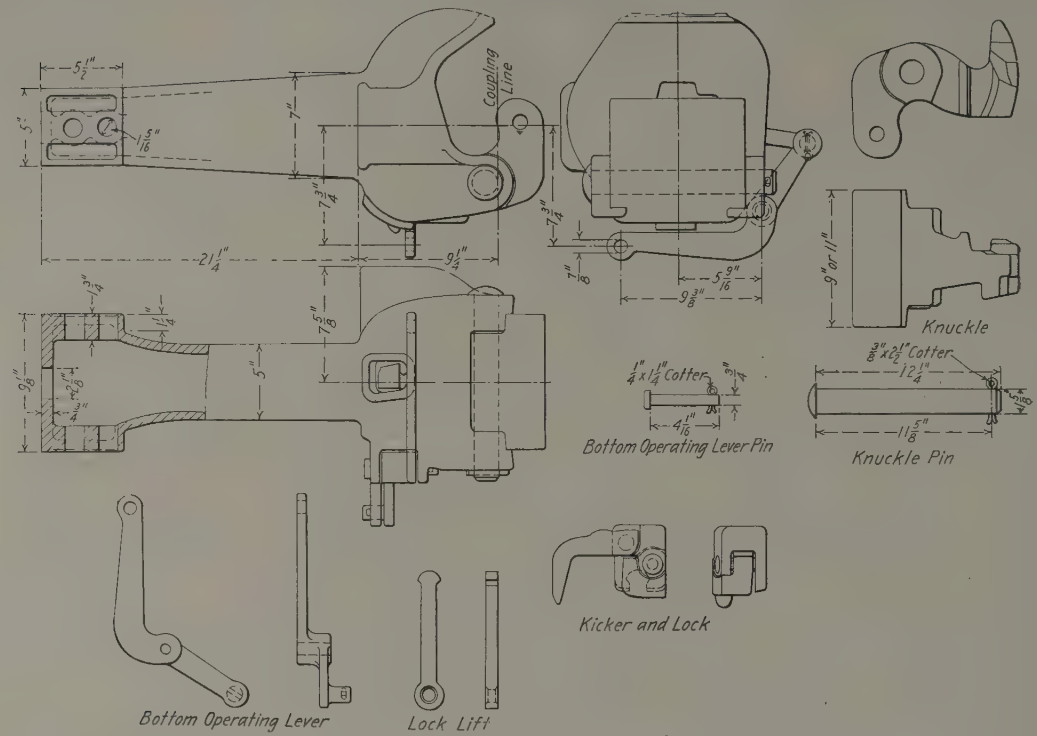


Fig. 669—Gould Bottom Operating Freight Coupler BZ-201, and Parts, Gould Coupler Company.

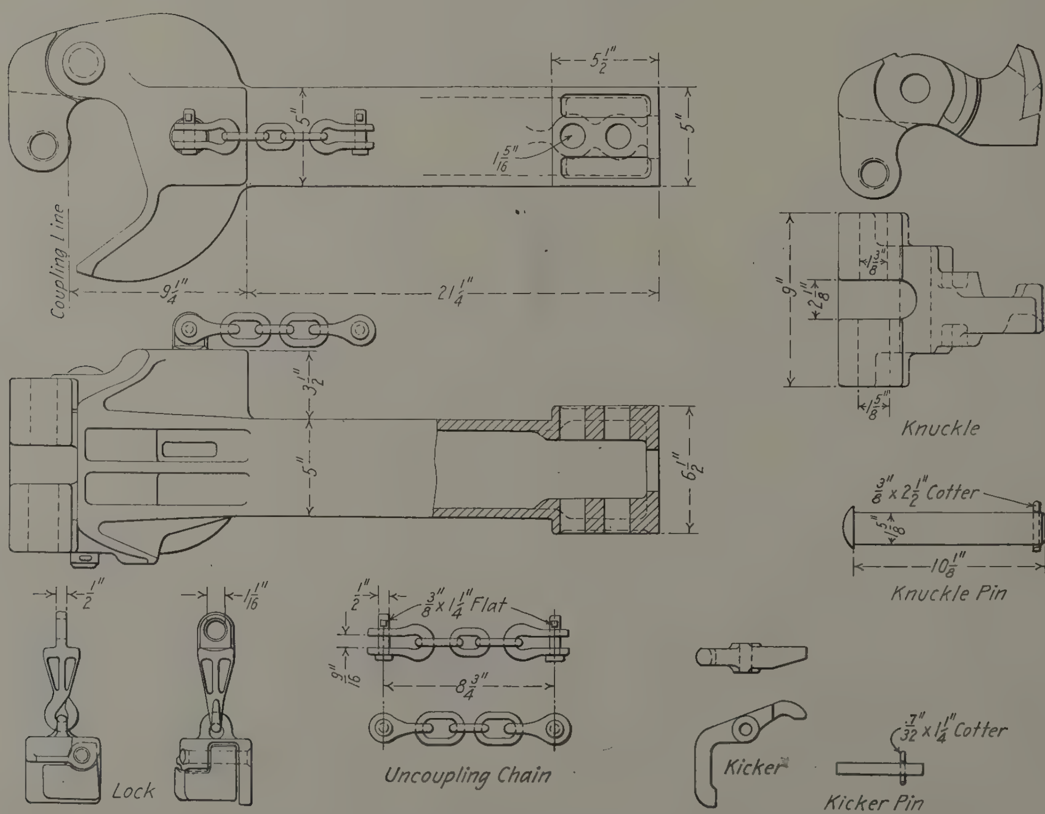


Fig. 670—Gould Top Operative Medium Type Freight Coupler, V-101, and Parts. Gould Coupler Company.

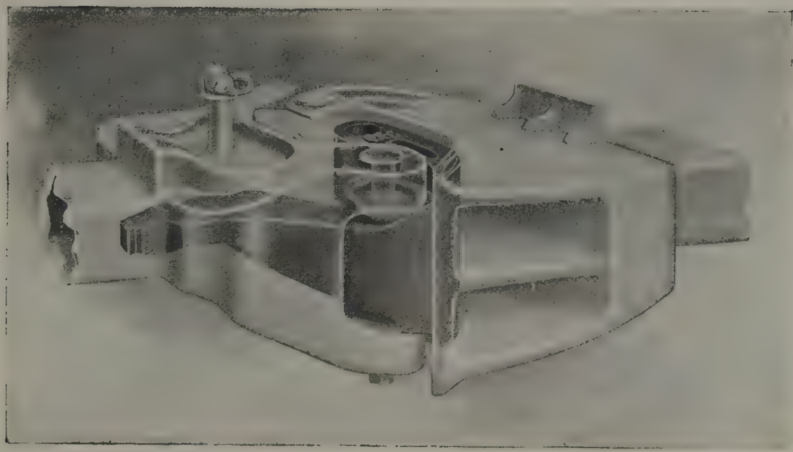


Fig. 671—Gilman-Brown Emergency Knuckle. The Q & C Company.

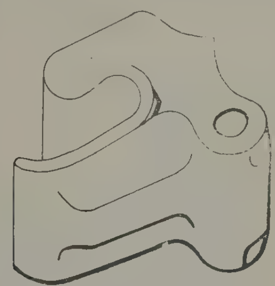


Fig. 672—Hinson Emergency Knuckle
National Car Coupler Company.

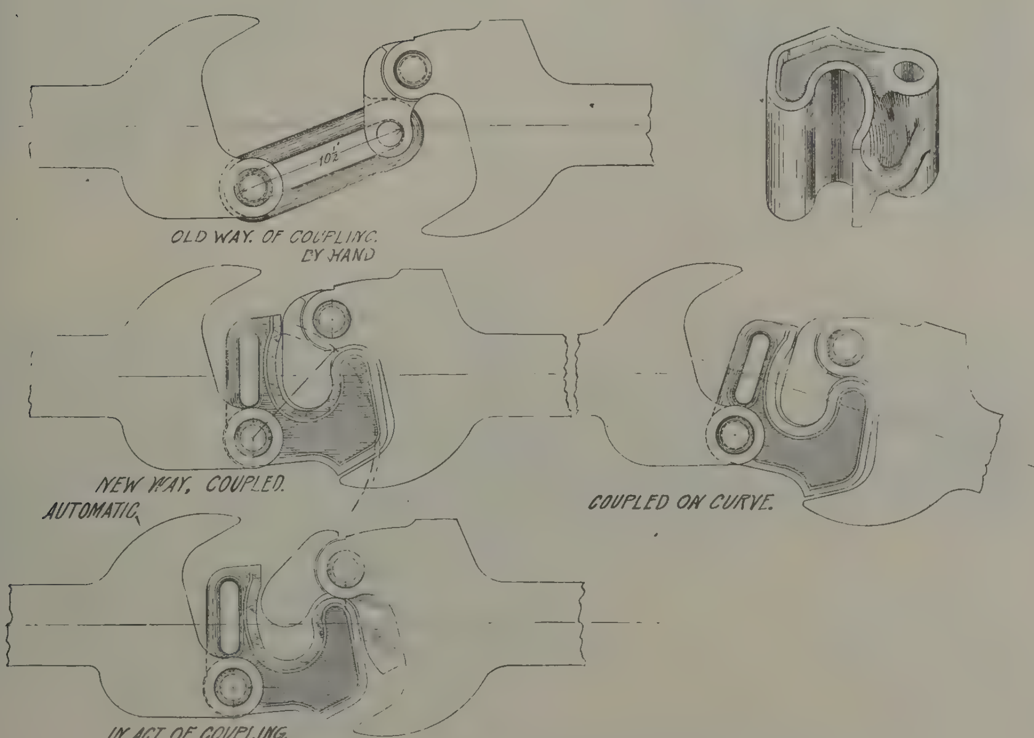


Fig. 673—Application of Hinson Emergency Knuckle.
National Car Coupler Company.

Fig. 674—Durbin Coupler with Knuckle Closed. Durbin Automatic Train Pipe Connector Company.

Fig. 675—Parts of Simplex Freight Coupler. American Steel Foundries.

Fig. 676—Parts of Durbin Coupler. Durbin Automatic Train Pipe Connector Company.

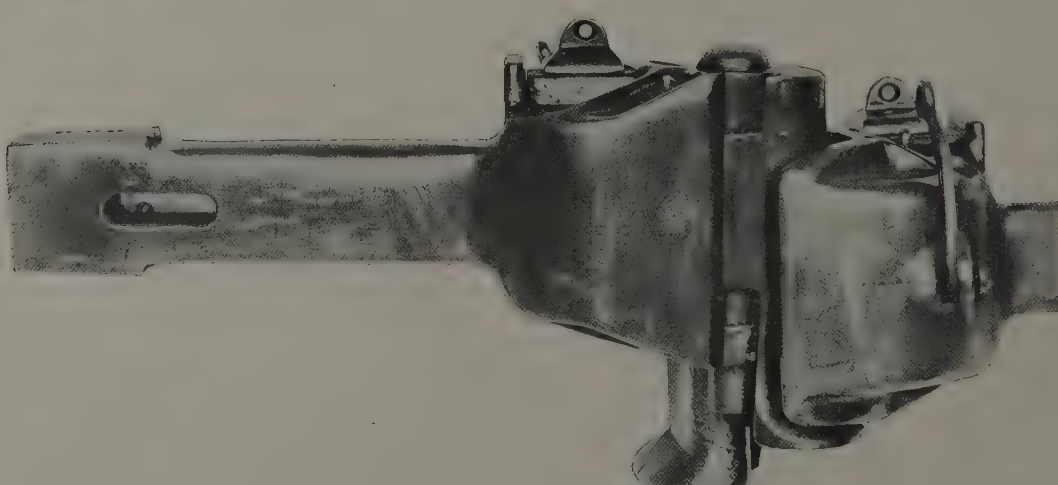


Fig. 677—Durbin Coupler with Safety Lip Carrying Another Coupler. Durbin Automatic Train Pipe Connector Company.

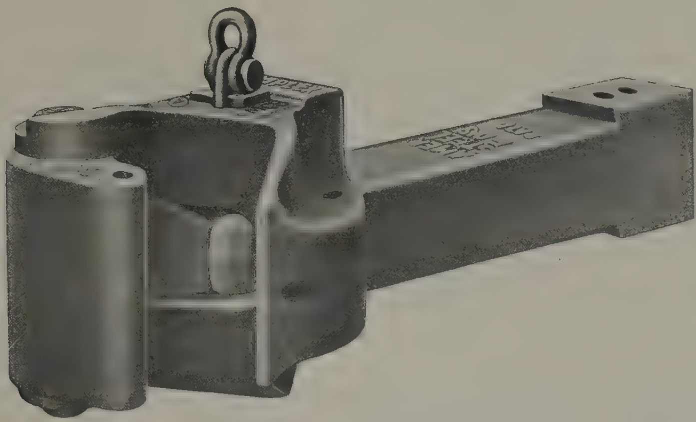


Fig. 678—Simplex Freight Coupler.

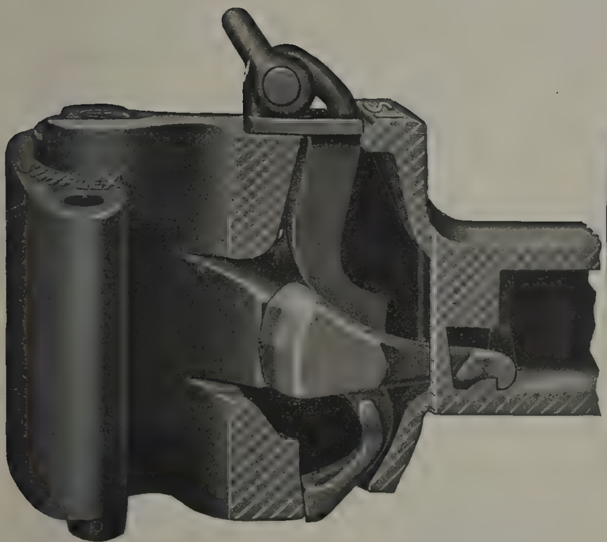


Fig. 679—Vertical Section Through Simplex Coupler When Closed.

Fig. 679A—Horizontal Section Through Simplex Coupler When Closed.

Fig. 680—Simplex Passenger Coupler. American Steel Foundries

American Steel Foundries.

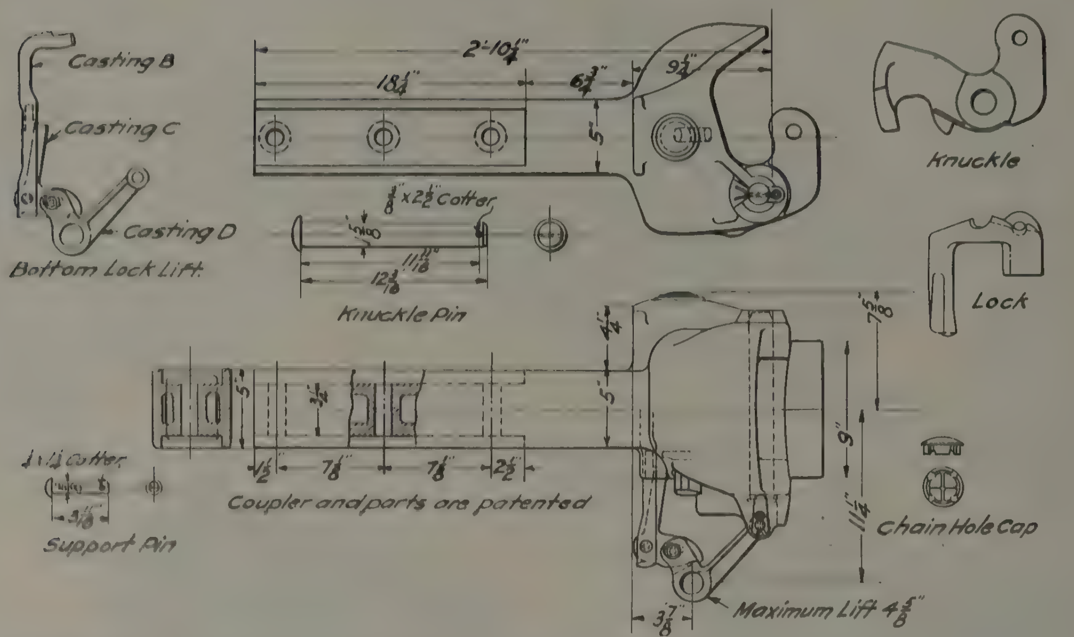


Fig. 681—Sharon Bottom Operating Passenger Coupler and Parts. National Malleable Castings Company.

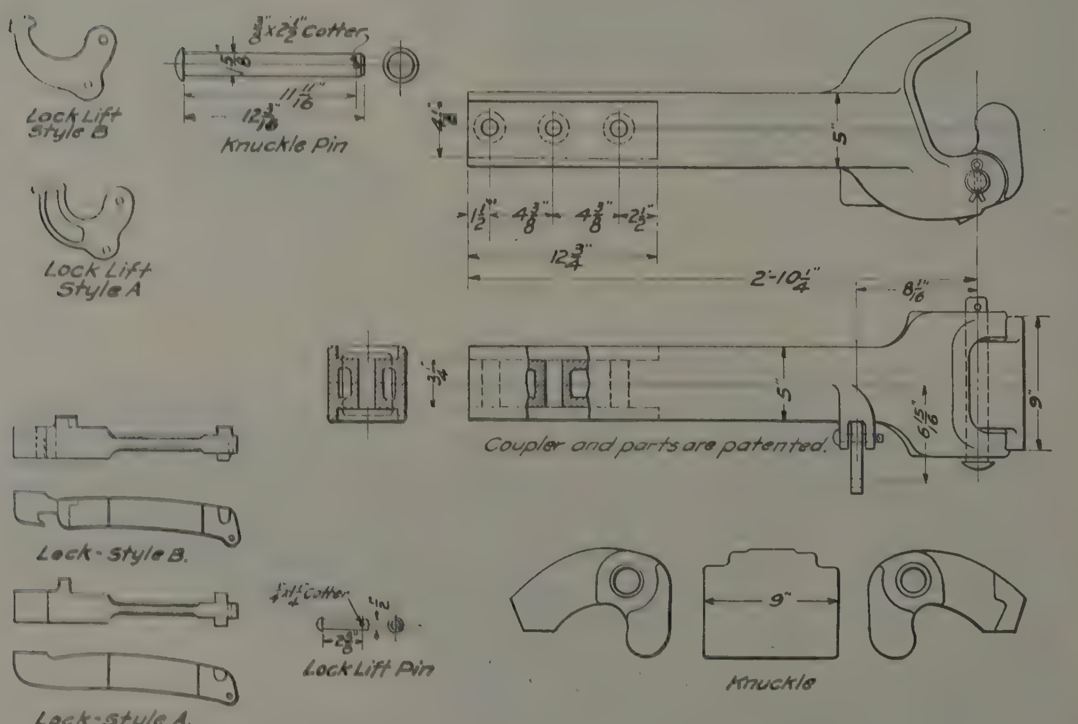


Fig. 682—Chicago Passenger Coupler and Parts. National Malleable Castings Company.

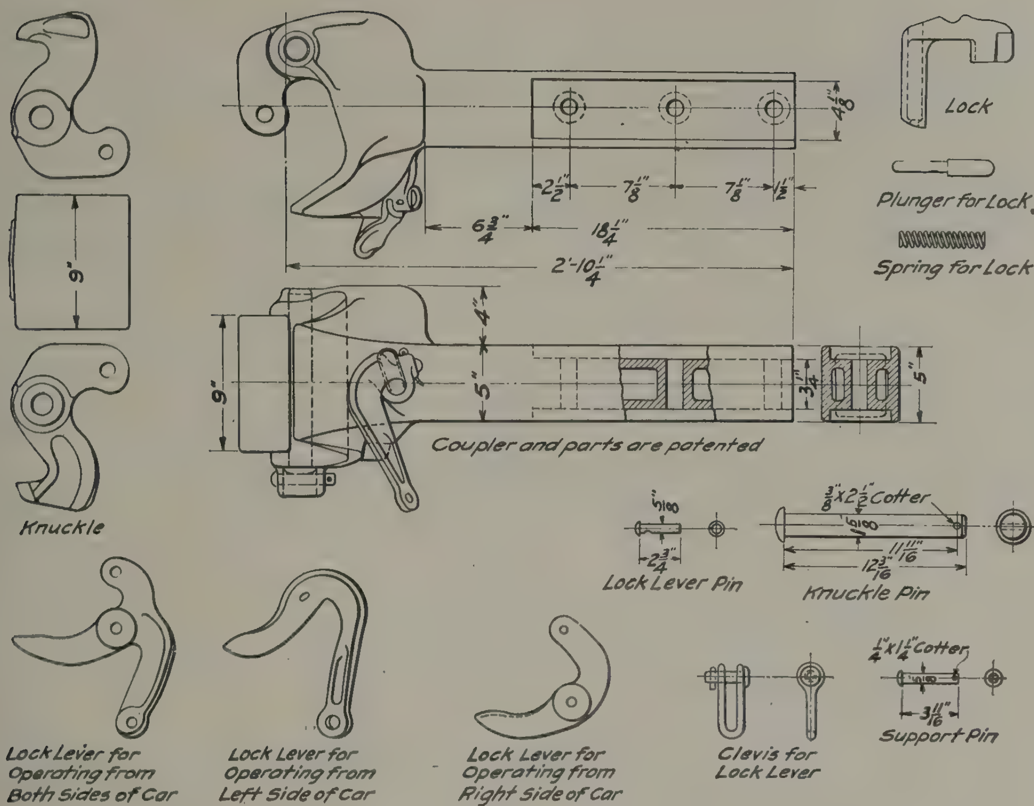


Fig. 683—Tower Passenger Coupler and Parts. National Malleable Castings Company.

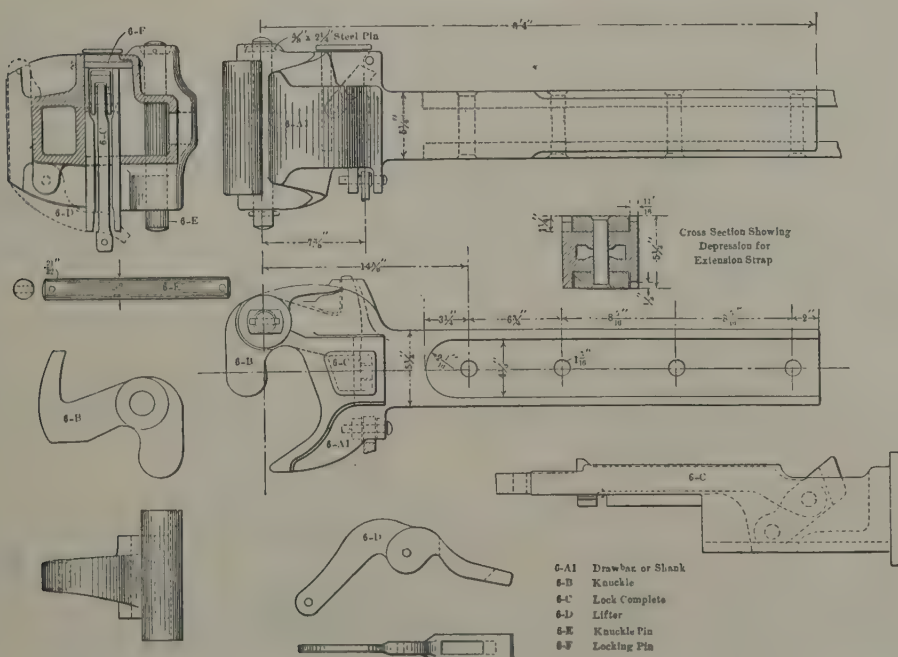


Fig. 684—National Passenger Coupler No. 6A1 and Parts. National Car Coupler Company.

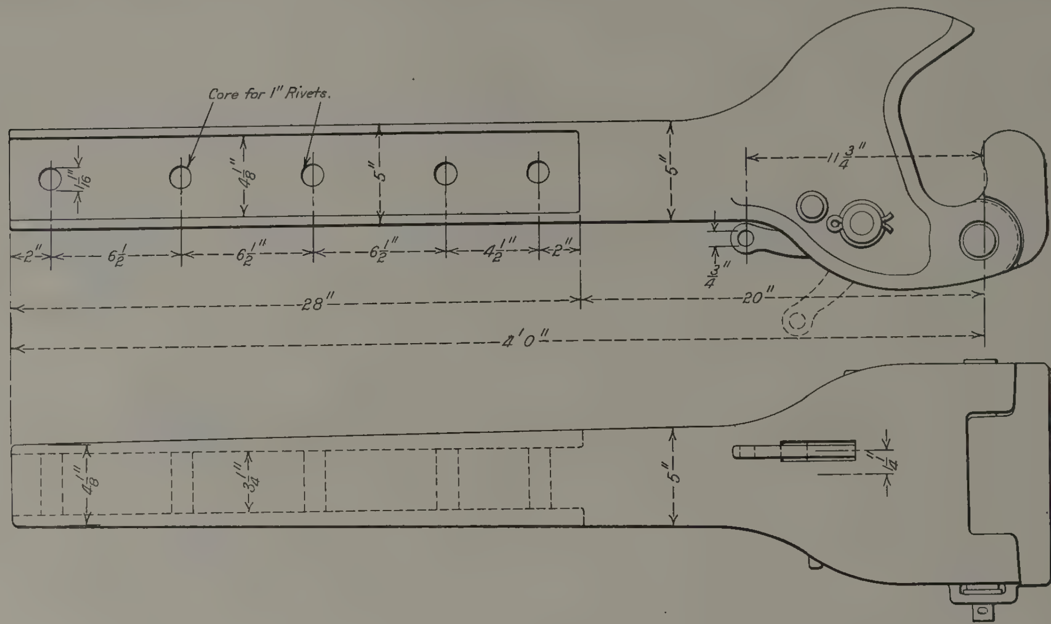


Fig. 685—Passenger Coupler with Single Side Operation. Gould Coupler Company.

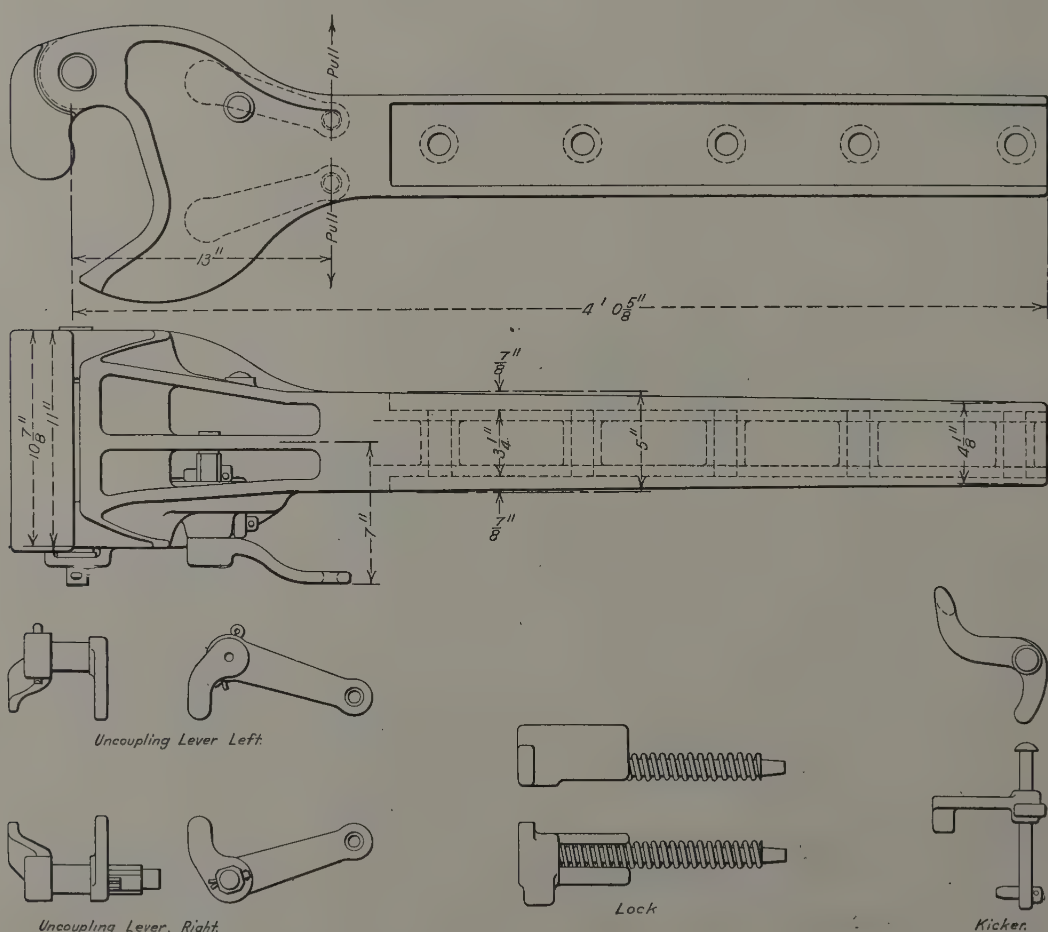


Fig. 686—Double Bottom Operated Passenger Coupler. Gould Coupler Company.

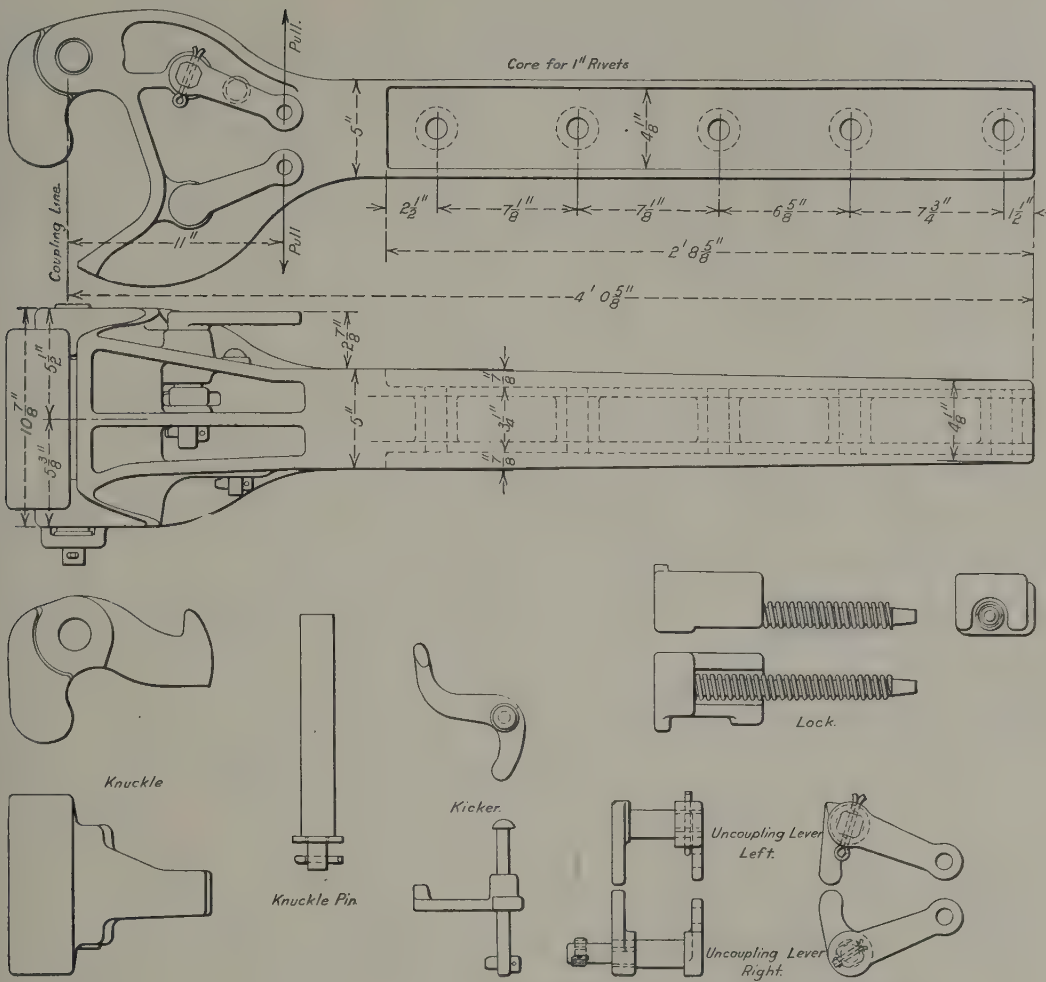


Fig. 687—Double Top Operated Passenger Coupler. Gould Coupler Company.

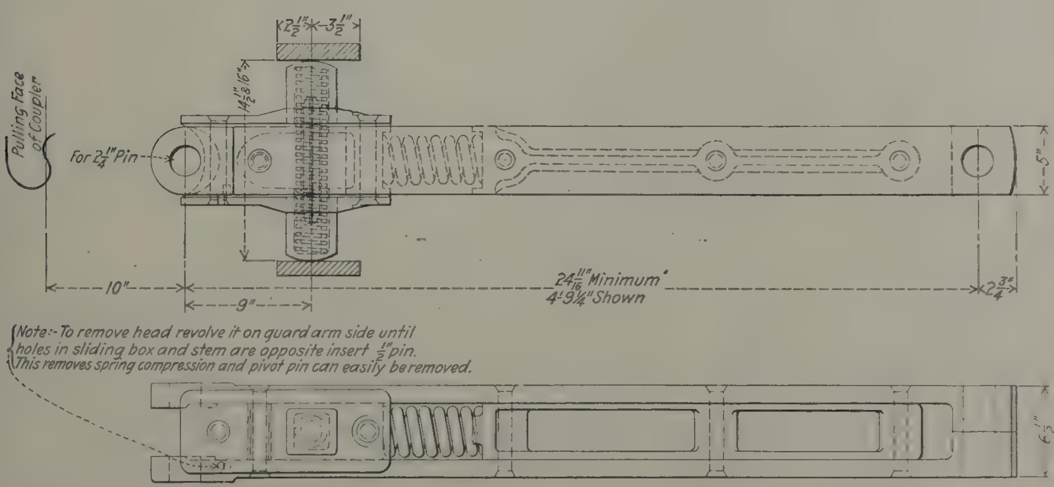


Fig. 688—Coupler Stem for Pitt Passenger Coupler. The McConway & Torley Company.

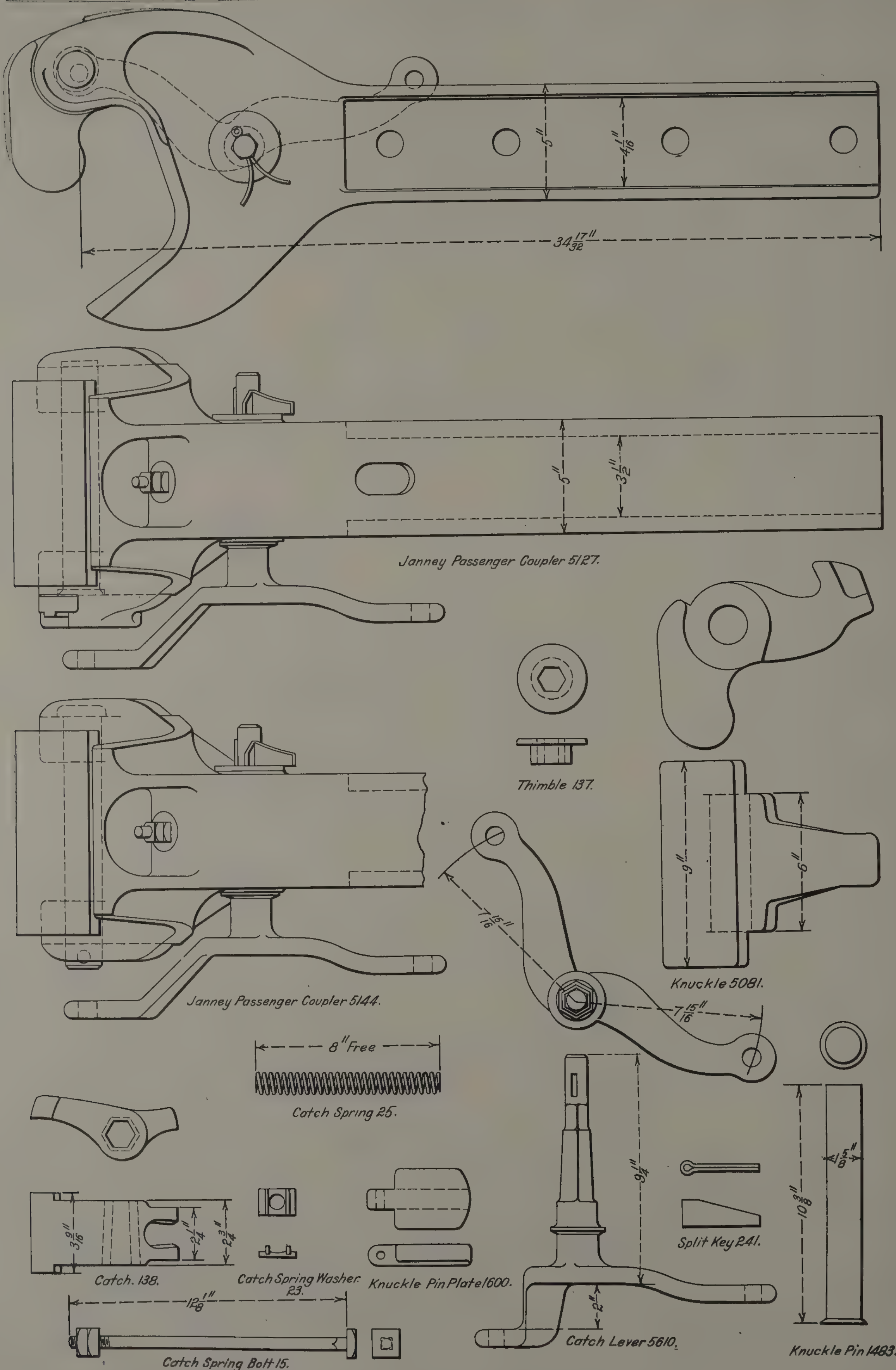


Fig. 689—Janney Passenger Couplers and Parts. The McConway & Torley Company.

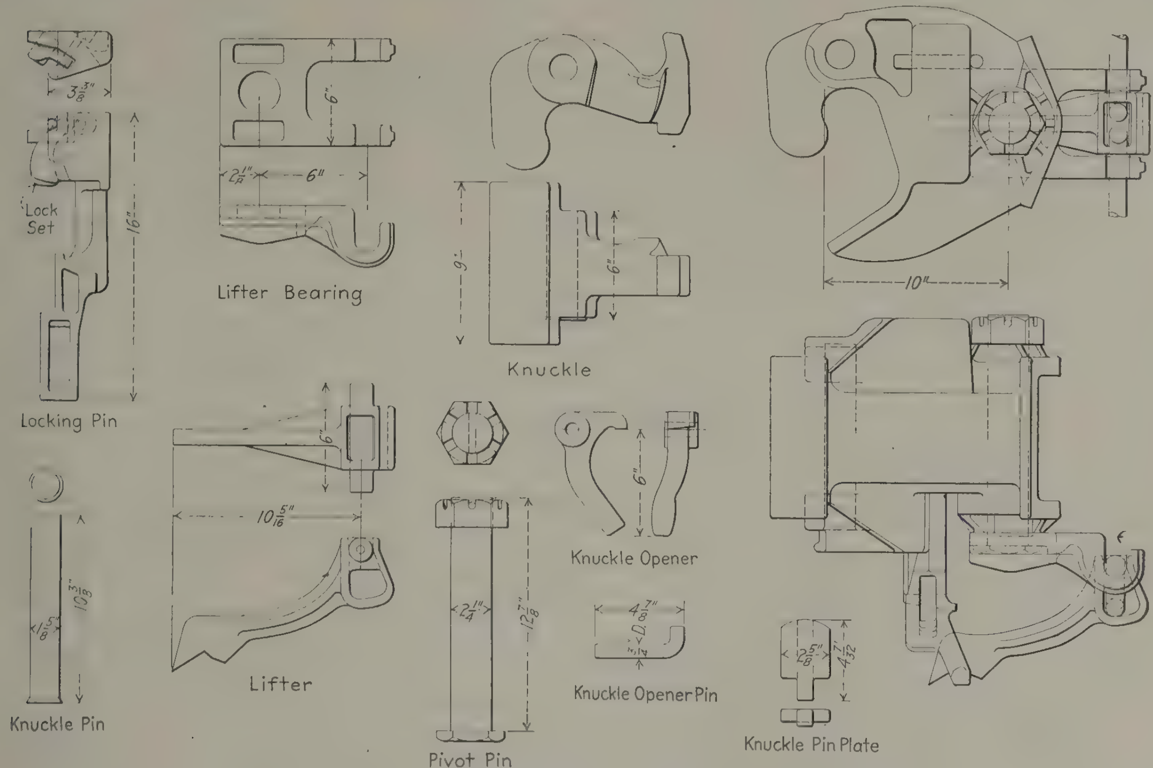


Fig. 690—Pitt Passenger Coupler, No. 255, with Underneath Release.
The McConway & Torley Company.

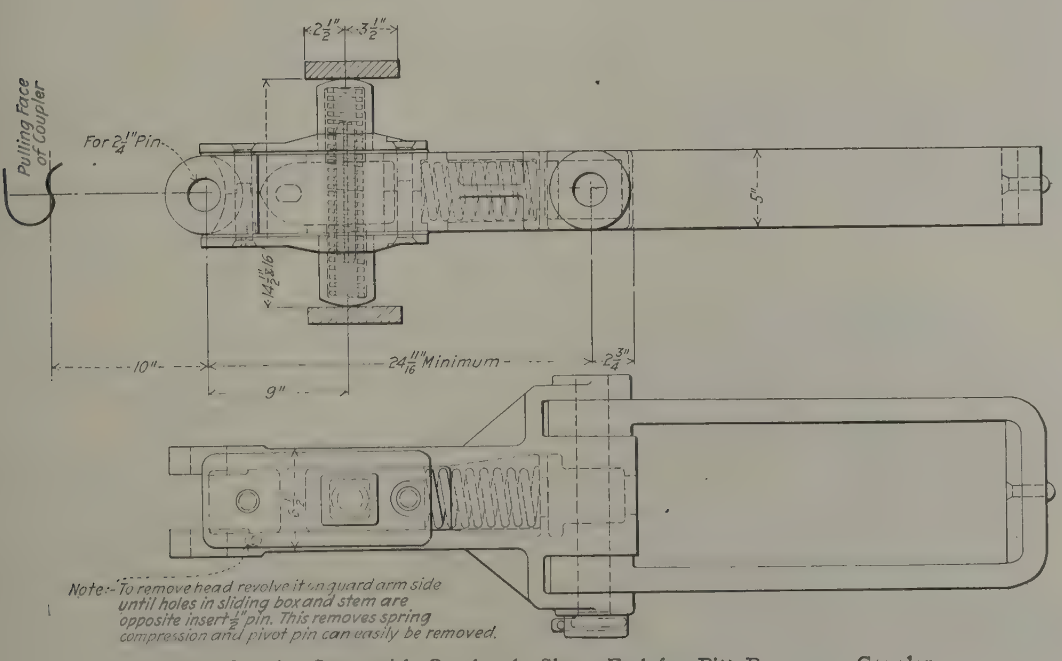


Fig. 691—Coupler Stem with Quadruple Shear End for Pitt Passenger Coupler.
The McConway & Torley Company.

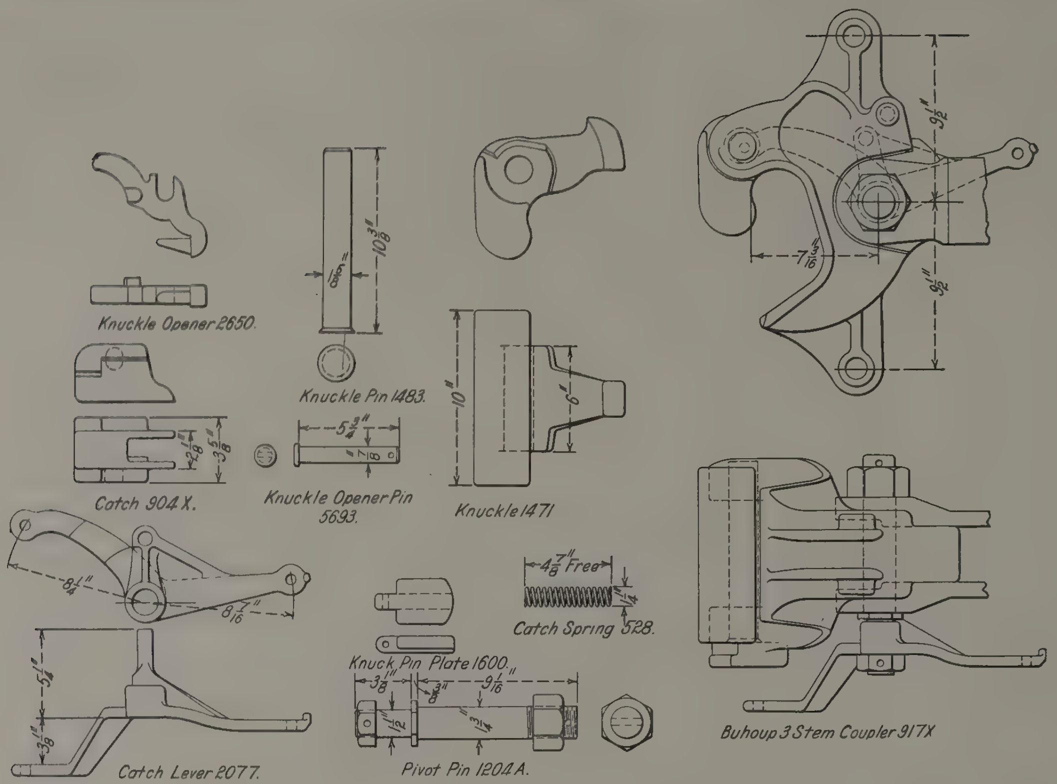


Fig. 692—Buhoup Three-Stem Passenger Coupler and Parts. The McConway & Torley Company.

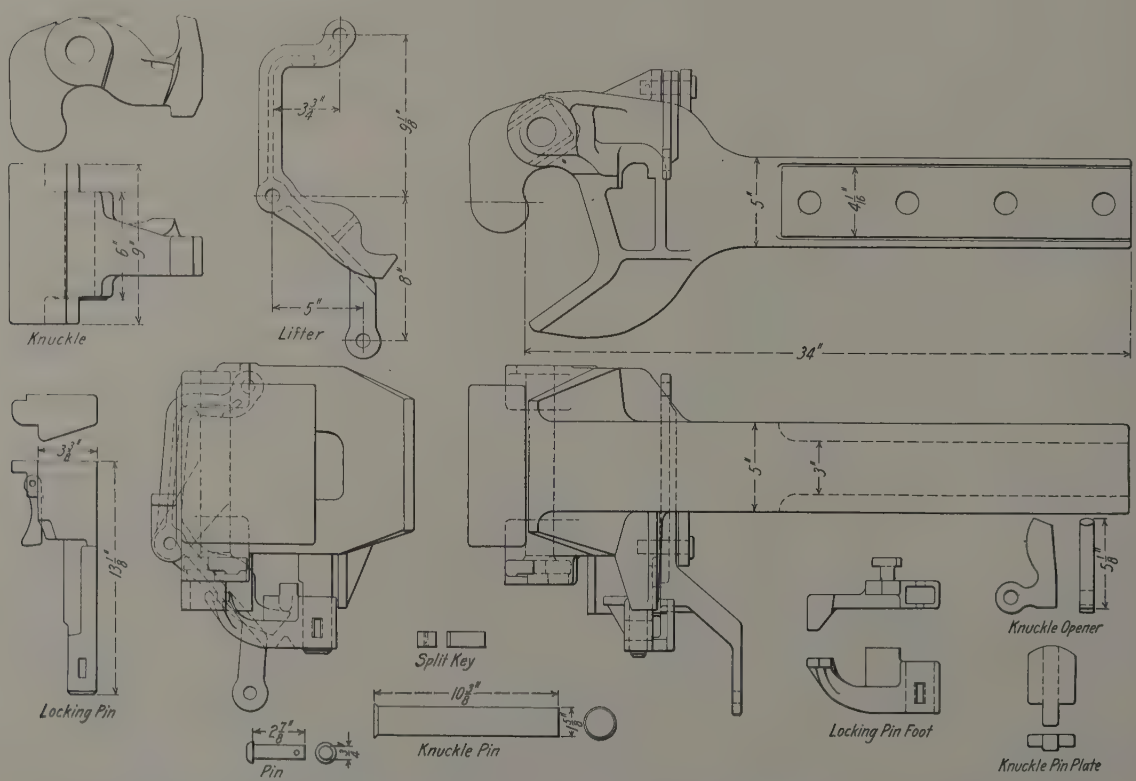


Fig. 693—Pitt Passenger Coupler, No. 171—SP2. The McConway & Torley Company.

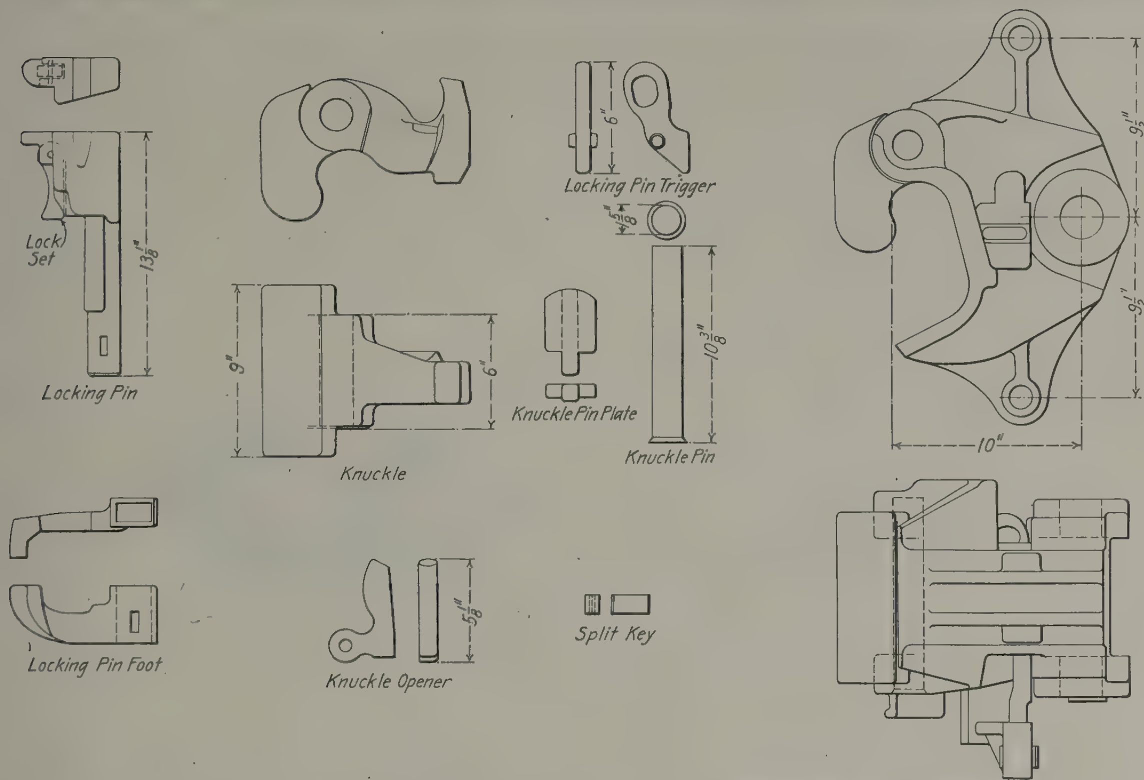


Fig. 694—Pitt Three-Stem Coupler No. 919. The McConway & Torley Company.

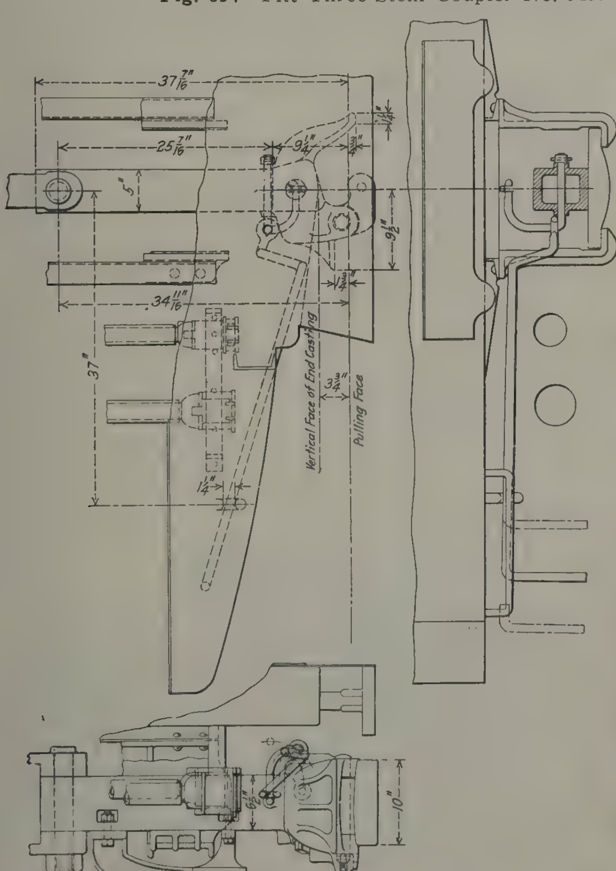


Fig. 695—Sharon Coupler with Centering Lug on Side of Head, for Long Island Railroad Cars.

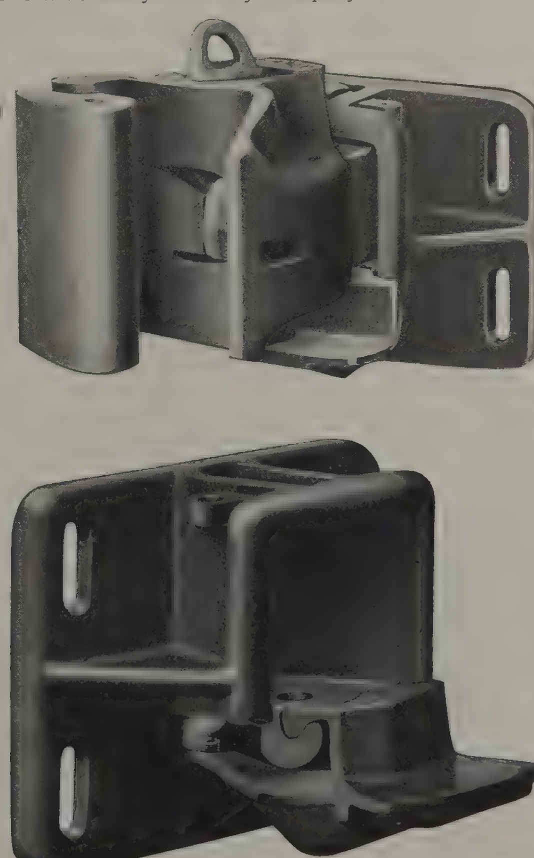


Fig. 696—Simplex Adjustable Coupler Pocket. American Steel Foundries.

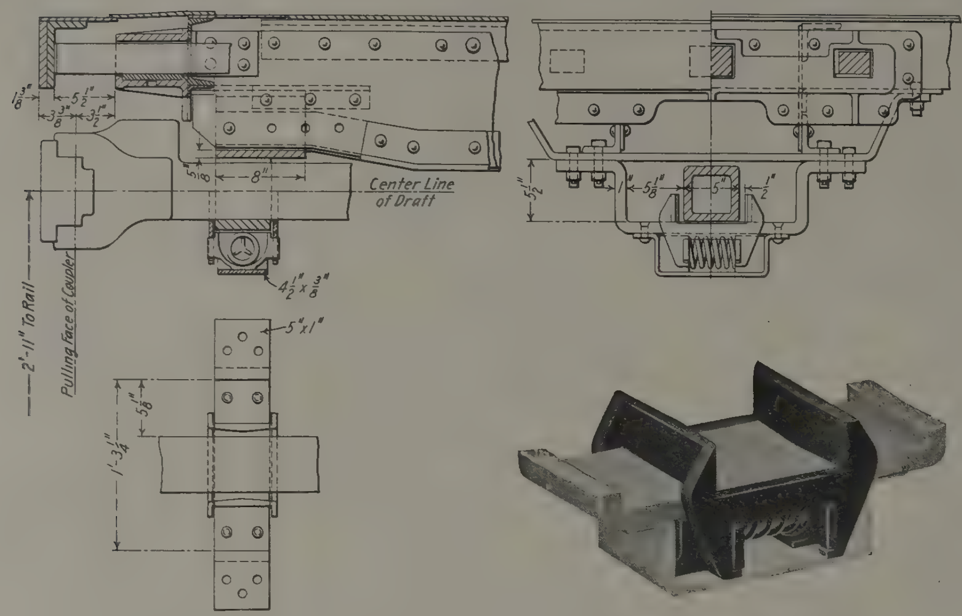


Fig. 697—Miner Coupler Centering Device as Applied to Passenger Equipment.
W. H. Miner.

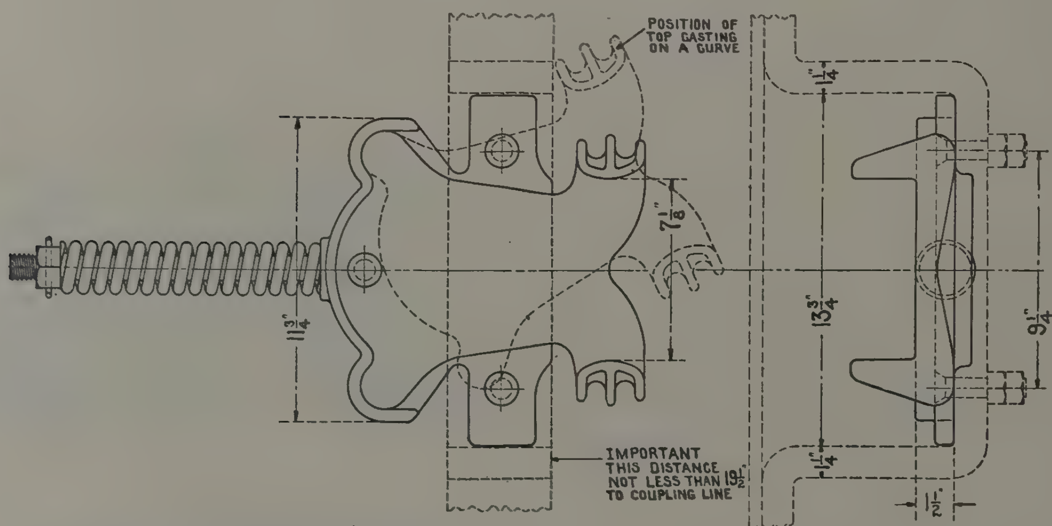


Fig. 698—Chaffee Centering Device. Waugh Draft Gear Company.

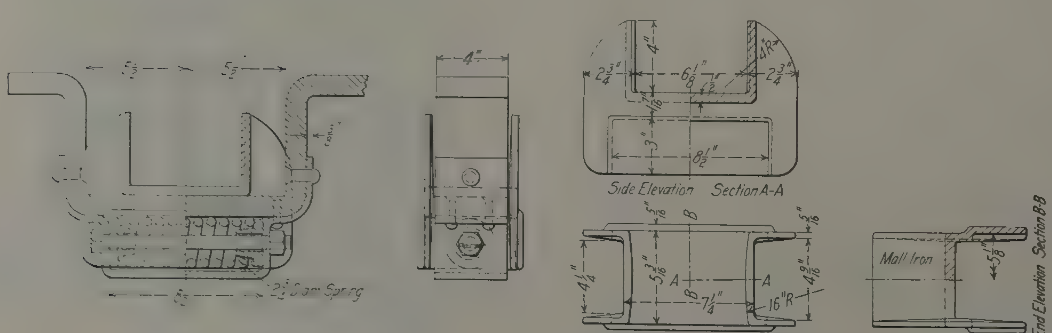


Fig. 699—Yerk Centering Device. Waugh Draft Gear Company.

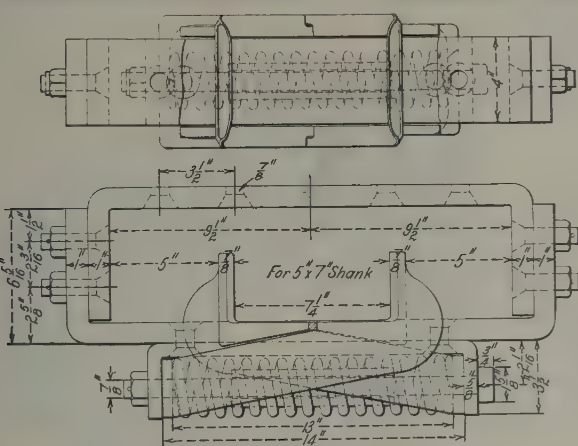


Fig. 700—National Centering Yoke for 5 in. x 7 in. Shank M. C. B. Couplers; National Car Coupler Company.

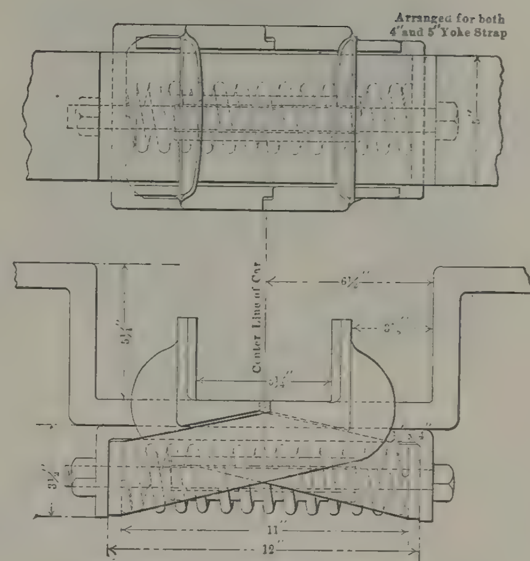


Fig. 701—National Drawbar Centering Yoke. National Car Coupler Company.

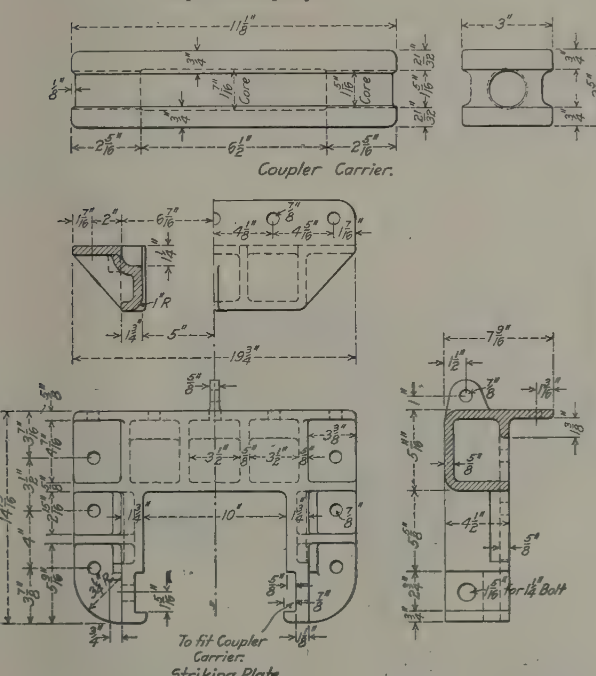


Fig. 702—Coupler Carry Iron and Striking Plate for Central of New Jersey Ice Car.

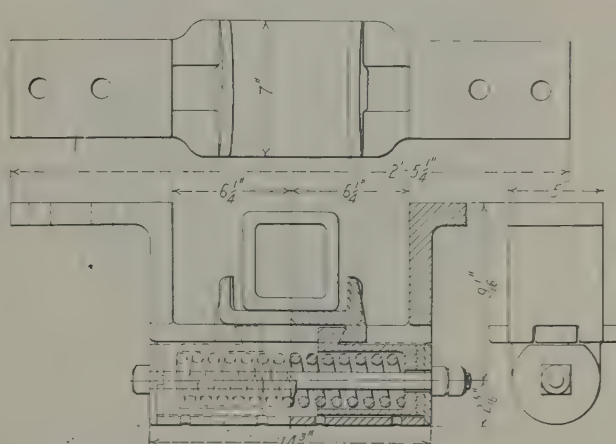


Fig. 703—Combination Coupler Carrier and Centering Device. Gould Coupler Company.

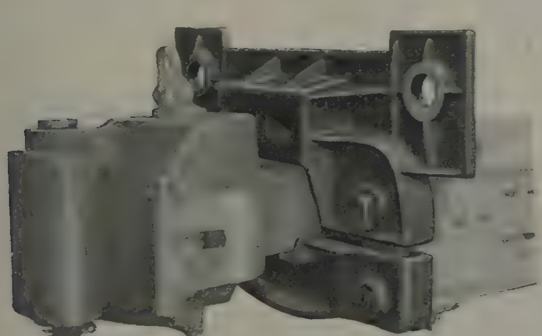


Fig. 704—"Ureco" Coupler Centering Device. Union Railway Equipment Co.

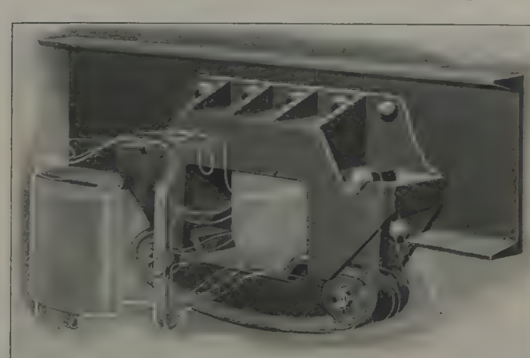


Fig. 705—Imperial Centering Device. Imperial Appliance Company.

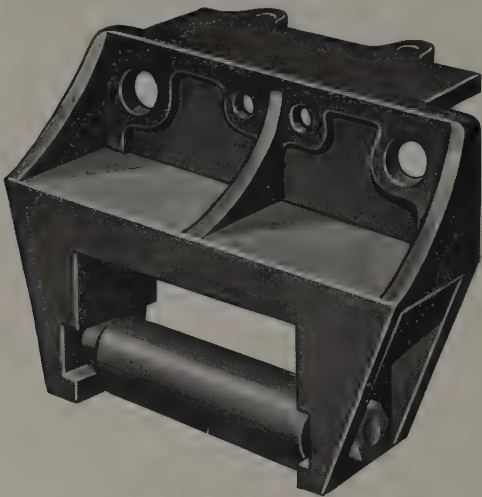


Fig. 706—Flory Carry Iron for Wooden Cars.

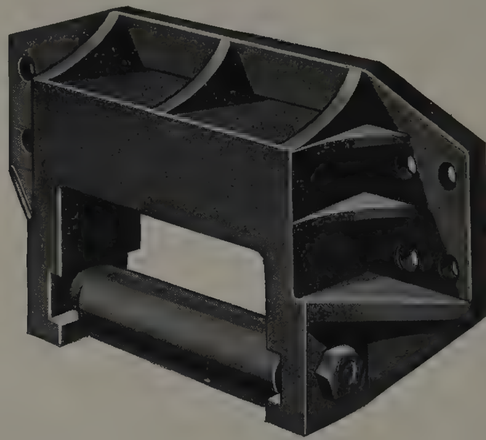


Fig. 707—Flory Carry Iron for Steel Cars.

Commonwealth Steel Company.

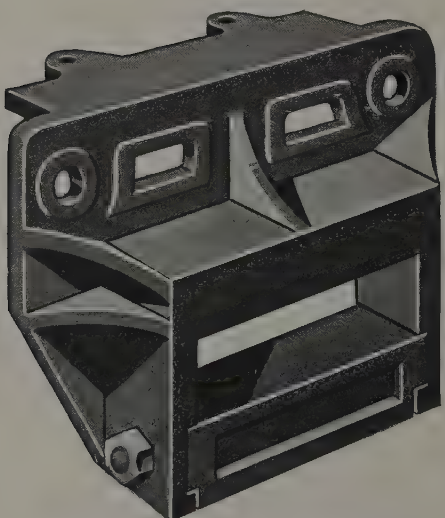


Fig. 708—Lug-Supported Carry Iron for Wooden Cars.
Commonwealth Steel Company.

Fig. 709—Flory Cast Steel Reversible Carry Iron and Striking Plate for Wooden Freight Cars.
Commonwealth Steel Company.

Fig. 710—Flory Cast Steel Reversible Carry Iron for Freight Couplers.

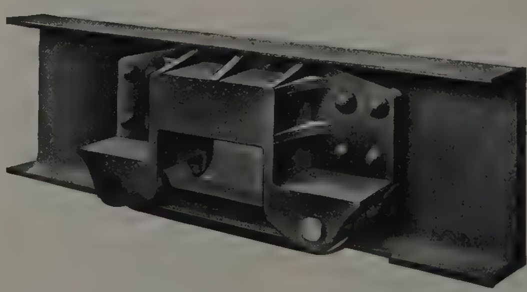


Fig. 710-A—Flory Cast Steel Reversible Carry Iron and Striking Plate for Steel Freight Cars.

Commonwealth Steel Company.

Fig. 711—End Construction of Bettendorf Single Center Sill Underframe, Showing Arrangements for Draft Gear. The Bettendorf Company.

Fig. 712—Inside View of Economy Draft Arm, Showing Draft Gear Lugs or Stops. American Steel Foundries.

Fig. 713—Economy Draft Arms Applied to Center Sills. American Steel Foundries.

Fig. 714—Economy Draft Arms for Strengthening Wooden Freight Cars. American Steel Foundries.

Fig. 715—Economy Draft Arms for Strengthening Wooden Freight Cars. American Steel Foundries.

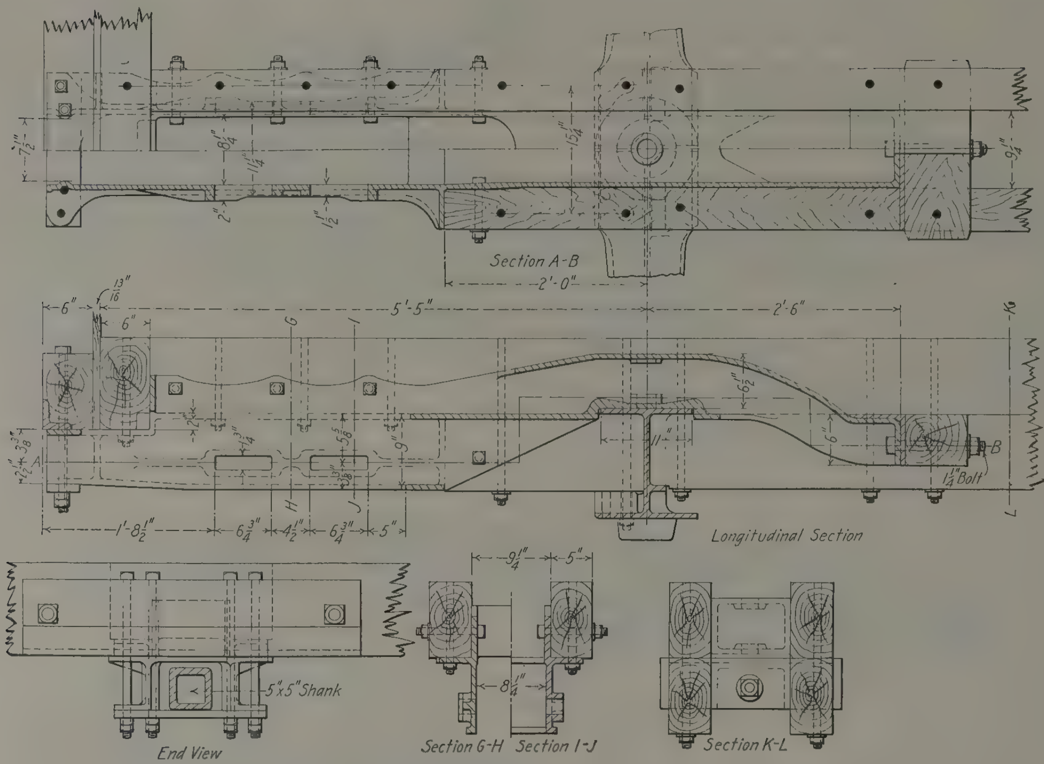


Fig. 716—Cast Steel Draft Arms Applied to Chicago Great Western Box Car. Chicago Steel Car Company.

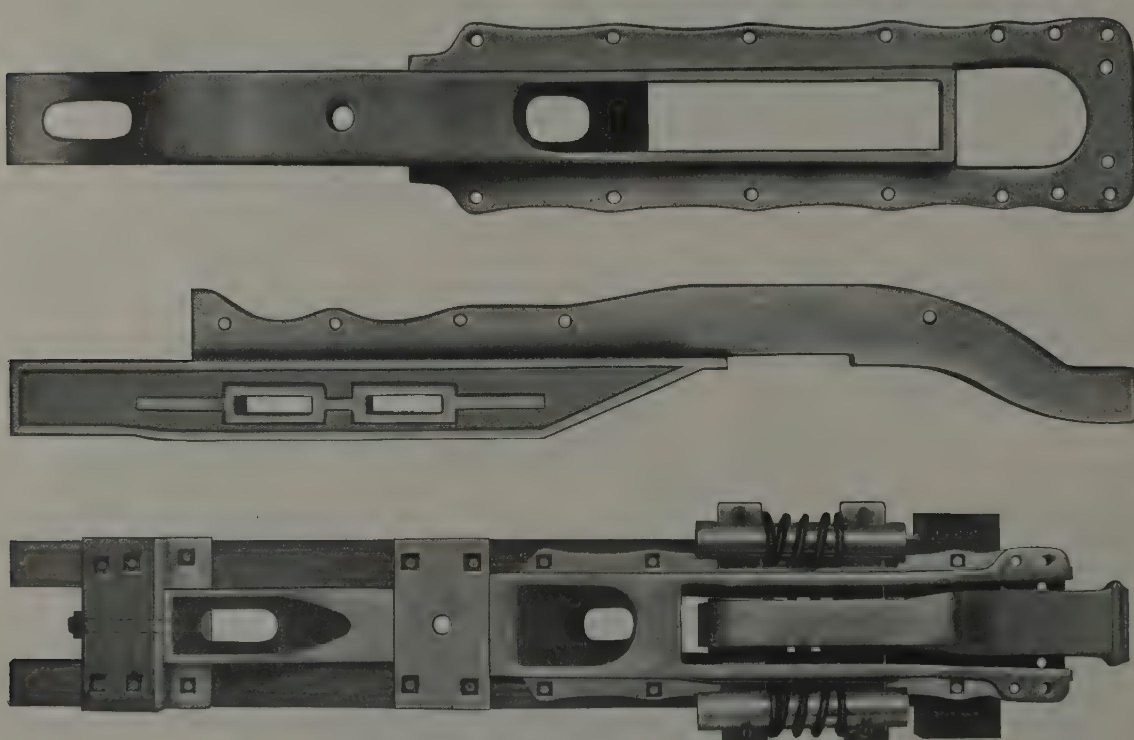


Fig. 717—Cast Steel Draft Arms. Chicago Steel Car Company.

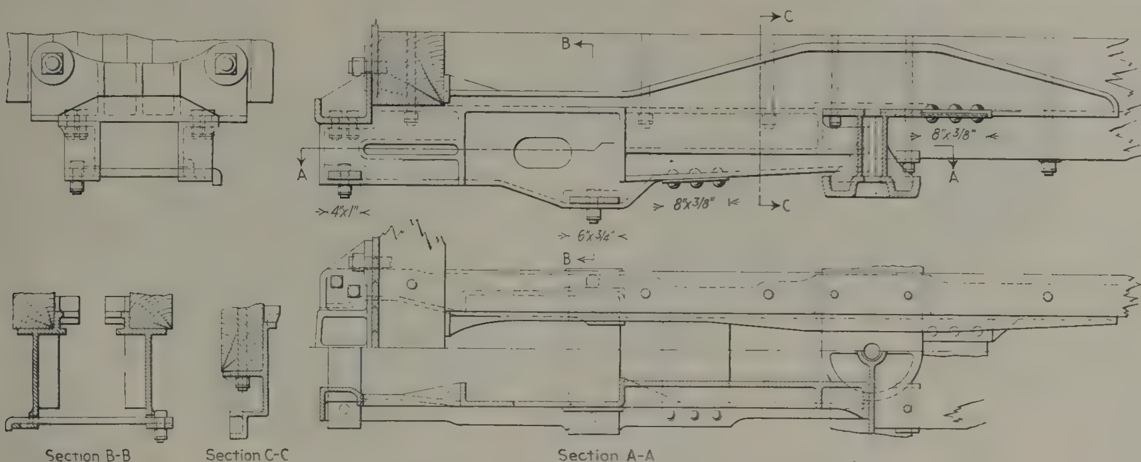


Fig. 718—Rolled Steel Draft Arm. Elgin, Joliet & Eastern.

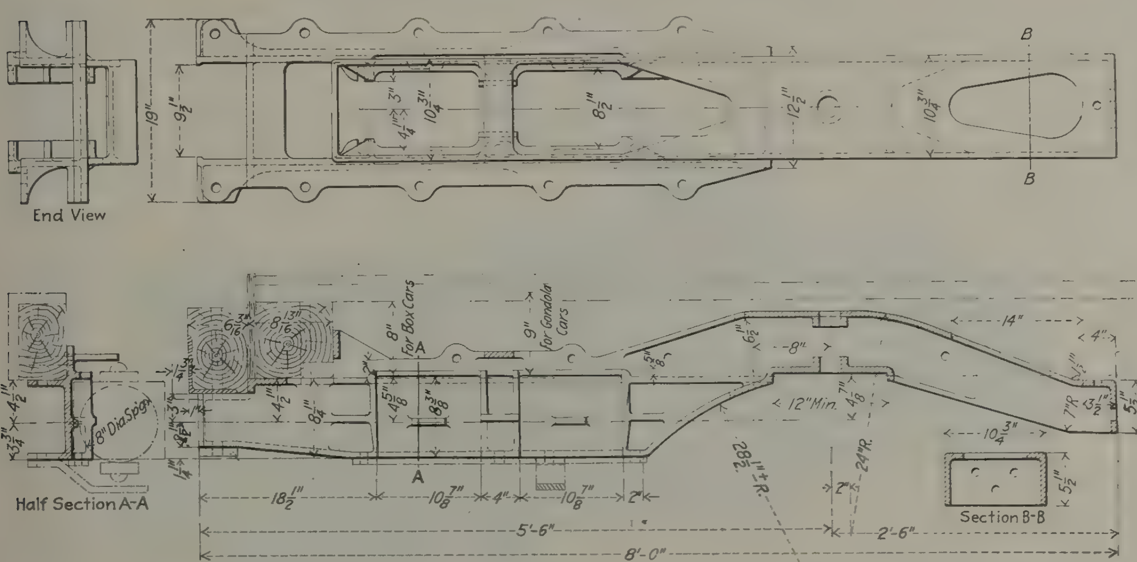


Fig. 719—Cast Steel Draft Arm. Pittsburgh Steel Foundry Company.

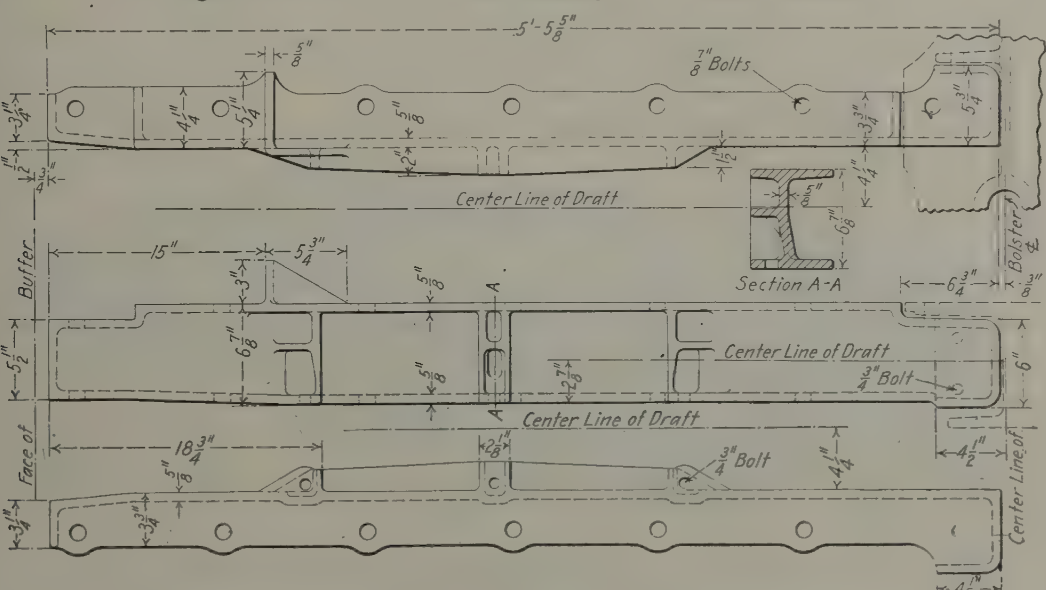


Fig. 720—Cast Steel Draft Arm. Pittsburgh Steel Foundry Company.

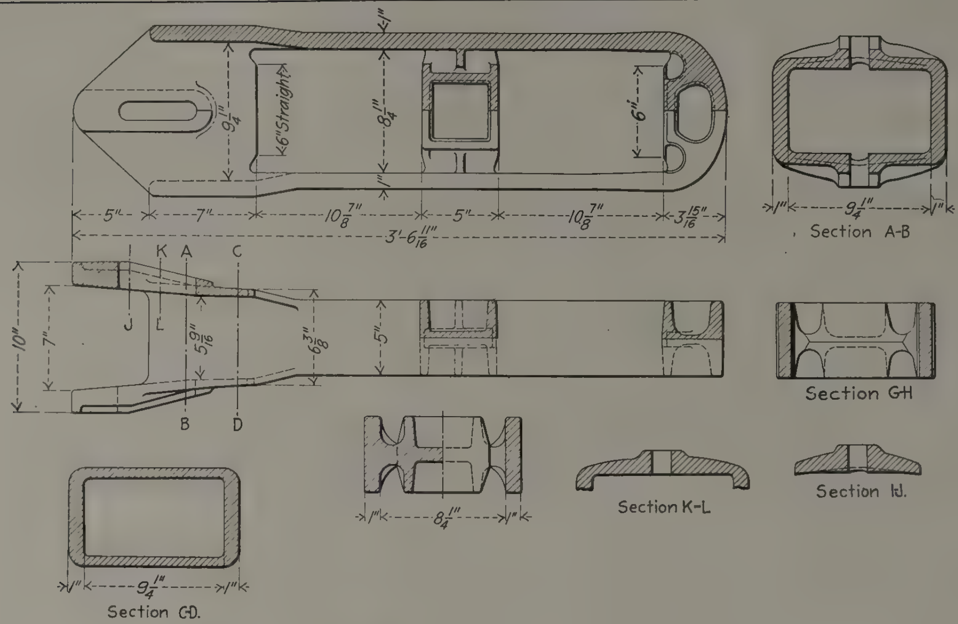


Fig. 721—Buckeye Yoke for 8 in. by 8 in. Tandem Gear.
Buckeye Steel Castings Company.

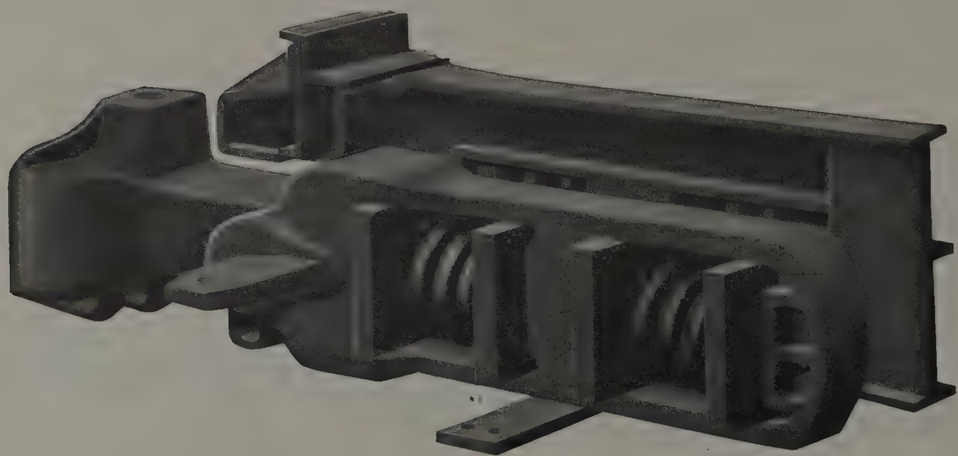


Fig. 722—Application of Buckeye Cast Steel Keyed Yoke for Tandem Gears.
Buckeye Steel Castings Company.

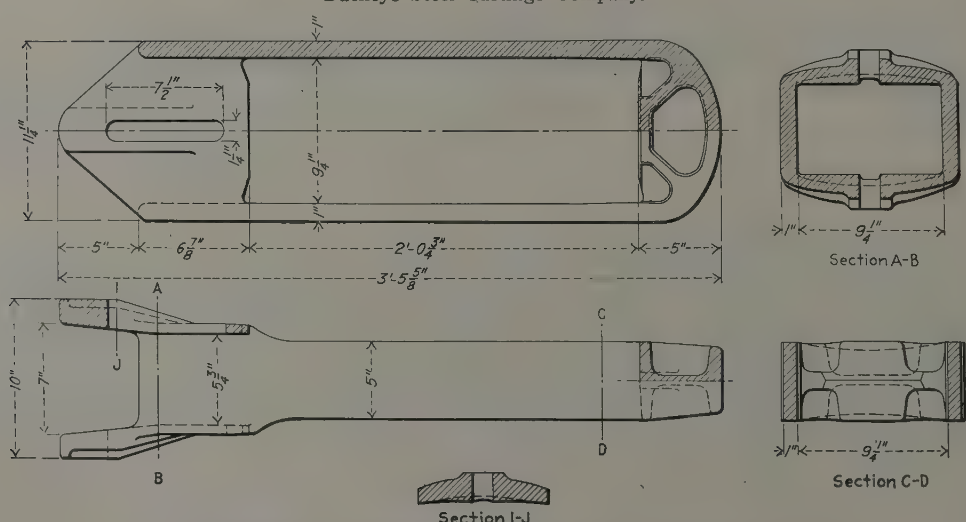


Fig. 723—Buckeye Yoke for Friction Gear. Buckeye Steel Castings Company.

Fig. 724—Buckeye Cast Steel Keyed Yoke for Tandem Gears.
Buckeye Steel Castings Company.

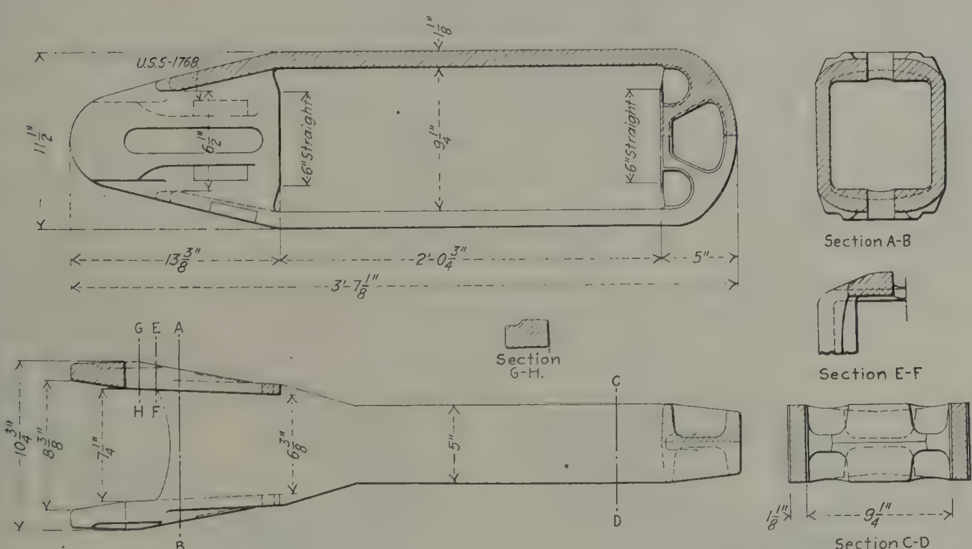


Fig. 725—Application of Buckeye Cast Steel Keyed Yoke for Twin Spring Gears.
Buckeye Steel Castings Company.

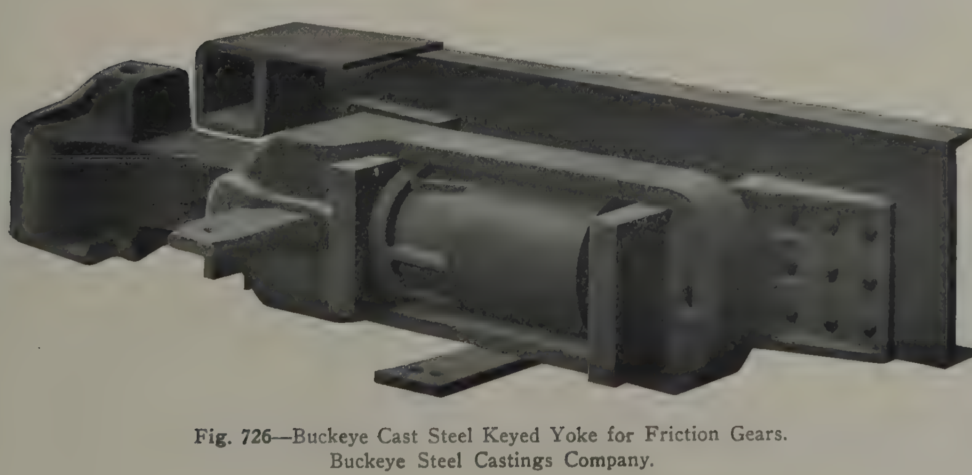


Fig. 726—Buckeye Cast Steel Keyed Yoke for Friction Gears.
Buckeye Steel Castings Company.

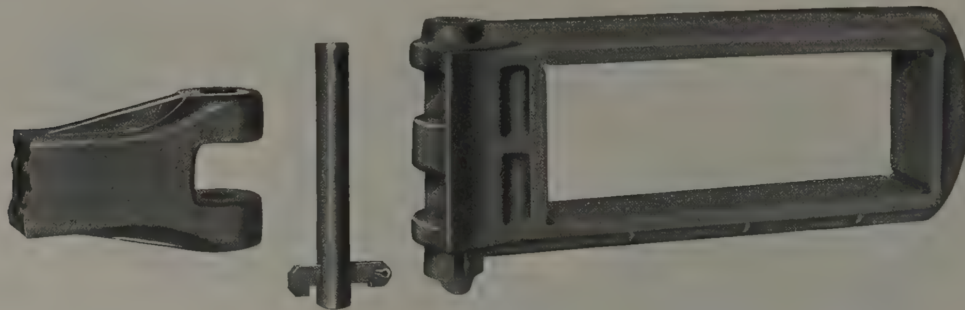


Fig. 727—Cast Steel Yoke with Quadruple Shear Pivot Pin.
National Malleable Castings Company.

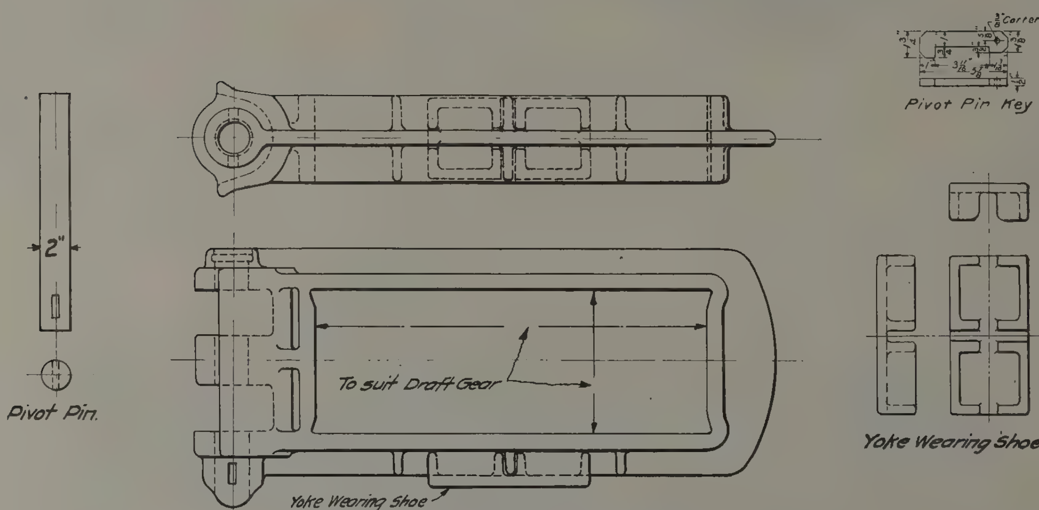


Fig. 728—Cast Steel Yoke with Quadruple Shear Pivot Pin.
National Malleable Castings Company.

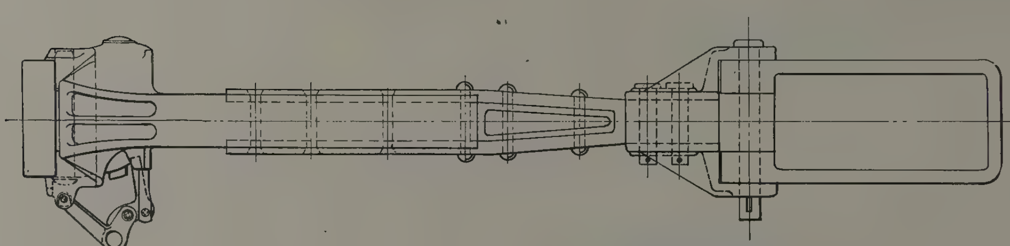


Fig. 729—Cast Steel Connection Between Wrought Shank and Yoke for Quadruple Shear Pivot Pin.
National Malleable Castings Company.

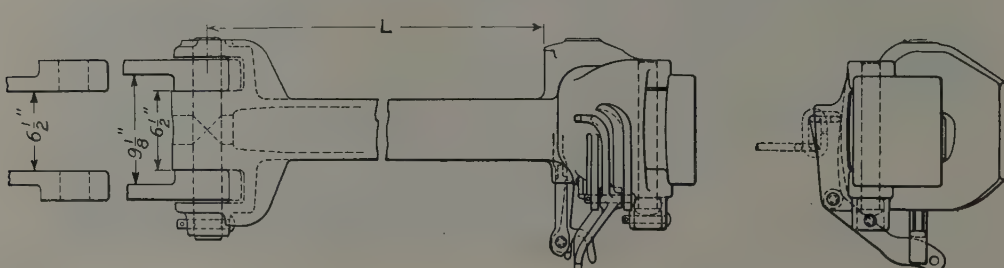


Fig. 730.—Cast Steel Extended Shank and Yoke Connection for Quadruple Shear Pivot Pin.
National Malleable Castings Company.

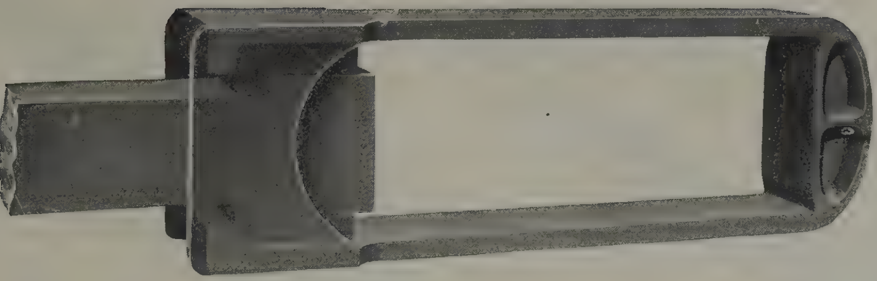


Fig. 731—Murray Keyless Cast Steel Yoke.
Keyoke Railway Equipment Co.

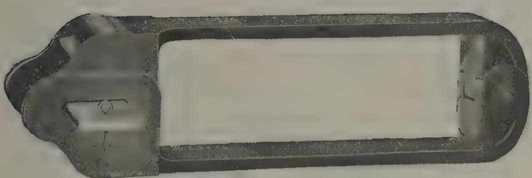


Fig. 732—Murray Cast Steel Keyoke.
Keyoke Railway Equipment Company.

Fig. 733—Eclipse Coupler Yoke.
American Steel Foundries.

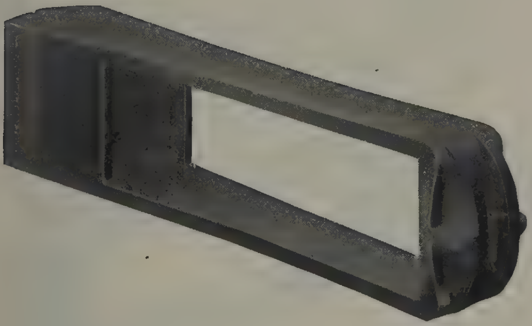


Fig. 734—Miner Two-Part Cast Steel Keyless Yoke for Friction Draft Gear. W. H. Miner.

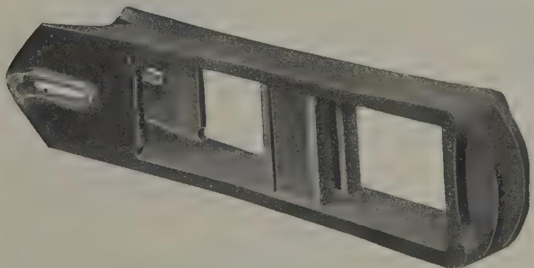


Fig. 735—Miner Two-Part Cast Steel Yoke for Tandem Gear Arranged for Key Connection to Coupler. W. H. Miner.

Fig. 736—Miner Cast Steel Keyless Yoke for Friction Draft Gear. W. H. Miner.

Fig. 737—Miner Two-Part Cast Steel Yoke for Friction Draft Gear Arranged for Key Connection to Coupler. W. H. Miner.

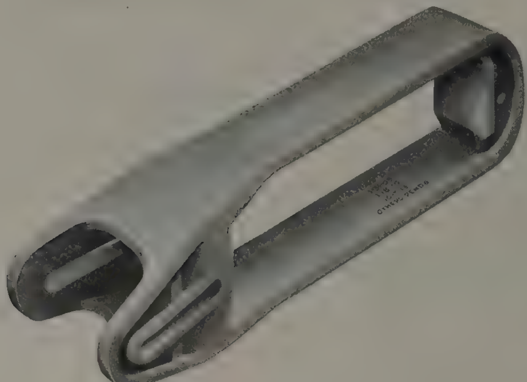


Fig. 738—Universal Keyed Yoke for U. S. Government Standard Cars. Universal Draft Gear Attachment Company.

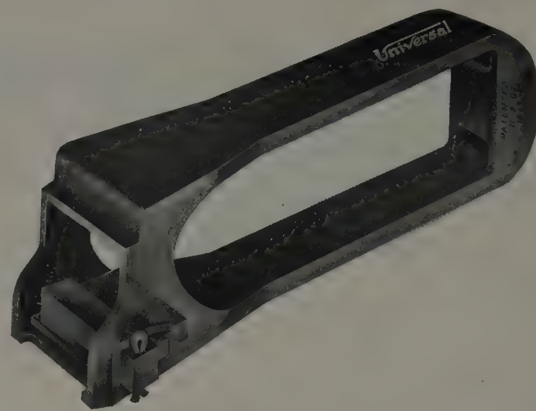


Fig. 740—Universal "Rivles" Yoke for Friction Draft Gear. Universal Draft Gear Attachment Company.

Fig. 739—Universal Keyed Yoke for Friction Draft Gear. Universal Draft Gear Attachment Company.

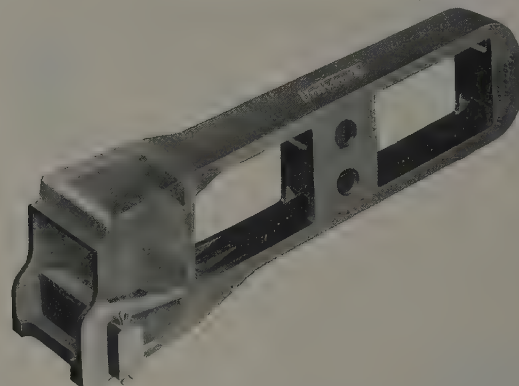


Fig 740-A—Universal "Rivles" Yoke for Tandem Spring Gear. Universal Draft Gear Attachment Co.

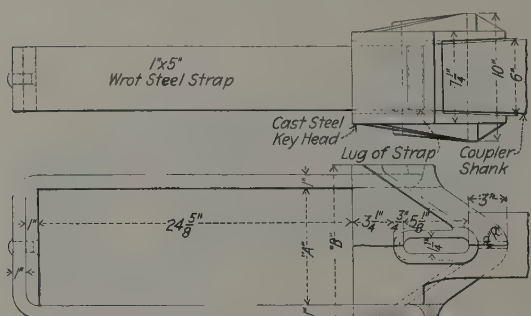


Fig. 741—Composite Coupler Yoke. Gould Coupler Company.

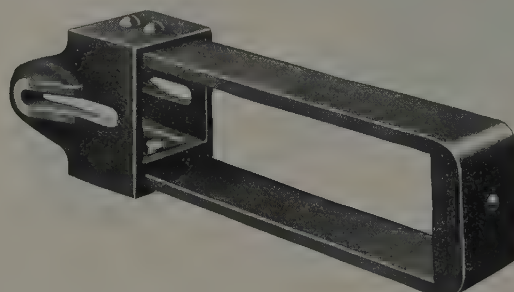


Fig. 743—Combination Yoke for Friction Draft Gear Arranged for Key Connection to Coupler. W. H. Miner.

Fig. 742—Eclipse Cast Steel Coupler Yoke. National Car Equipment Company.

Fig. 743A—Combination Yoke with T Head for Friction Draft Gear. W. H. Miner.

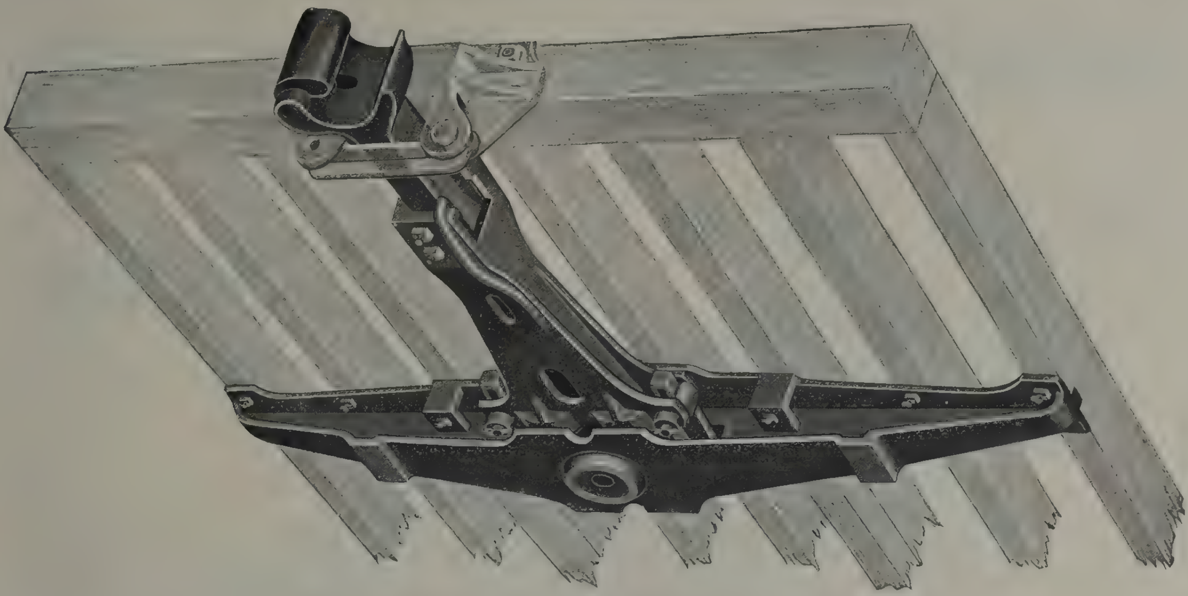


Fig. 744—Commonwealth Cast Steel Transom Draft Gear.

Fig. 745—Commonwealth Cast Steel Transom Draft Gear for Steel Cars.

Fig. 746—Parts of Commonwealth Cast Steel Transom Draft Gear for Wooden Cars.

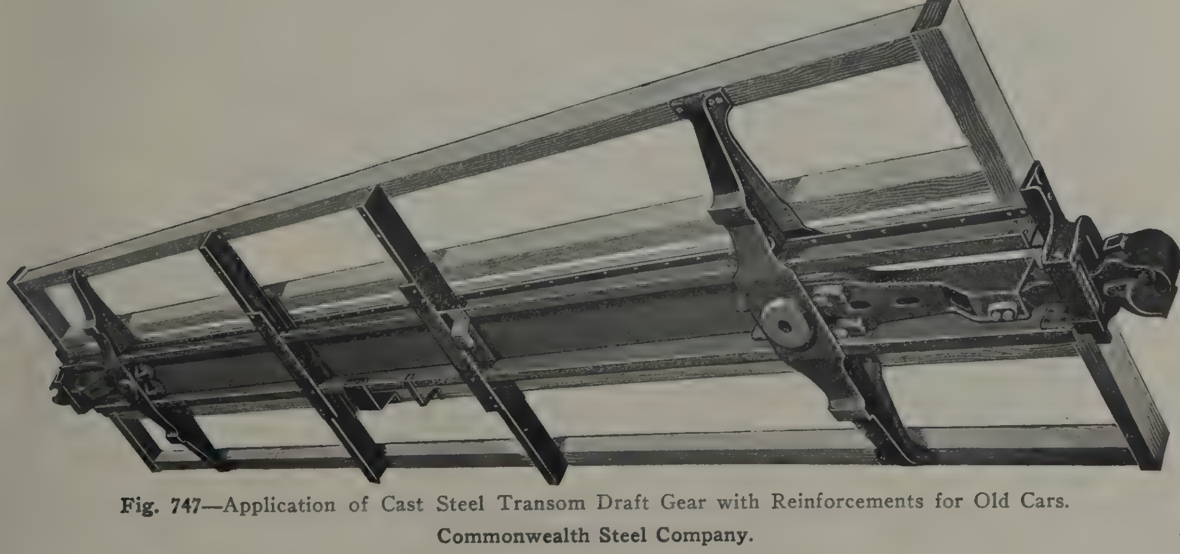
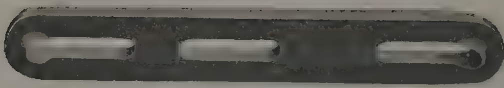
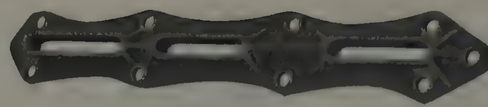


Fig. 747—Application of Cast Steel Transom Draft Gear with Reinforcements for Old Cars.

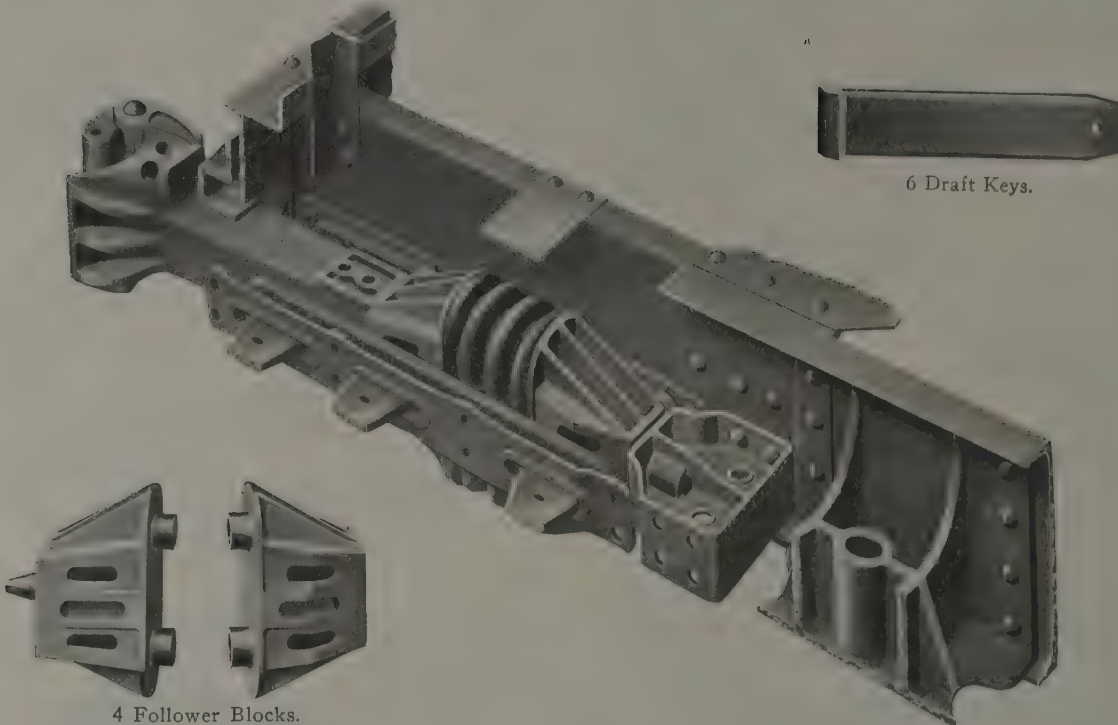
Commonwealth Steel Company.



4 Side Links



4 Cheek Plates.



6 Draft Keys.

4 Follower Blocks.

Fig. 748—Farlow Three-Key Draft Attachment for Use with M. C. B., Class G, 8 in. by 7⅞ in. Twin Springs, and Parts for One Car. T. H. Symington Company.

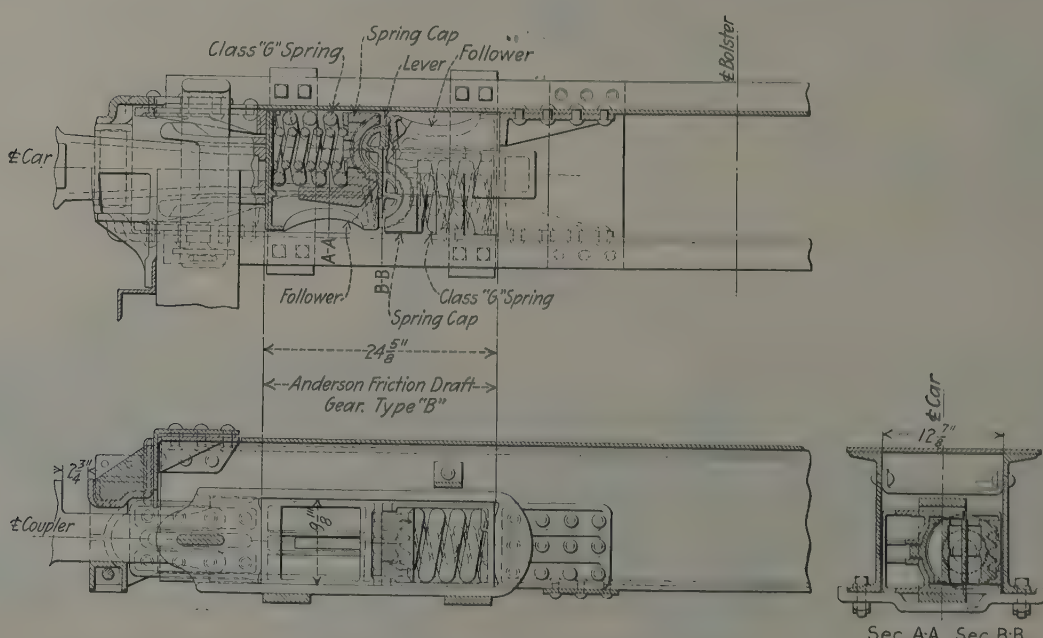
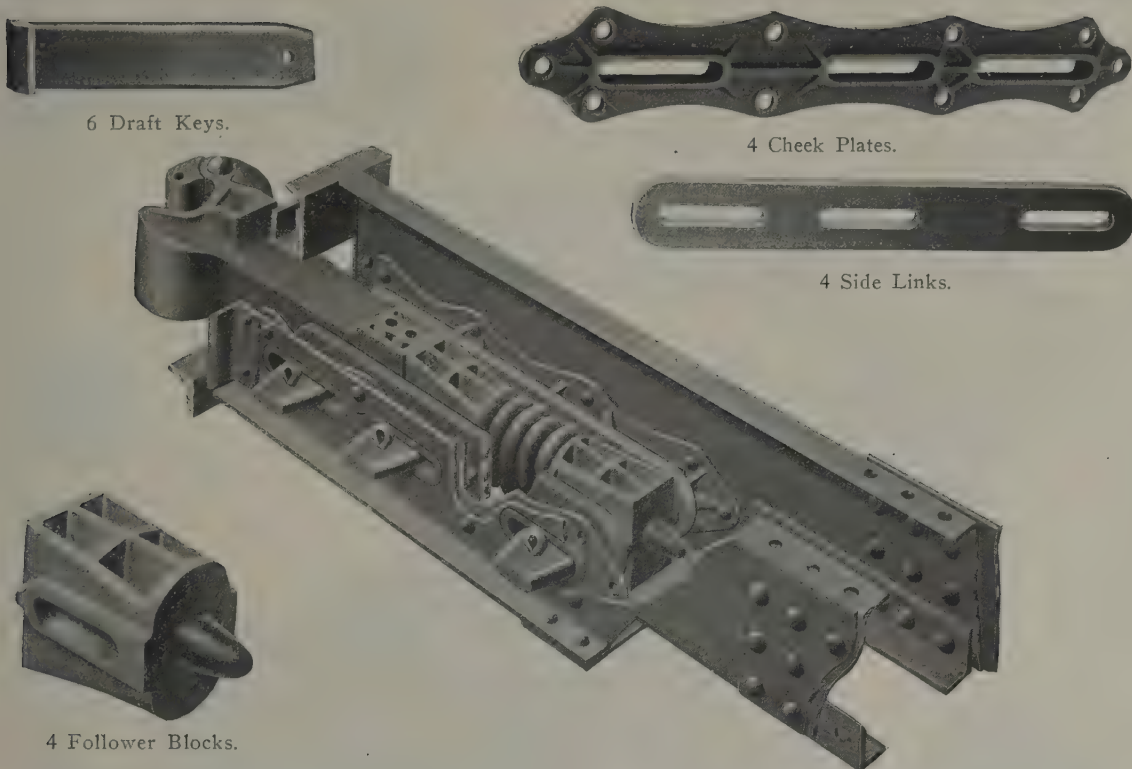


Fig. 749—Anderson Type B Friction Draft Gear. Waugh Draft Gear Company.



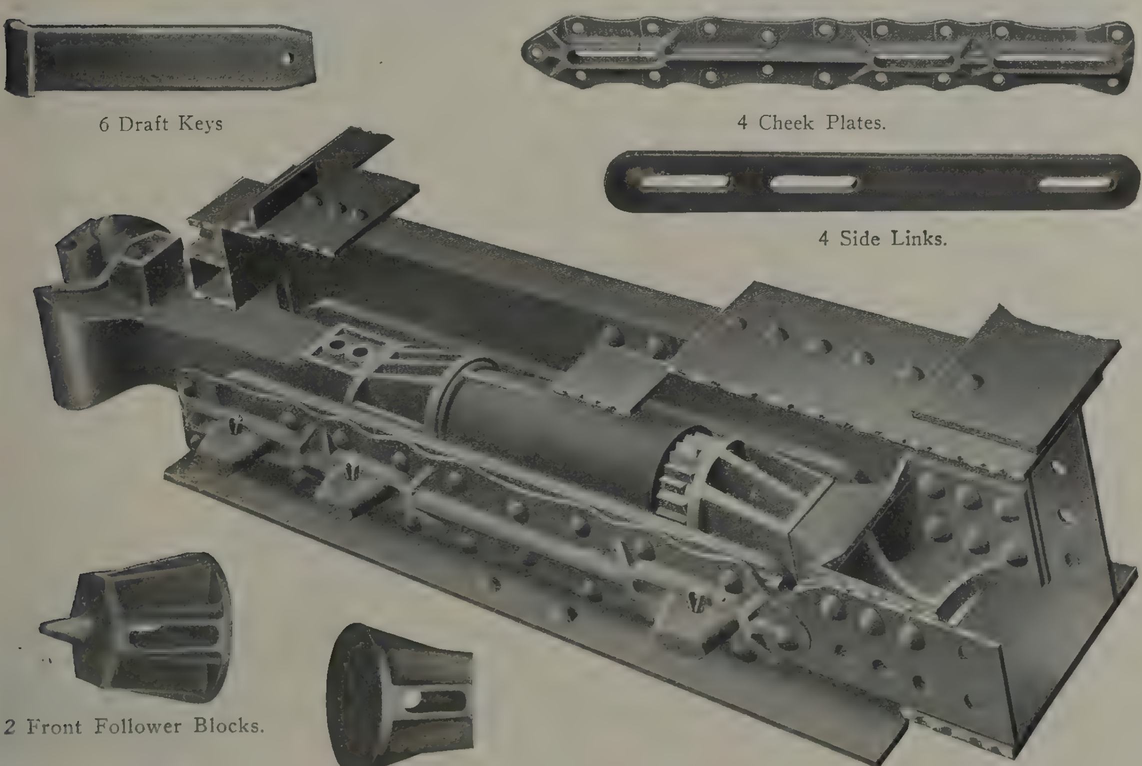
6 Draft Keys.

4 Cheek Plates.

4 Side Links.

4 Follower Blocks.

Fig. 750—Farlow Three-Key Draft Attachment for Use with M. C. B. 6¼ in. by 8 in. Single Spring, and Parts for One Car, as applied to Light Capacity Cars for Export.



6 Draft Keys

4 Cheek Plates.

4 Side Links.

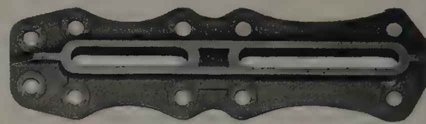
2 Front Follower Blocks.

2 Back Follower Blocks.

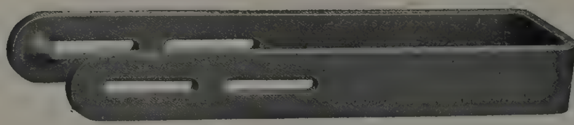
Fig. 751—Farlow Three-Key Draft Attachments for Use with Westinghouse or Any Other Type of Friction Draft Gear, and Parts for One Car.

T. H. Symington Company.

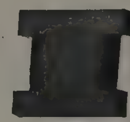
4 Draft Keys



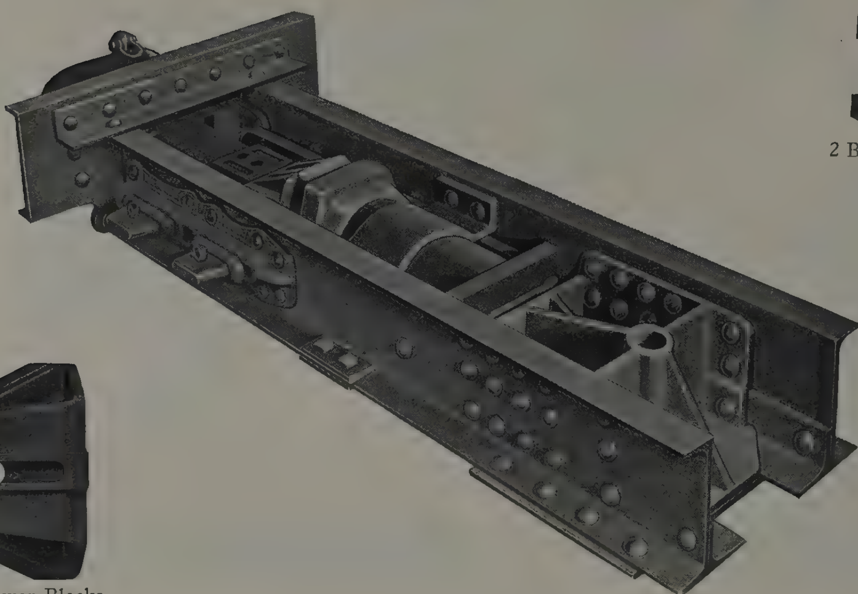
4 Cheek Plates.

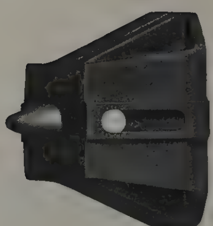


2 Yokes.



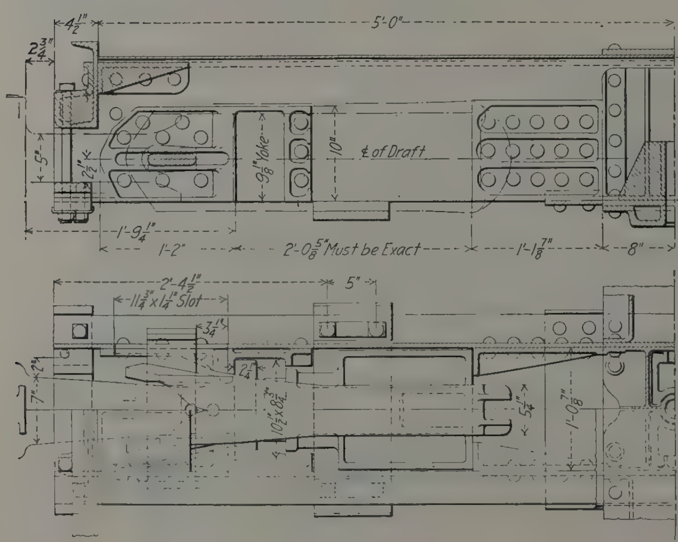
2 Back Followers.

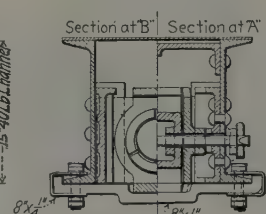




2 Front Follower Blocks.

Fig. 752—Farlow Two-Key Draft Attachment for Use with Sessions or Other Types of Friction Draft Gear, and Parts for One Car. T. H. Symington Company.





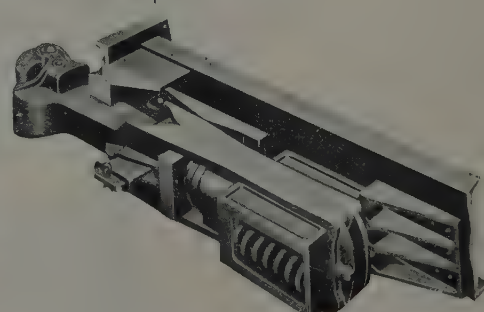


Fig. 753—Miner Friction Draft Gear Class A-18-S and Two-Part Cast Steel Yoke with Key Connection to Coupler, as applied to Freight Equipment.
W. H. Miner.

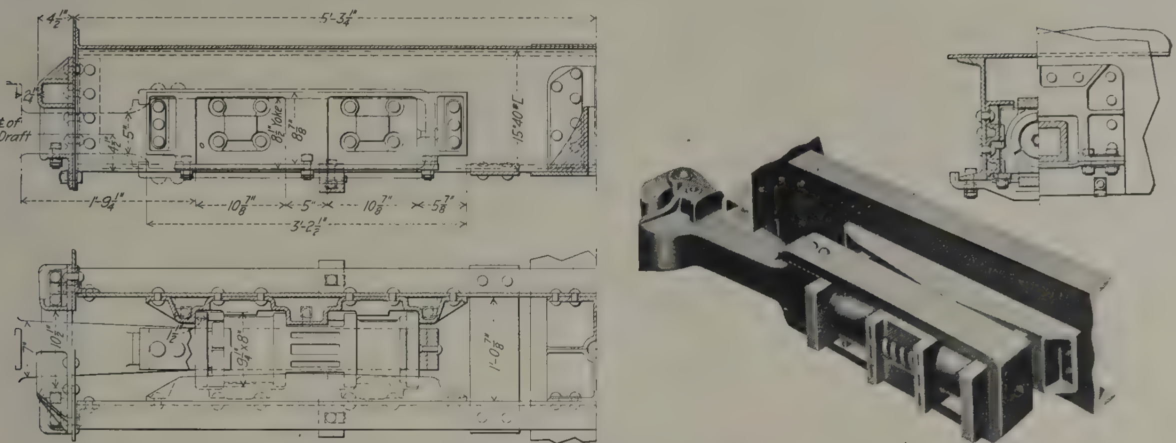


Fig. 754—Miner Friction Draft Gear Class-A-19-A as Applied to Freight Equipment.
W. H. Miner.

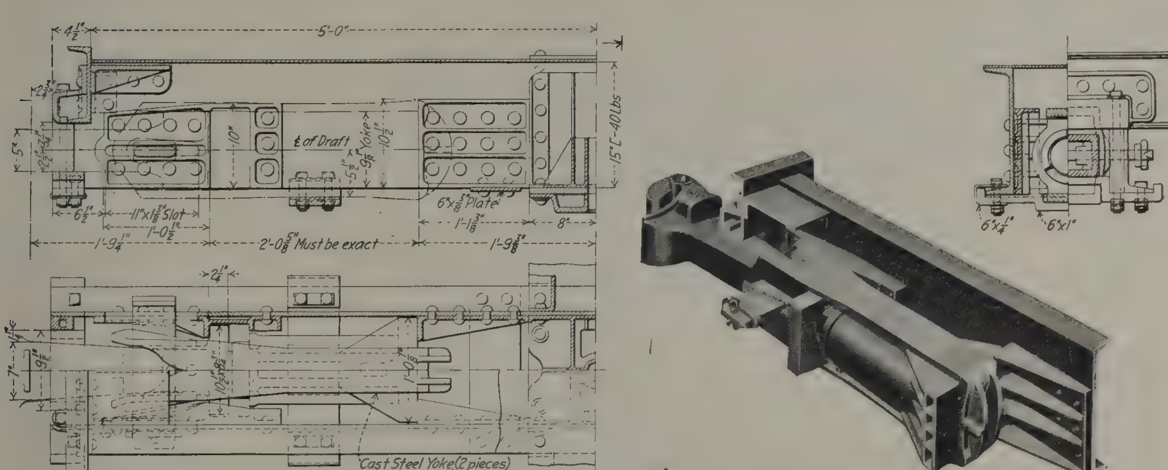


Fig. 755—Miner Friction Draft Gear Class-A-29-S and Two-Part Cast Steel Yoke with Key Connection to Coupler as Applied to Freight Equipment. W. H. Miner.

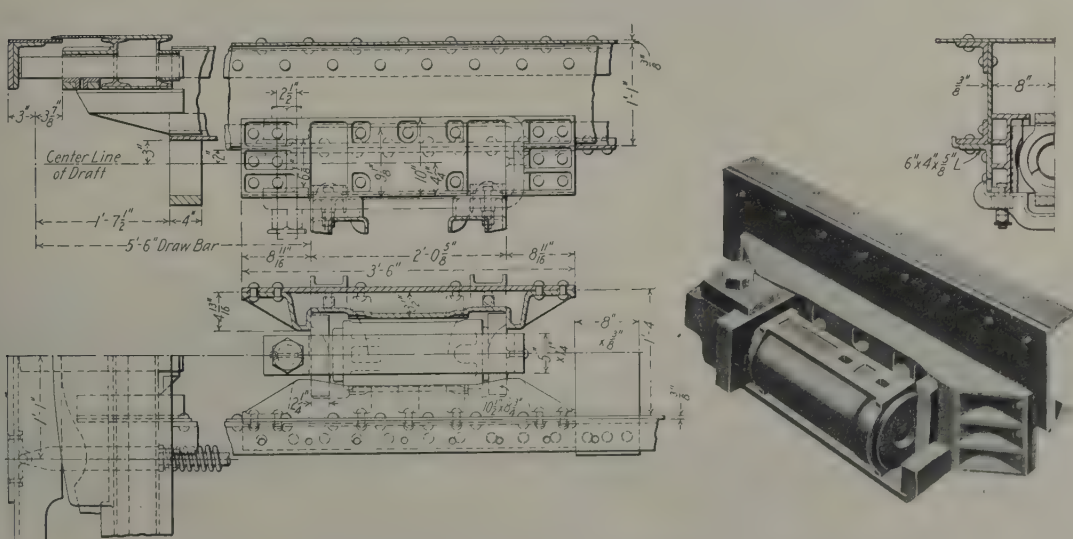


Fig. 756—Miner Friction Draft Gear Class A-3-P as Applied to Passenger Equipment.
W. H. Miner.

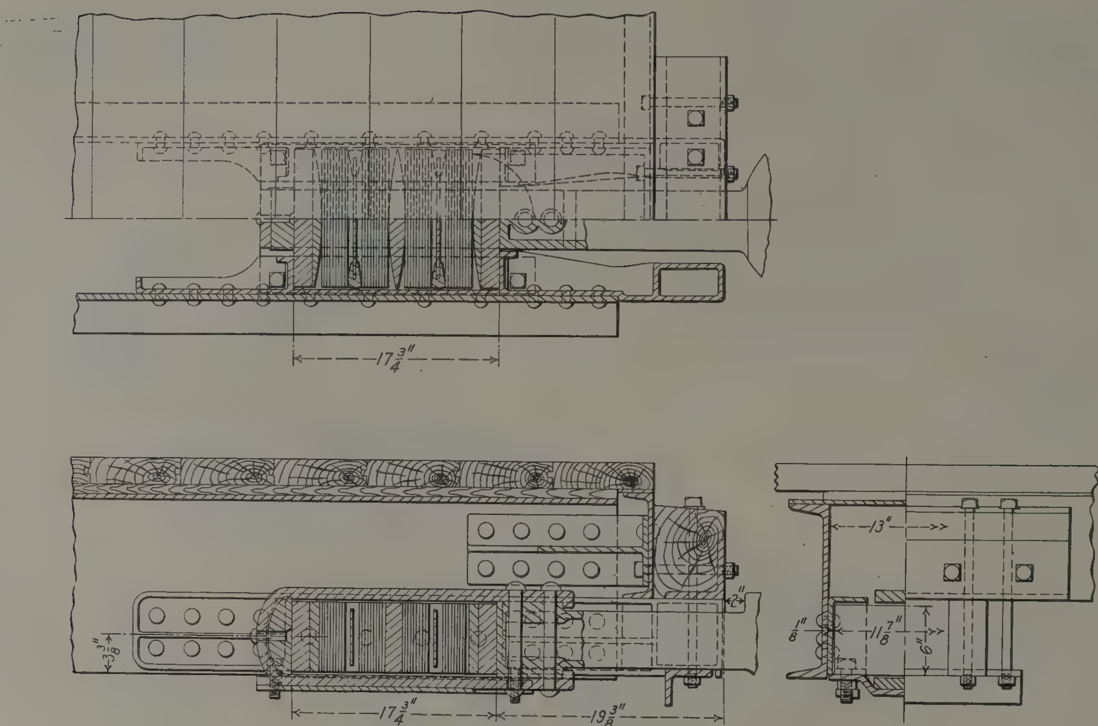


Fig. 757—Waugh Draft Gear as Applied to Chicago & North Western Freight Cars.
Waugh Draft Gear Company.

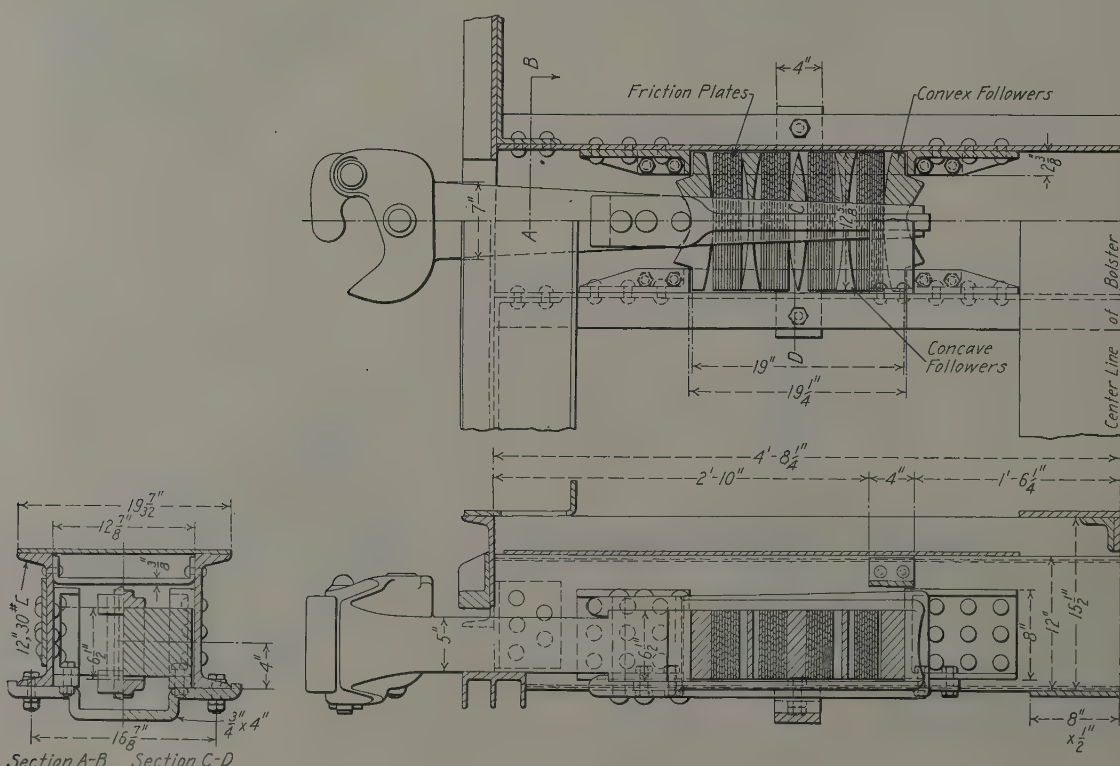


Fig. 758—Application of Waugh-Forsyth High Capacity Radial Draft Gear to Southern Railway Freight Cars.
Waugh Draft Gear Company.

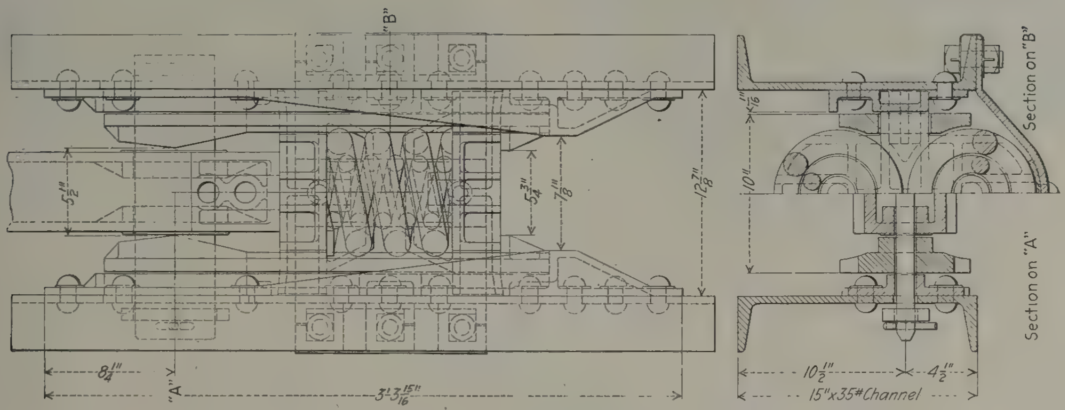


Fig. 759—Sherman Twin Spring Draft Gear with M. C. B. Class G Springs. Dominion Steel Foundry Company, Ltd.

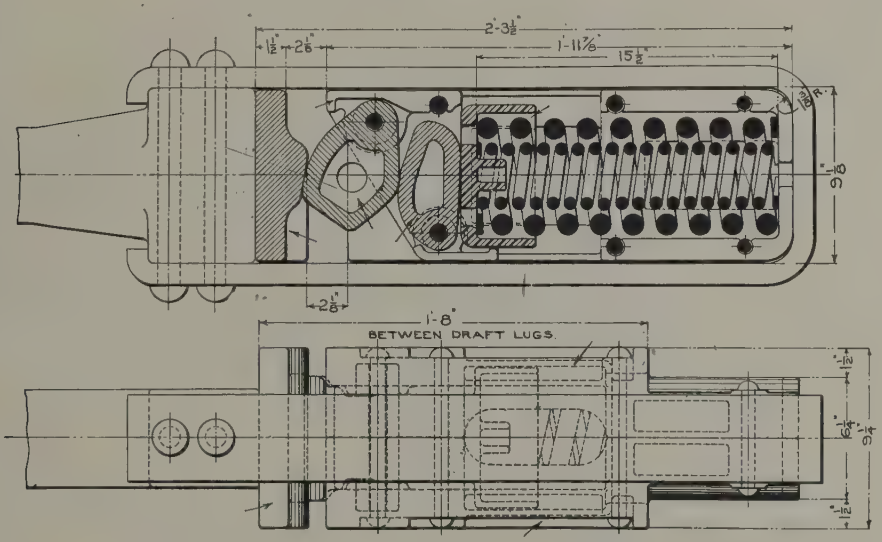


Fig. 760—General Arrangement of McCord Draft Gear, Type D. McCord & Company.

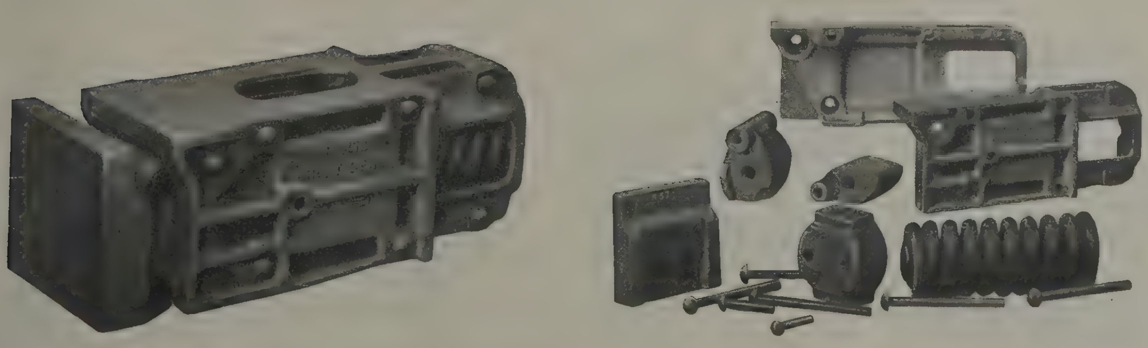


Fig. 761—McCord Draft Gear, Type D. McCord & Company.

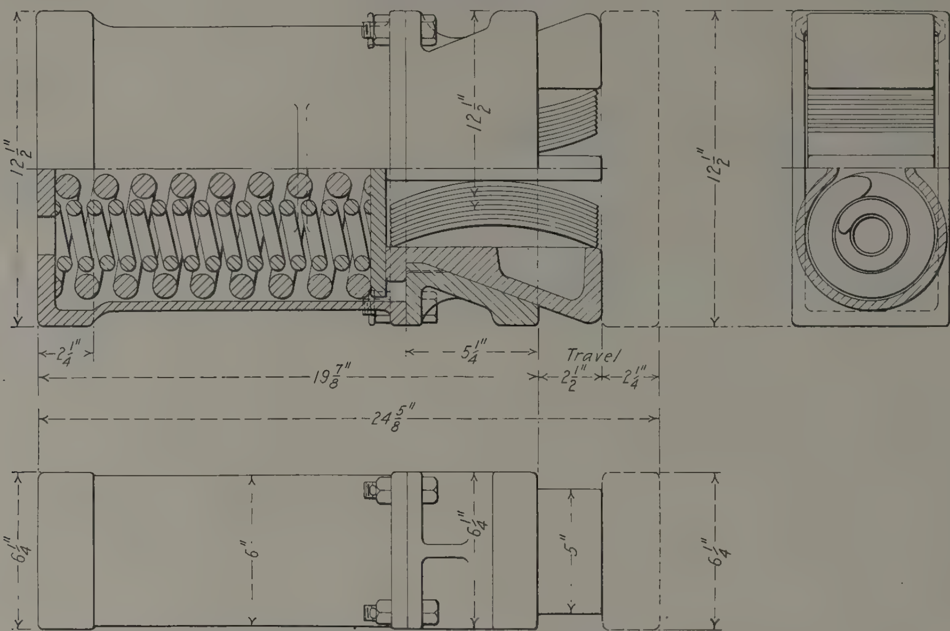


Fig. 762—Passenger Friction Draft Gear for 6½-in. Coupler Yoke. Gould Coupler Company.

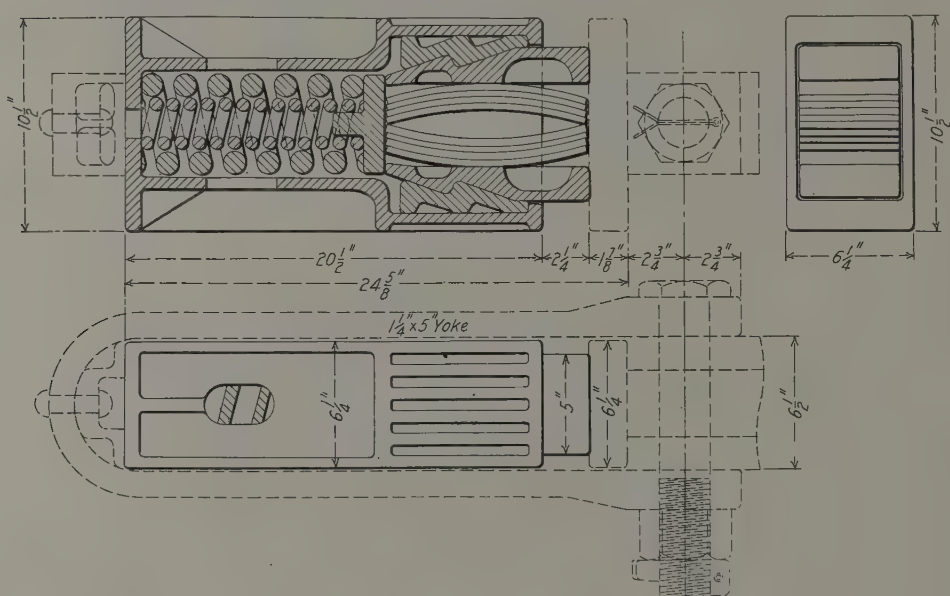


Fig. 763—Gould Passenger Friction Draft Gear FDG-56. Gould Coupler Company.

Fig. 764—Gould Heavy Type Friction Draft Gear No. 175. Gould Coupler Company.

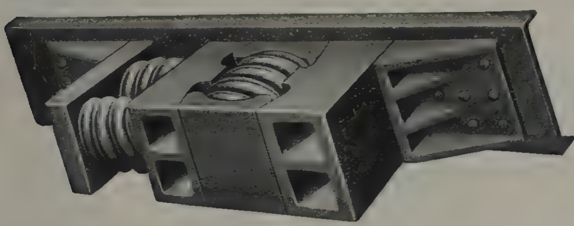


Fig. 765—Butler Friction Draft Gear No. 370 with One Draft Sill Removed.

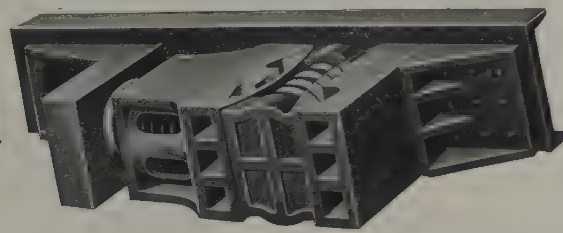
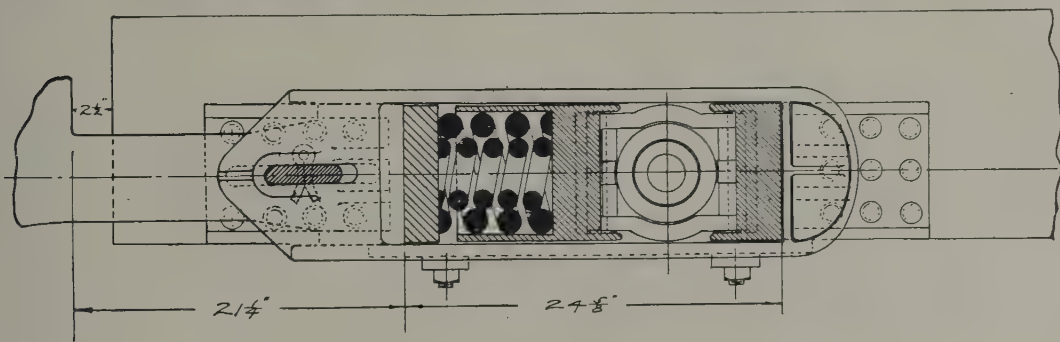


Fig. 766—Butler Friction Draft Gear with One Sill Removed.



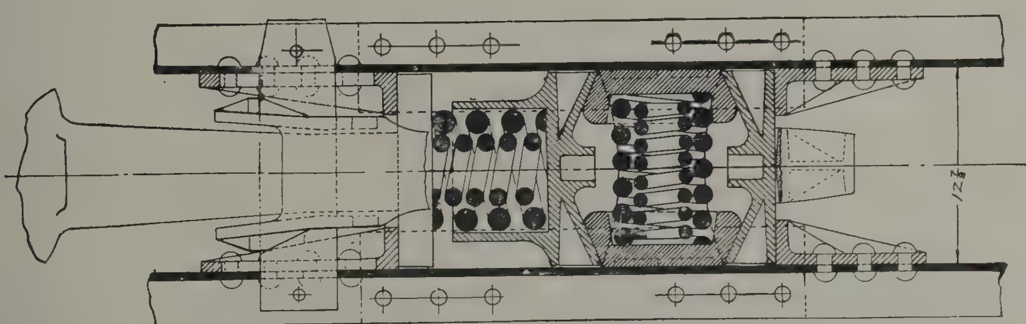
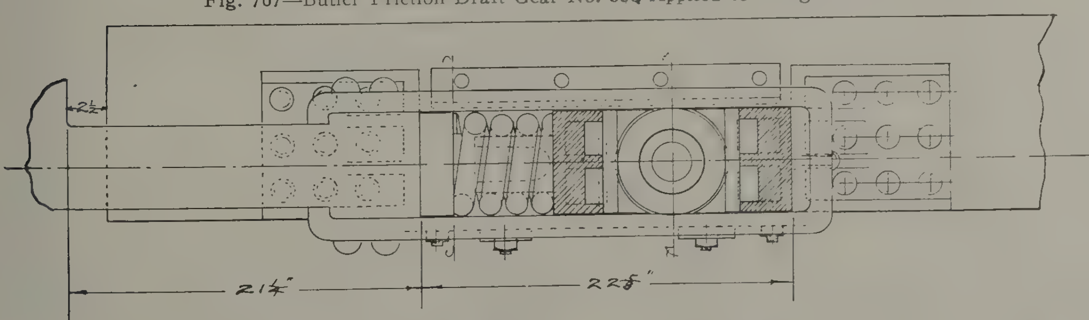


Fig. 767—Butler Friction Draft Gear No. 350 Applied to Freight Car.



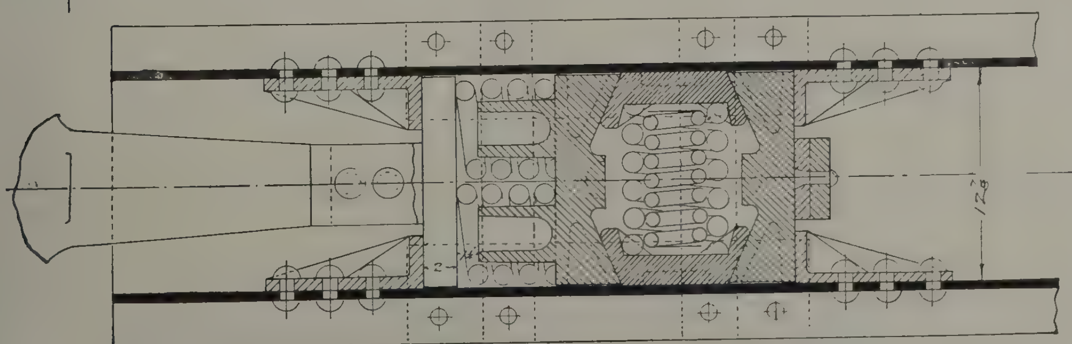


Fig. 768—Butler Friction Draft Gear No. 370 Applied to Freight Car.

Butler Drawbar Attachment Company.

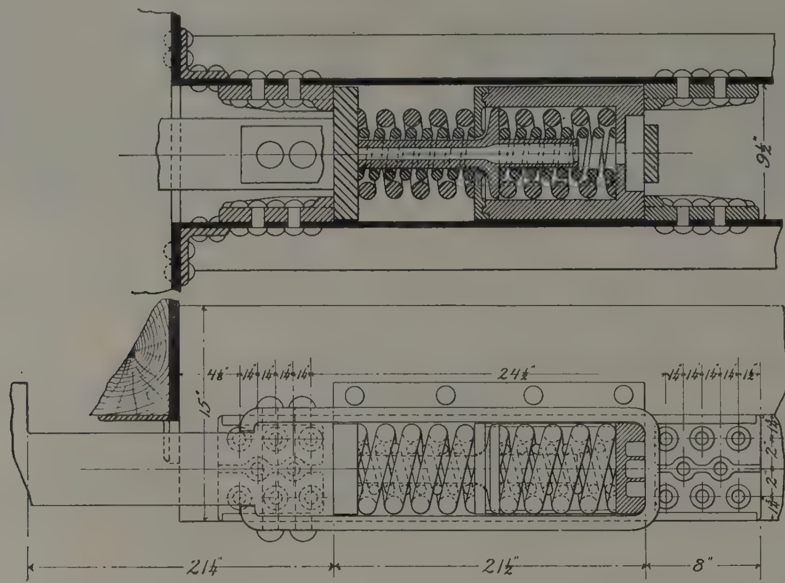


Fig. 769—Butler Special Tandem Spring Draft Gear. Butler Drawbar Attachment Company.

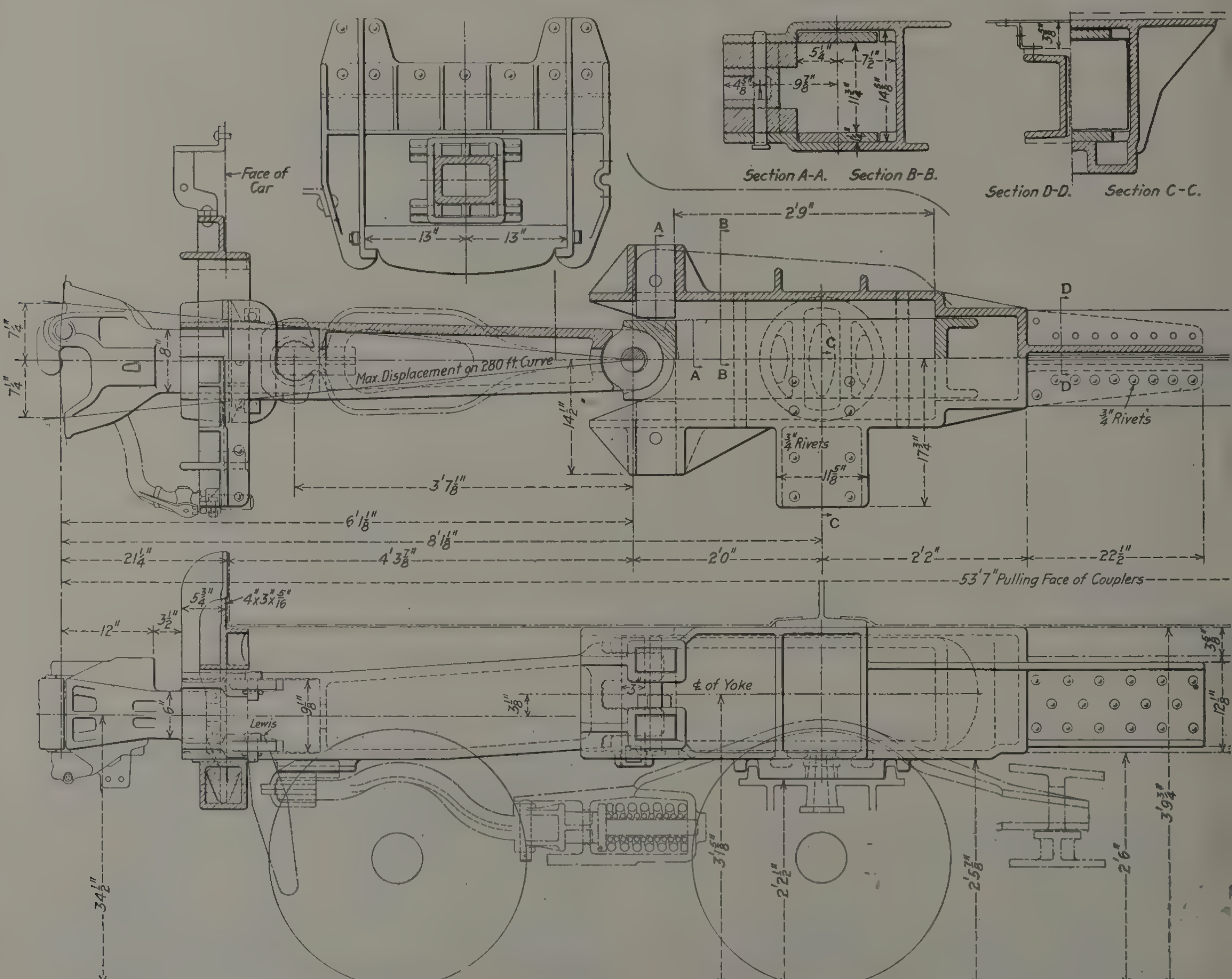


Fig. 770—National Radial Draft Gear Applied to 120-Ton Virginian Gondola Coal Car.
National Malleable Castings Company.

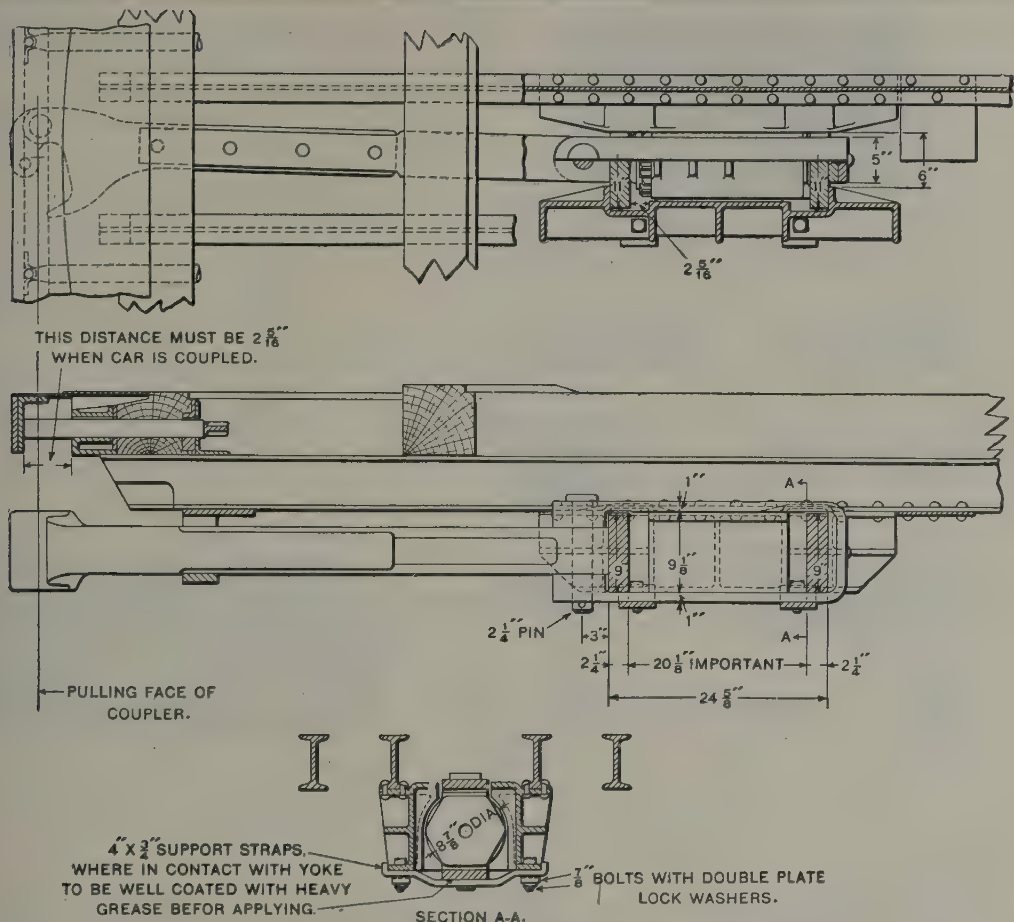
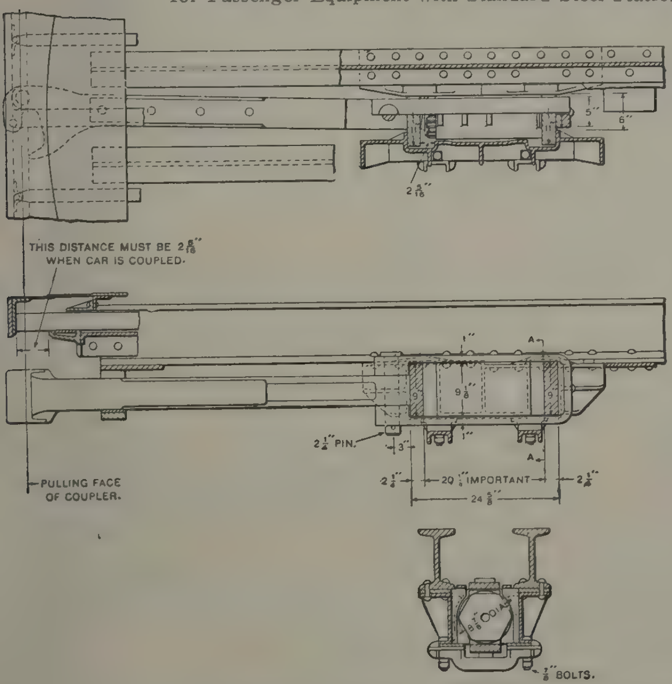


Fig. 771—Westinghouse Type D-3 Friction Draft Gear with Continuous Draft Plates with Limiting Stops, for Passenger Equipment with Standard Steel Platforms. Westinghouse Air Brake Company.



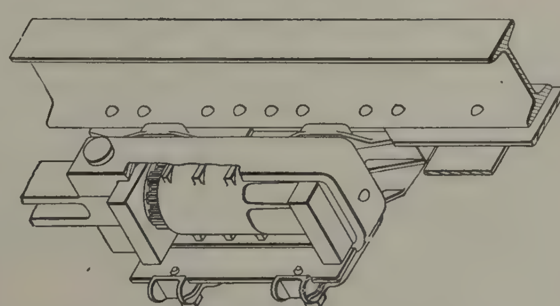


Fig. 773—Westinghouse Type D-3 Draft Gear Applied to Draft Sill.

Fig. 772—Westinghouse Type D-3 Friction Draft Gear with Universal Draft Gear Attachment Company's Continuous Draft Plates for Passenger Equipment with Standard Steel Platforms. Westinghouse Air Brake Company.

Parts of Westinghouse Friction Draft Gear, Type D-3.

42355 *Type D-3 Friction Draft Gear, Complete*
42292 *Cylinder Body*
5662 *Release Spring*
5663 *Preliminary Spring*
5664 *Auxiliary Release Spring*
5665 *Auxiliary Preliminary Spring*
5666 *Nut for Release Pin*
5667 *Release Pin*
5668 *Rivet for Securing Release Pin Nut*
5669 *Wedge*
5670 *Female Segment*
5671 *Male Segment*
5672 *Friction Strip*
5673 *Wedge and Release Pin with Auxiliary Preliminary Spring*

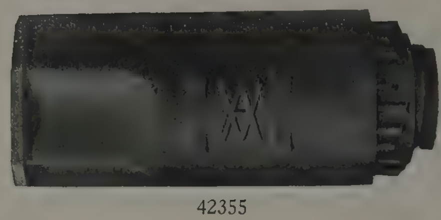


Fig. 774—Details of Westinghouse Friction Draft Gear. Westinghouse Air Brake Company.

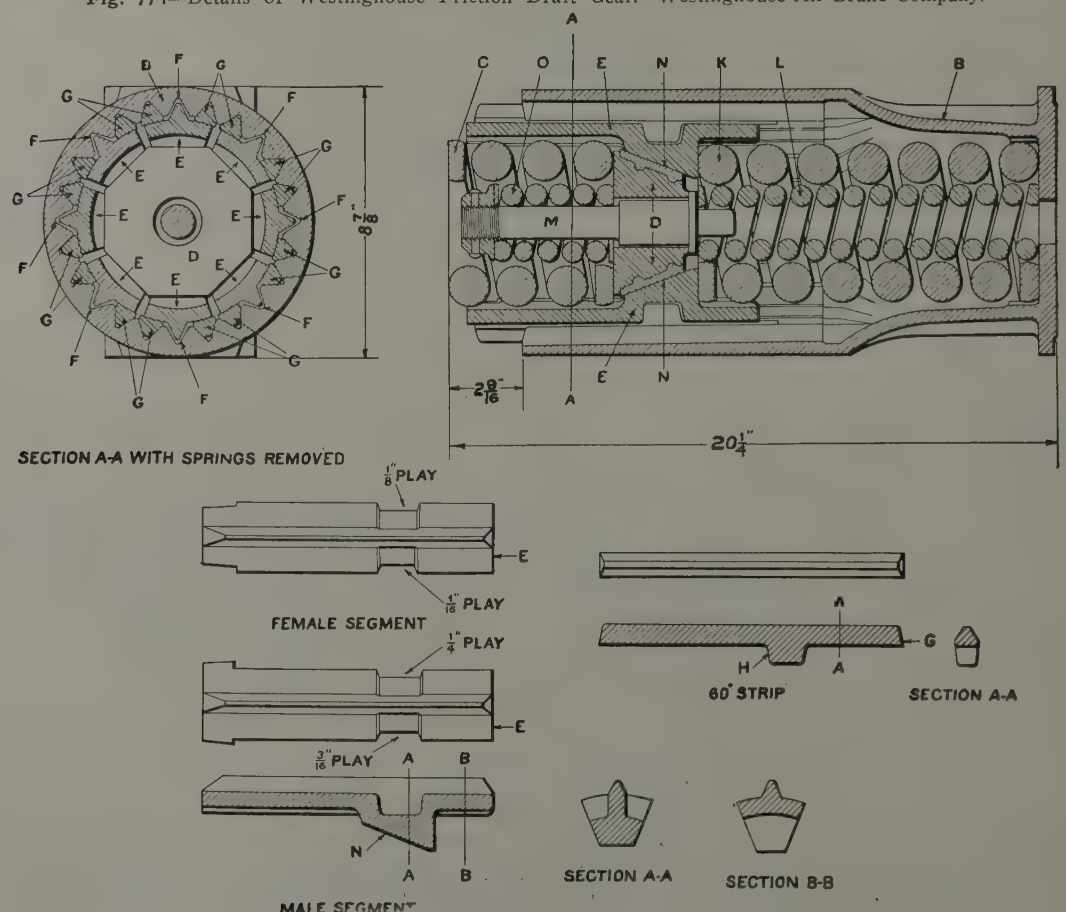


Fig. 775—Section Through Westinghouse Friction Draft Gear, Type D-3. Westinghouse Air Brake Company.

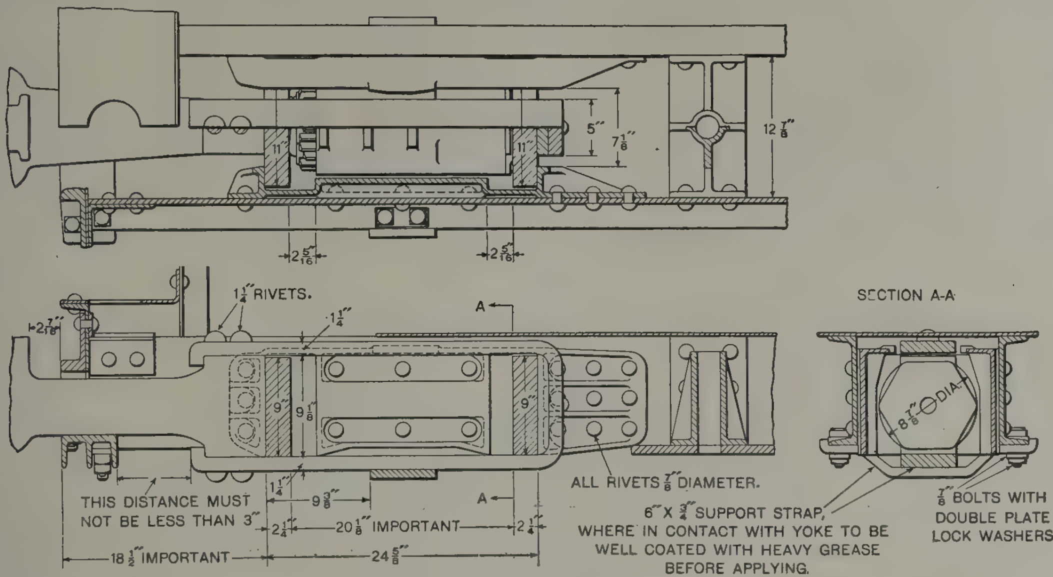


Fig. 776—Westinghouse Type D-3 Friction Draft Gear with Continuous Draft Plates with Limiting Stops, for Steel Underframe Freight Cars. Westinghouse Air Brake Company.

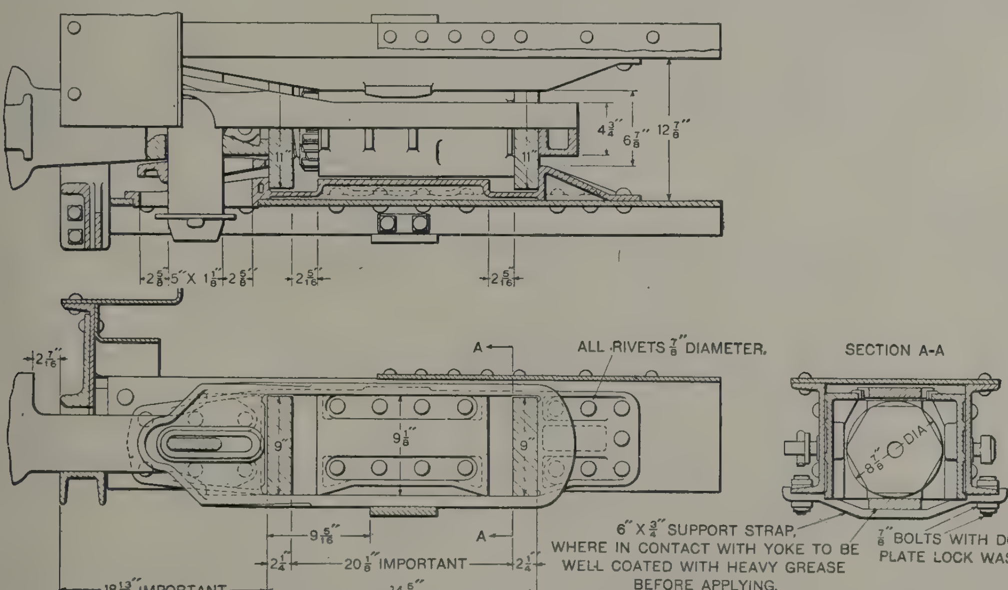
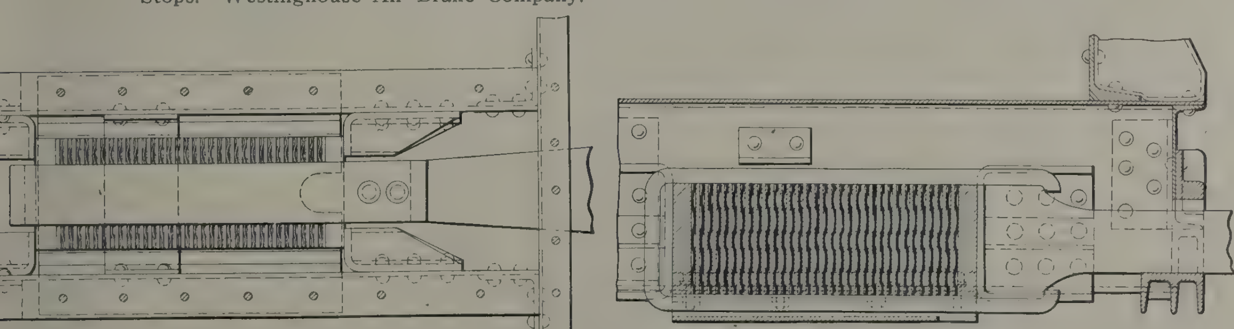


Fig. 777—Westinghouse Type D-3 Friction Draft Gear for Steel Underframe Freight Cars, with Universal Draft Gear Attachment Company's Keyed Yoke and Continuous Draft Plates with Limiting Stops. Westinghouse Air Brake Company.



Longitudinal Section. Plan.

Fig. 778—Slick Friction Draft Gear. Cambria Steel Company.

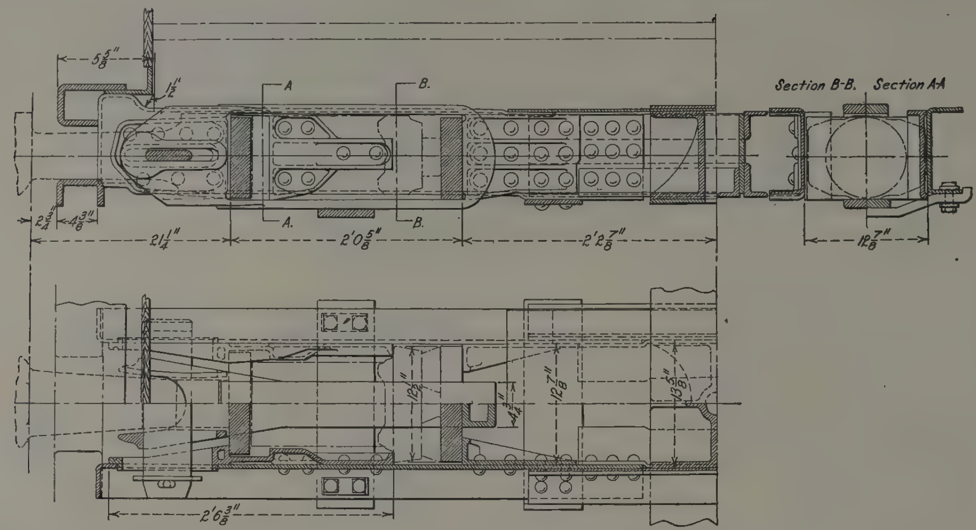


Fig. 779—Universal Attachments and Yoke for Sessions Draft Gear, Type K. Universal Draft Gear Attachment Company.

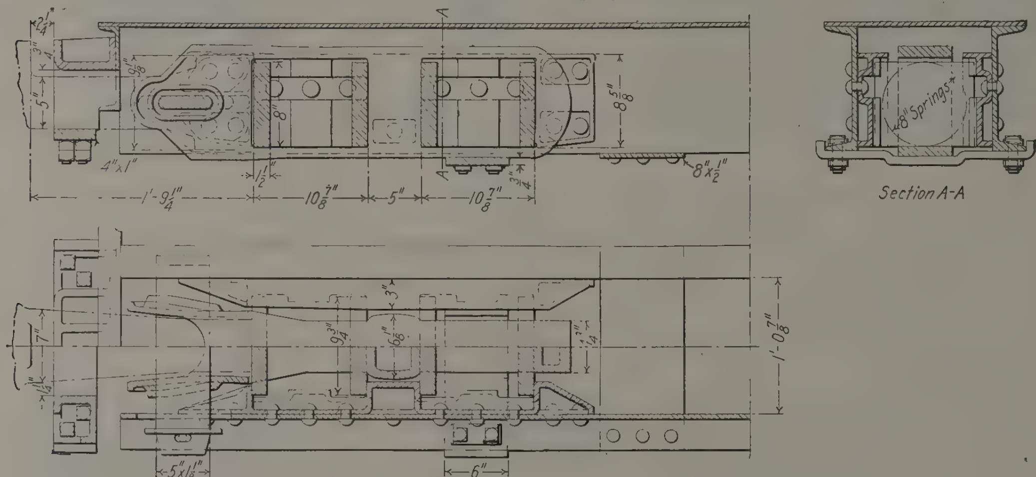


Fig. 780—General Application to Steel Underframes of Universal Tandem Keyed Yoke and Attachments Used with Class G Springs. Universal Draft Gear Attachment Company.

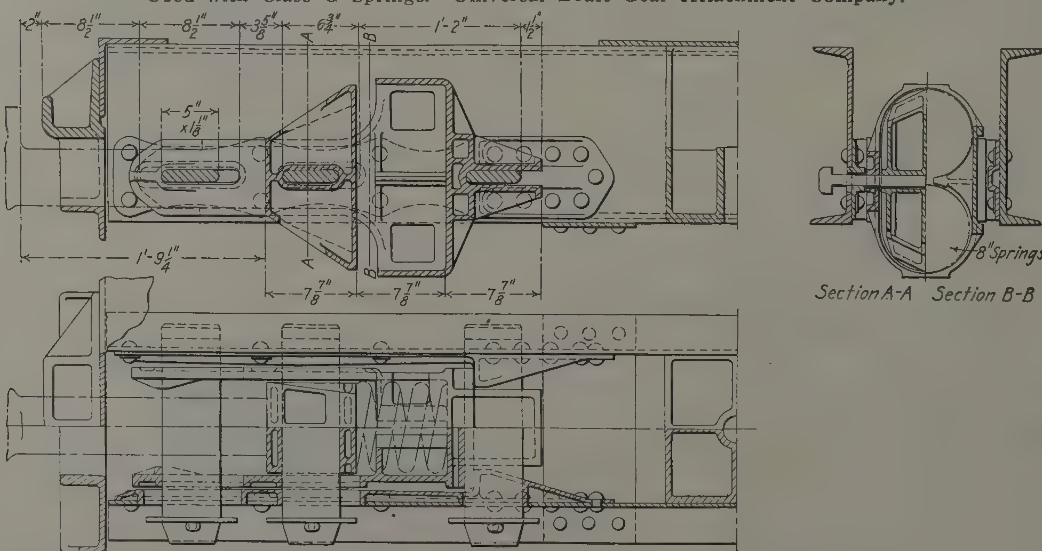


Fig. 781—General Application of Universal Triple Key Yoke and Attachments for Class G Twin Springs. Universal Draft Gear Attachment Co.

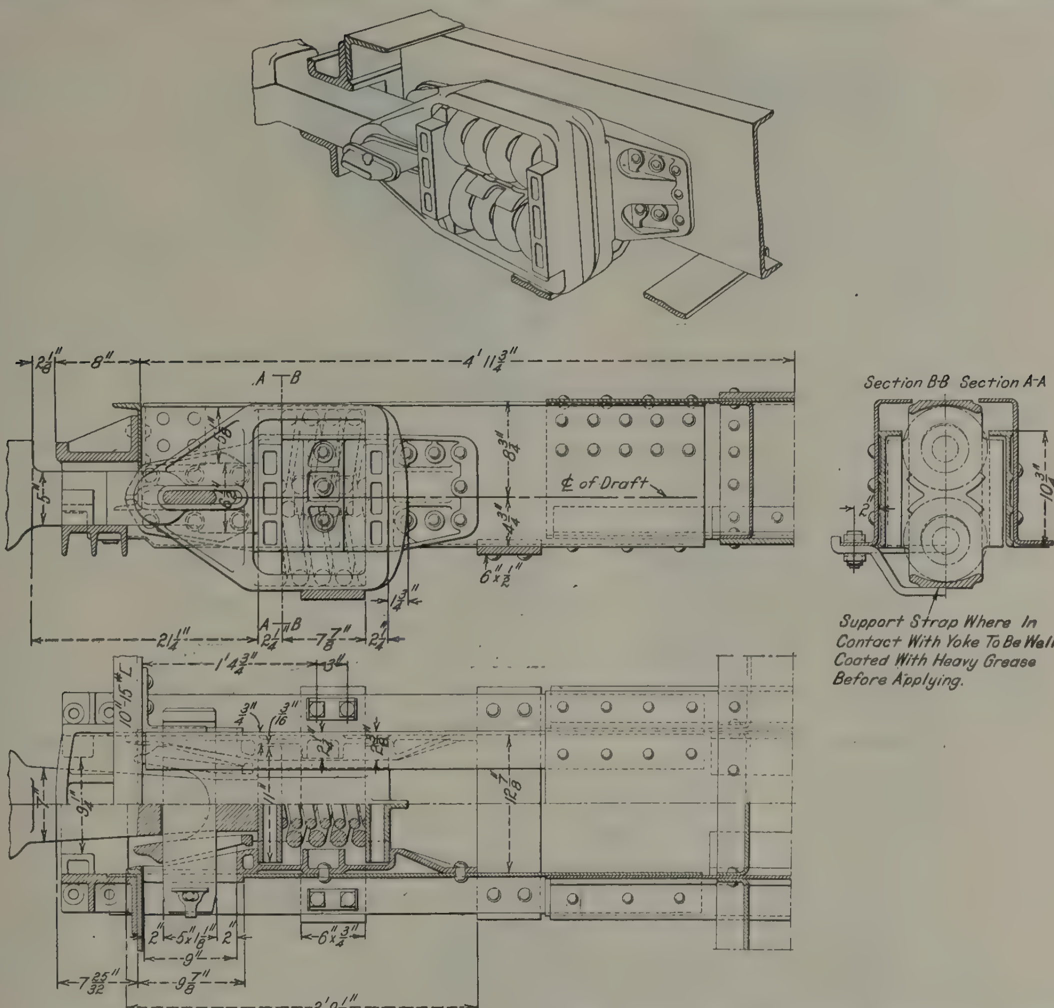


Fig. 782—Universal Attachments and Yoke for Twin Spring Draft Gear. Universal Draft Gear Attachment Company.

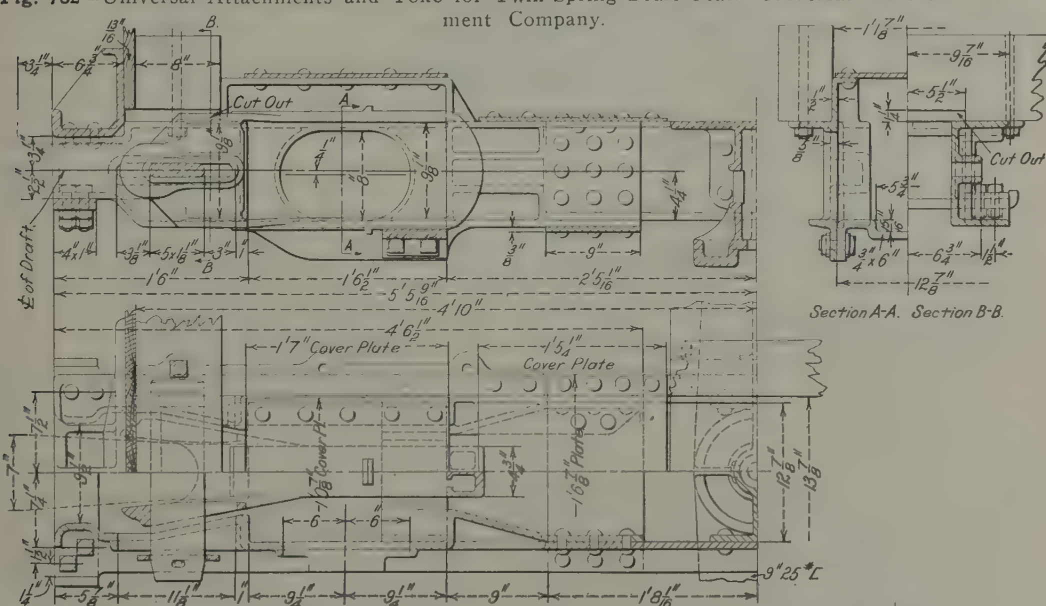


Fig. 783—Universal Attachments and Keyed Yoke with Cast Steel Draft Arms, for Cardwell Friction Draft Gear, Type G. Universal Draft Gear Attachment Company.

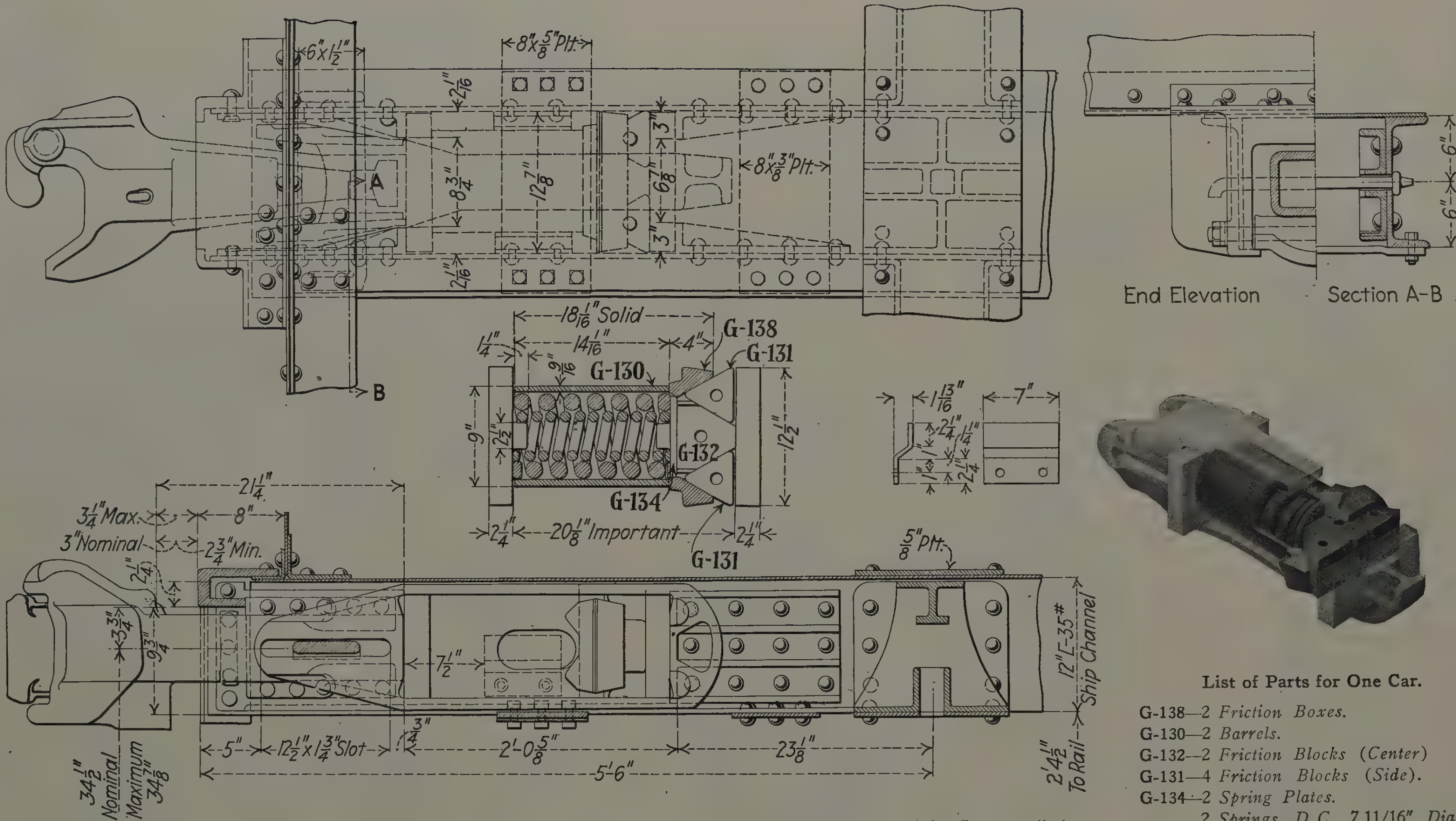


Fig. 784—Sessions-Standard Friction Draft Gear, Type K, for Freight Cars, applied to Draft Sill of U. S. Gov't Standard Box Cars. Standard Coupler Company.

List of Parts for One Car.

G-138—2 *Friction Boxes.*
G-130—2 *Barrels.*
G-132—2 *Friction Blocks (Center)*
G-131—4 *Friction Blocks (Side).*
G-134—2 *Spring Plates.*
2 *Springs, D. C., 7 11/16" Dia., 14⅜" Long.*

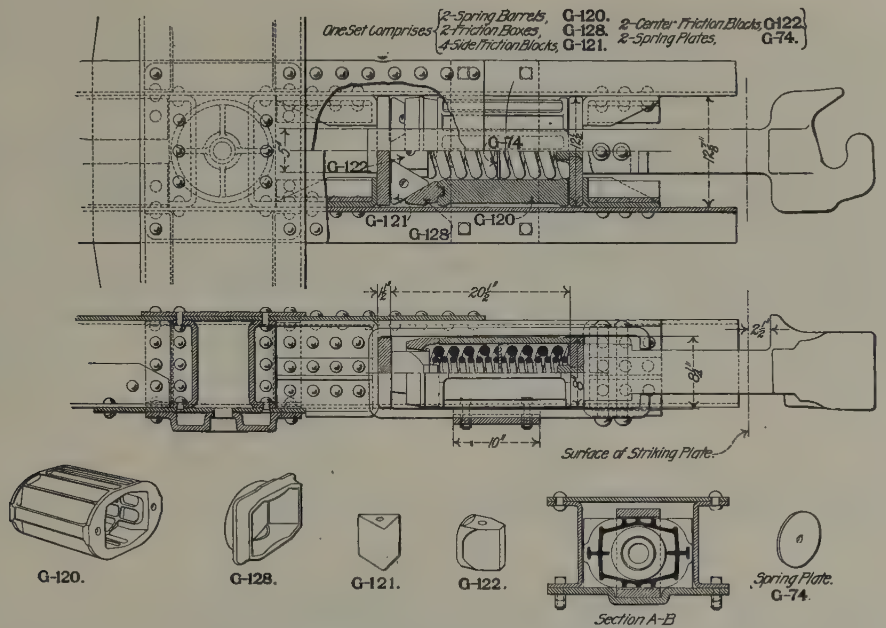


Fig. 785—Sessions-Standard Friction Draft Gear, Type H, for Freight Cars with Pressed Steel Underframes. Standard Coupler Company.

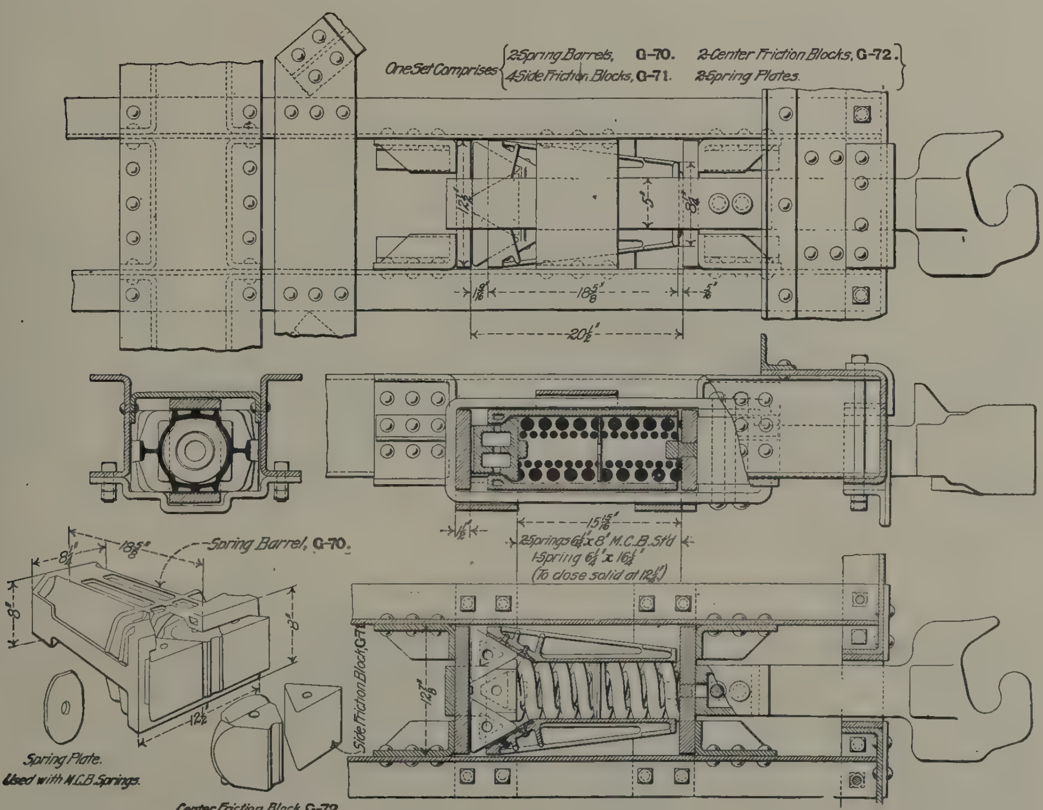


Fig. 786—Sessions-Standard Friction Draft Gear, Type C, for Freight Cars with Pressed Steel Underframes. Standard Coupler Company.

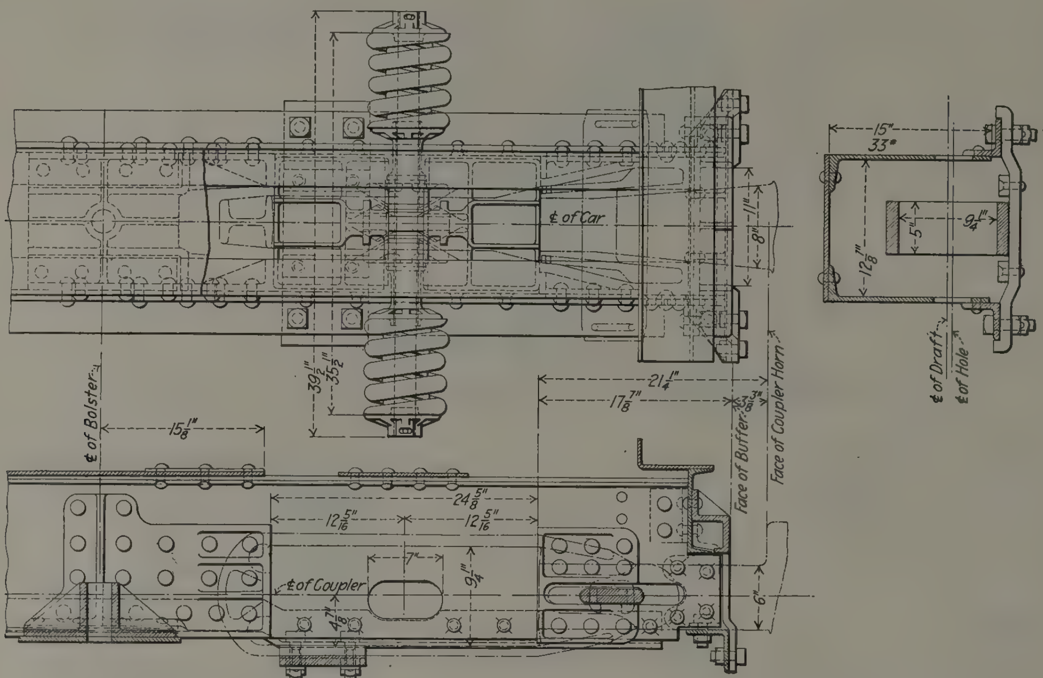


Fig. 788—Cardwell Friction Draft Gear Type G Class 18-A. Union Draft Gear Company.

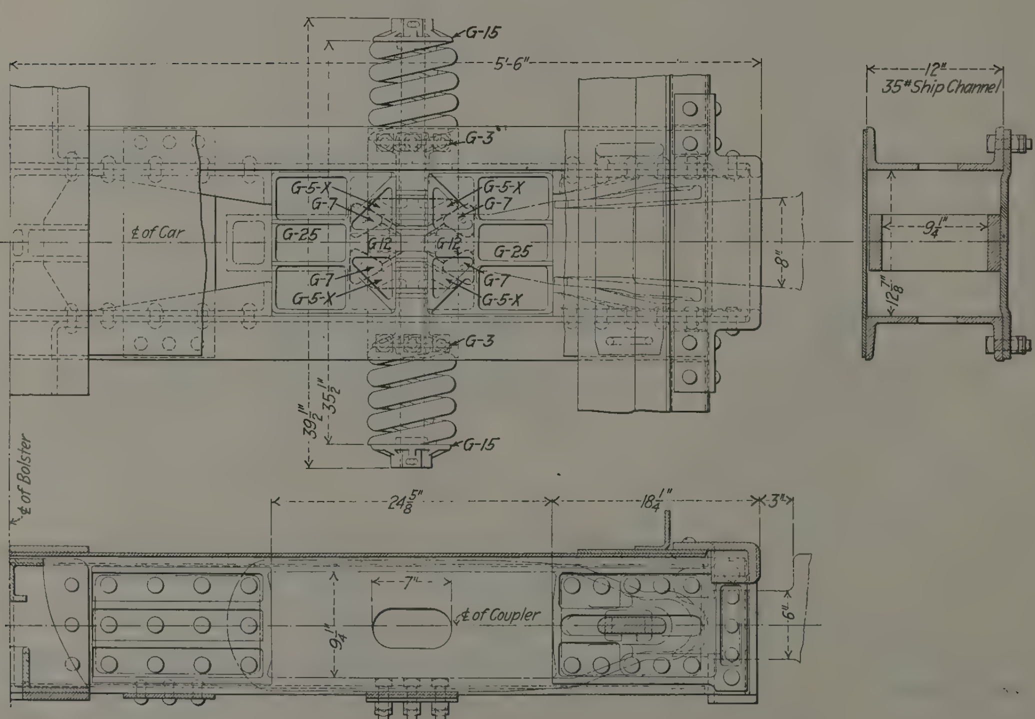


Fig. 789—Cardwell Friction Draft Gear Type G Class 25-A. Union Draft Gear Company.

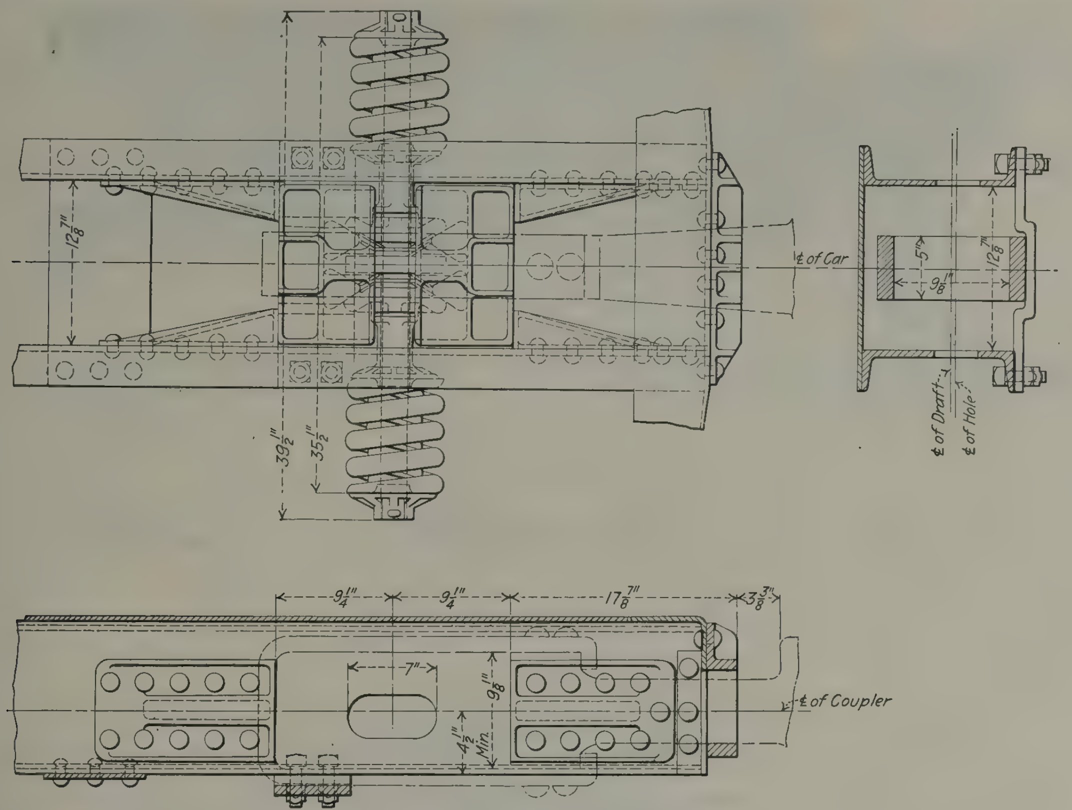


Fig. 790—Cardwell Friction Draft Gear Type G Class 11-A. Union Draft Gear Company.

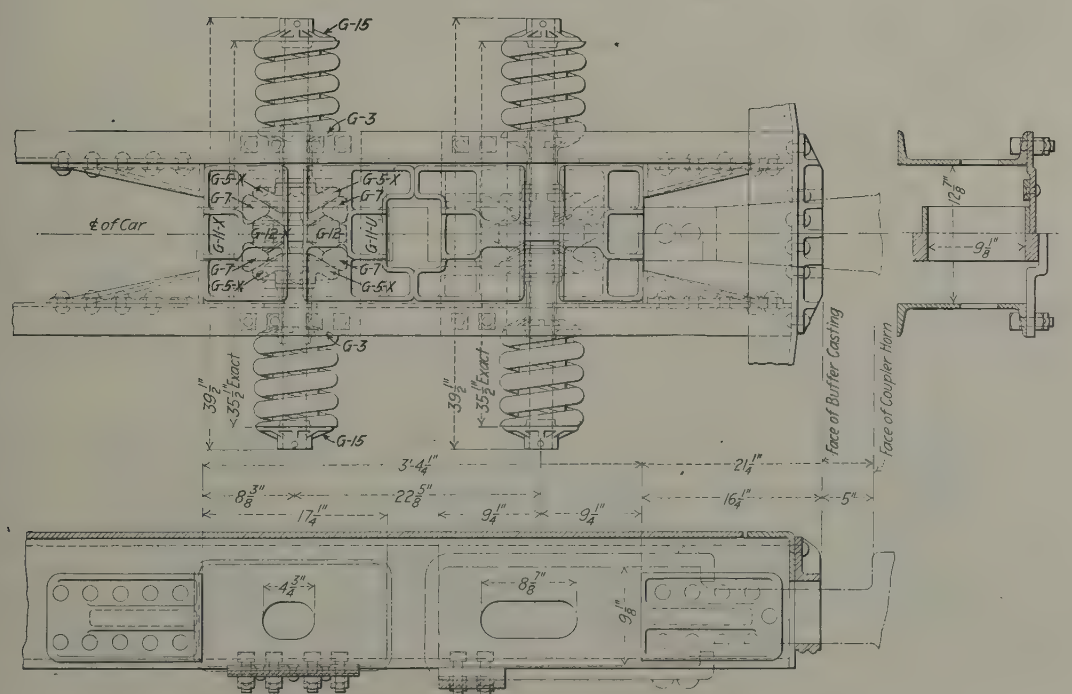


Fig. 791—Cardwell Friction Draft Gear Type G Class 11-A Compound. Union Draft Gear Company.

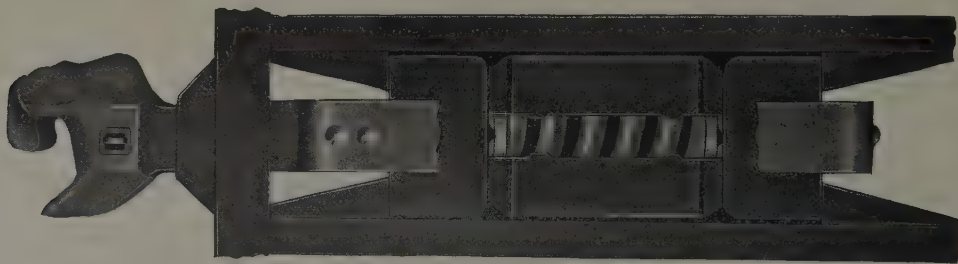


Fig. 792—Murray Cast Steel Friction Draft Gear Applied with M. C. B. Riveted Yoke.

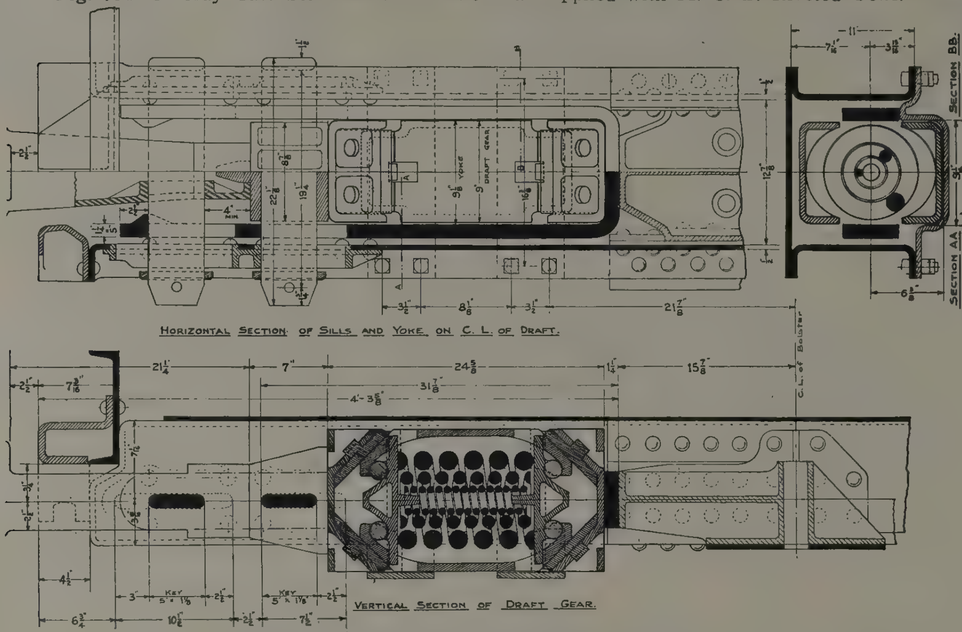


Fig. 793—Murray Draft Gear Type H Class 8.

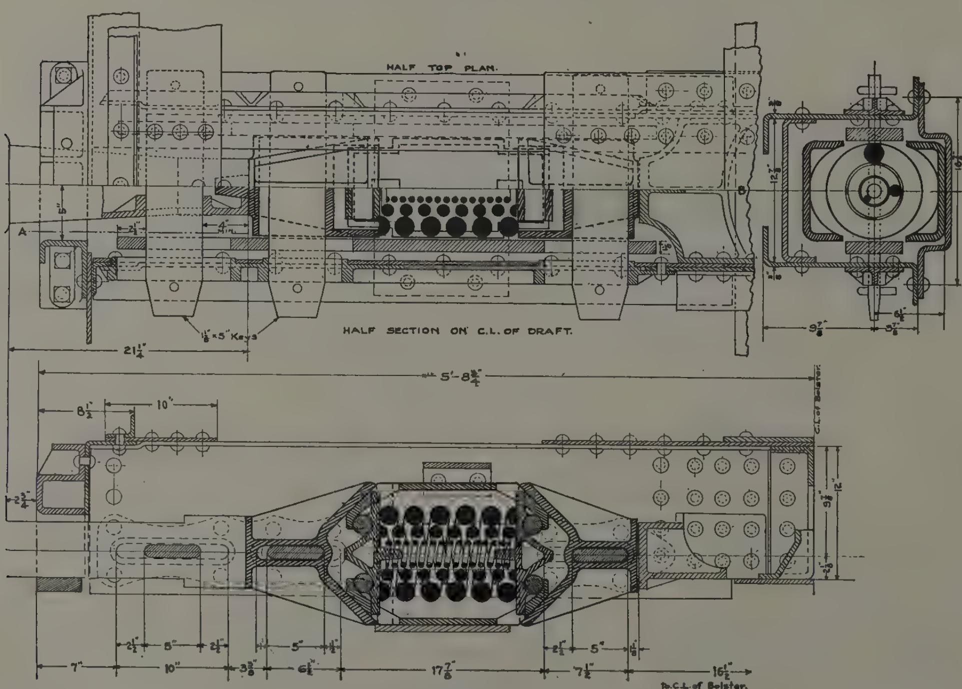


Fig. 794—Murray-Farlow Draft Gear Type H.

Keyoke Railway Equipment Company.

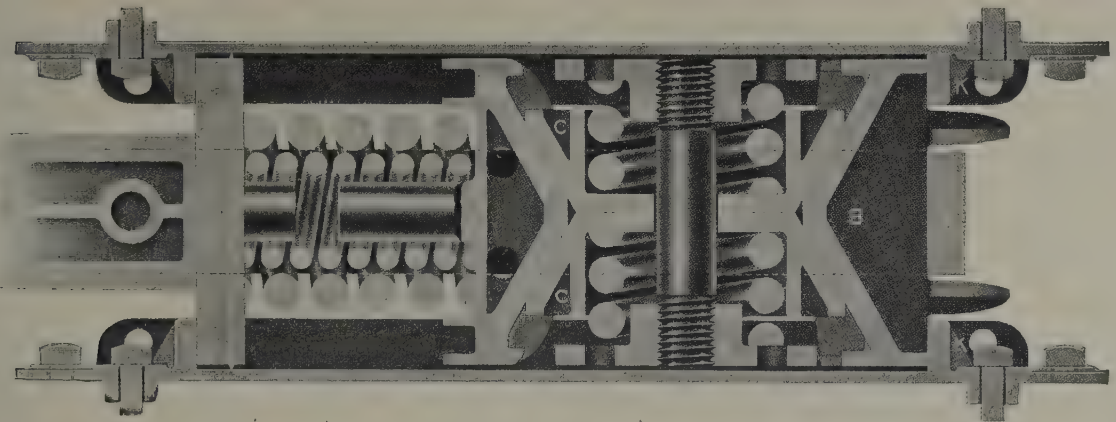


Fig. 795—Republic Friction Draft Gear, Type G, with Parts in Normal Position.
Western Railway Equipment Company.

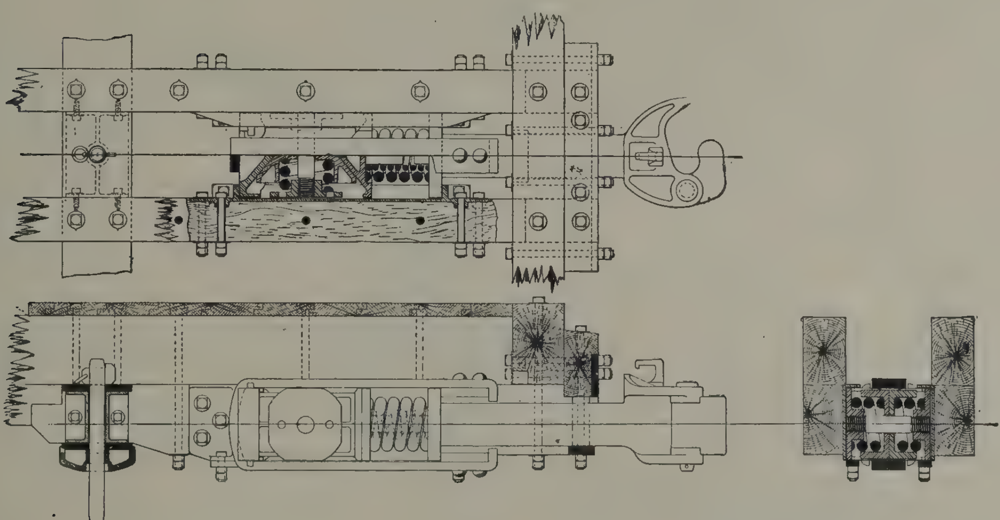


Fig. 796—Republic Friction Draft Gear for Freight Cars with Wooden Sills.
Western Railway Equipment Company.

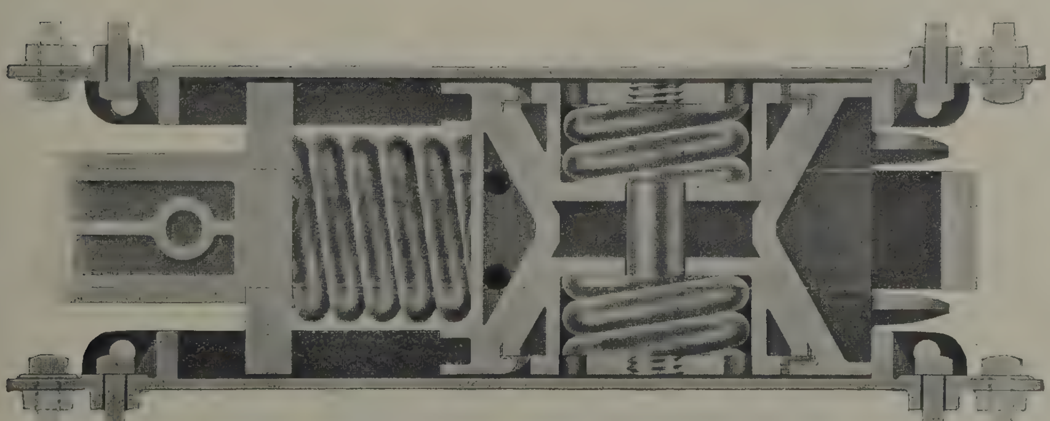
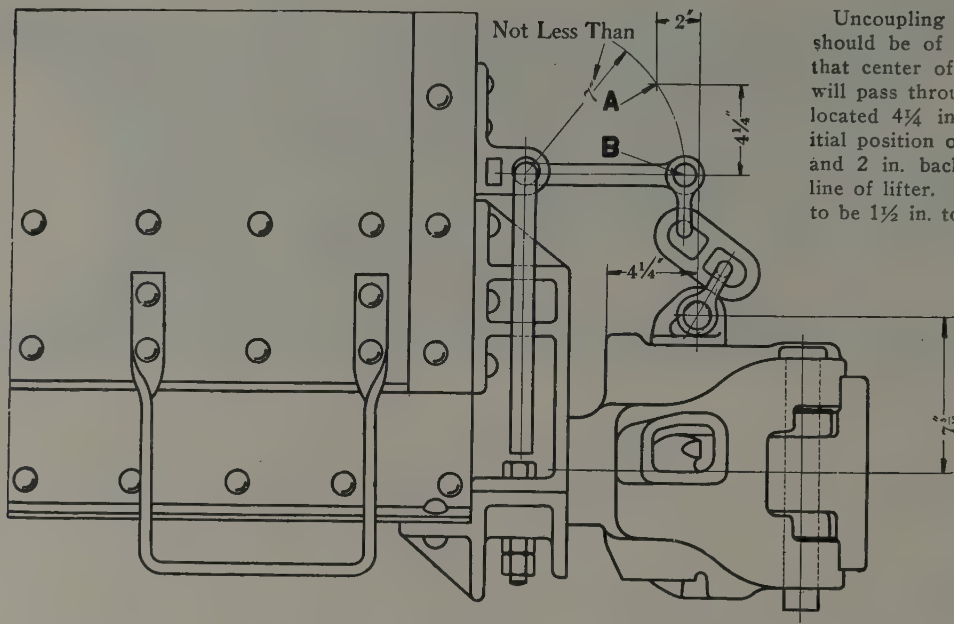


Fig. 797—Republic Friction Draft Gear Under Buffing Compression.
Western Railway Equipment Company.



Uncoupling lever arm should be of such length that center of pin-hole **B** will pass through point **A** located 4¼ in. above initial position of lever arm and 2 in. back of center line of lifter. Chain slack to be 1½ in. to 2 in.

Fig. 798—Method of Application of Uncoupling Lever to Simplex Top Lift Freight Coupler. American Steel Foundries.

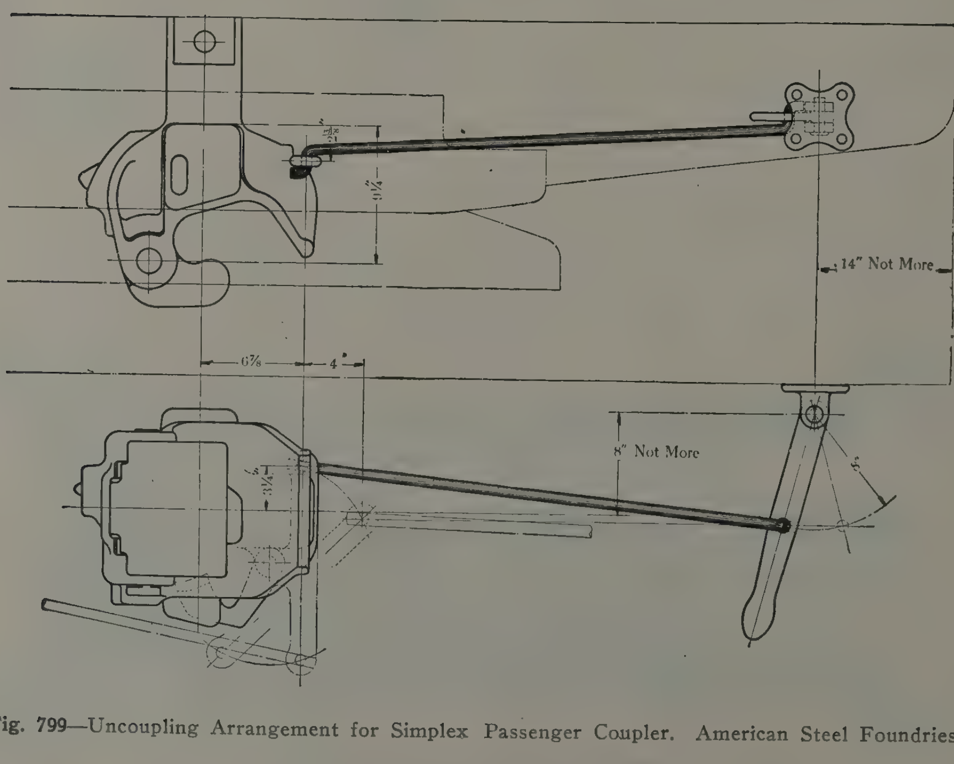


Fig. 799—Uncoupling Arrangement for Simplex Passenger Coupler. American Steel Foundries.

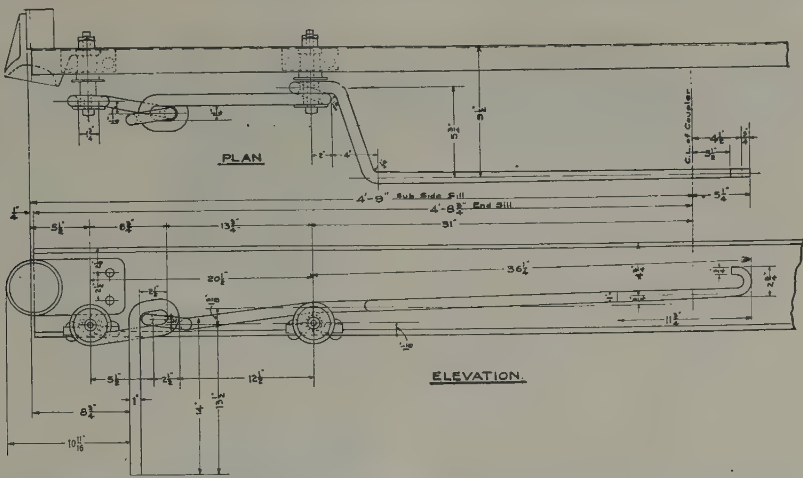


Fig. 800—Application of Uncoupling Apparatus to Channel End Sill.

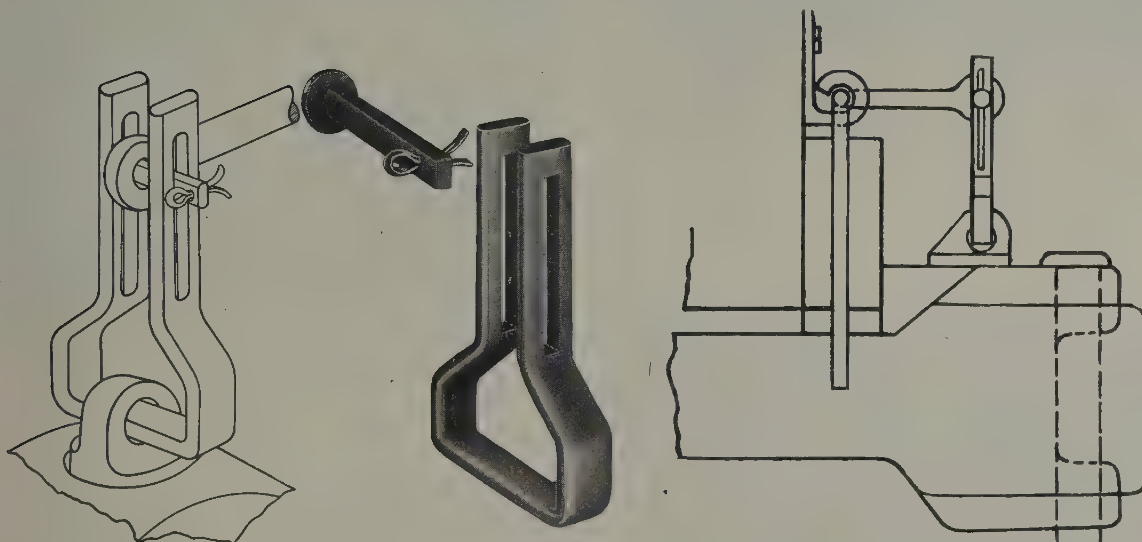


Fig. 801—Details and Method of Application of Sta-Rite Uncoupling Attachment. Railway Devices Company.

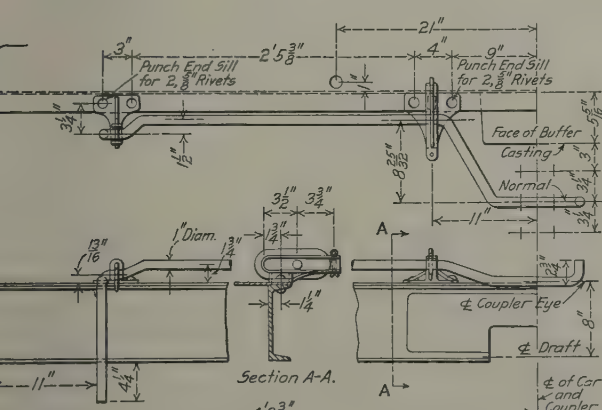


Fig. 802—Coupler Release Rigging. National Railway Devices Company.

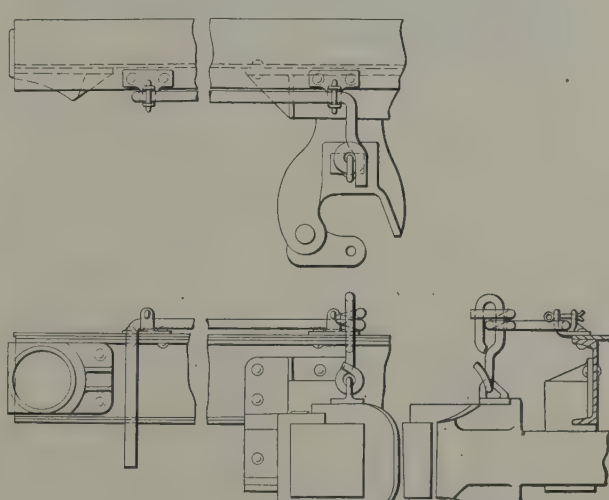


Fig. 803—Singlelink Coupler Release Rigging. National Railway Devices Company.

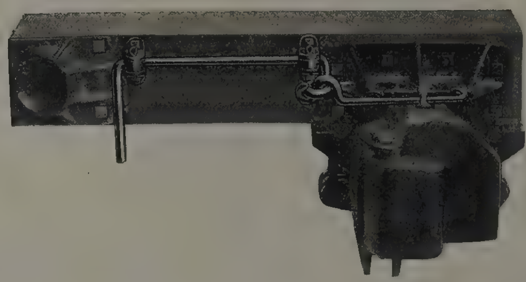


Fig. 804—Imperial Release Rigging.

Fig. 805—Carmer Release Rigging.

Fig. 806—Imperial Type B Release Rigging.

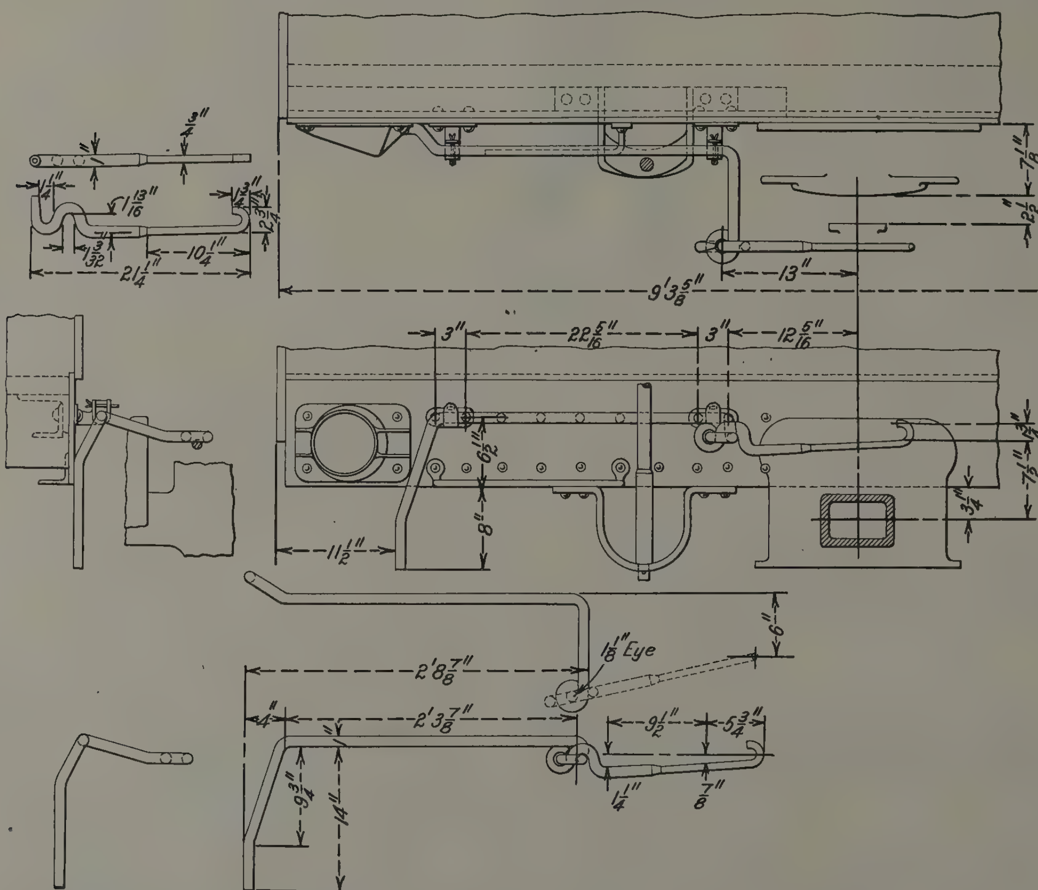


Fig. 807—Imperial Uncoupling Apparatus and Details, for New York Central Box Cars.
Imperial Appliance Company.

Fig. 808—Interior of Grand Trunk Hopper Bottom Box Car.

Fig. 809—Hopper Open and Grain Door in Place, Canadian Pacific Hopper Bottom Box Car.

Fig. 810—Exterior of Hopper with Door Closed, Canadian Pacific Hopper Bottom Box Car.

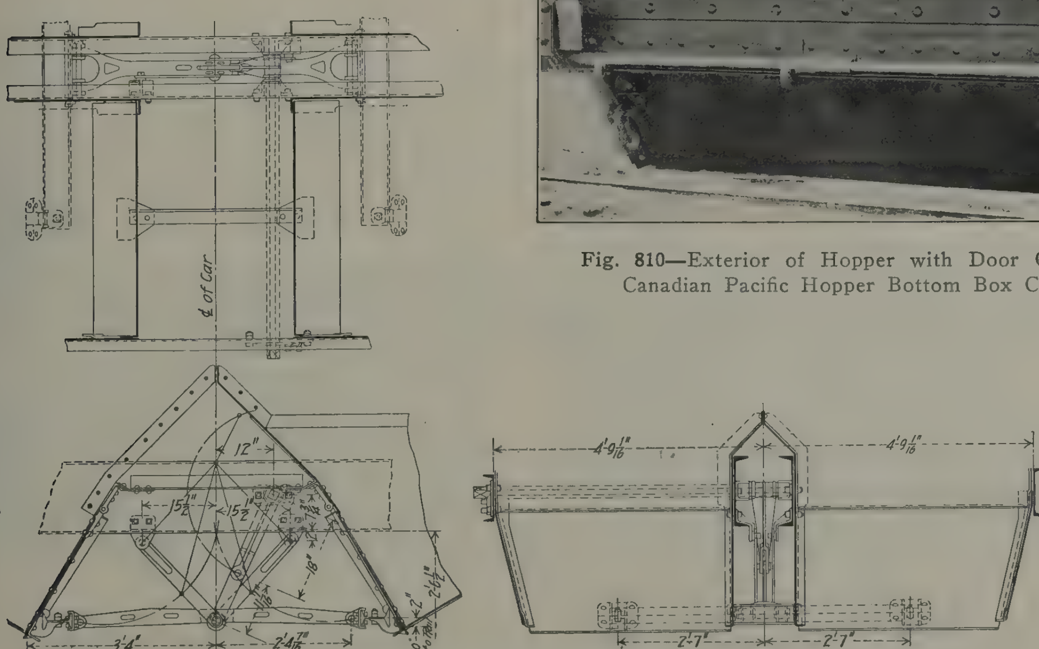


Fig. 811—Hopper Door Operating Apparatus. Standard Steel Car Company.

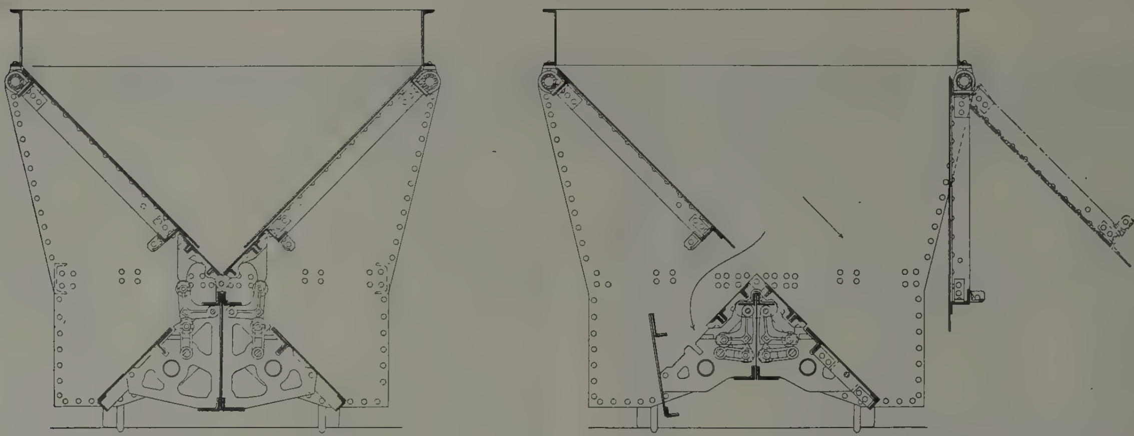


Fig. 812—Door Positions of the Gilman-Taylor Car Shown in Fig. 137. Goodwin Car & Manufacturing Company.

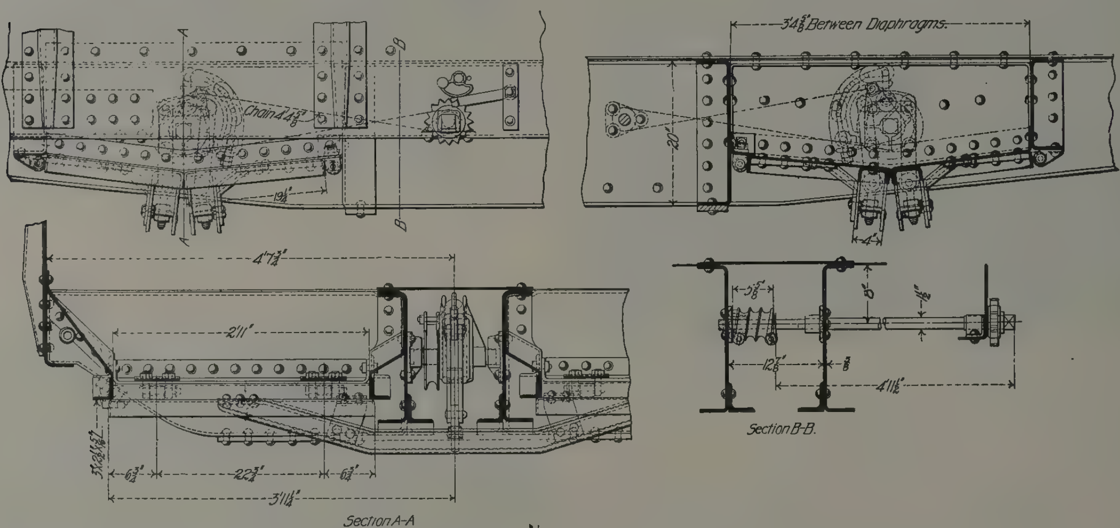


Fig. 813—Lind Drop Door Apparatus for All-Steel Hopper Bottom Gondola Car. Pressed Steel Car Company.

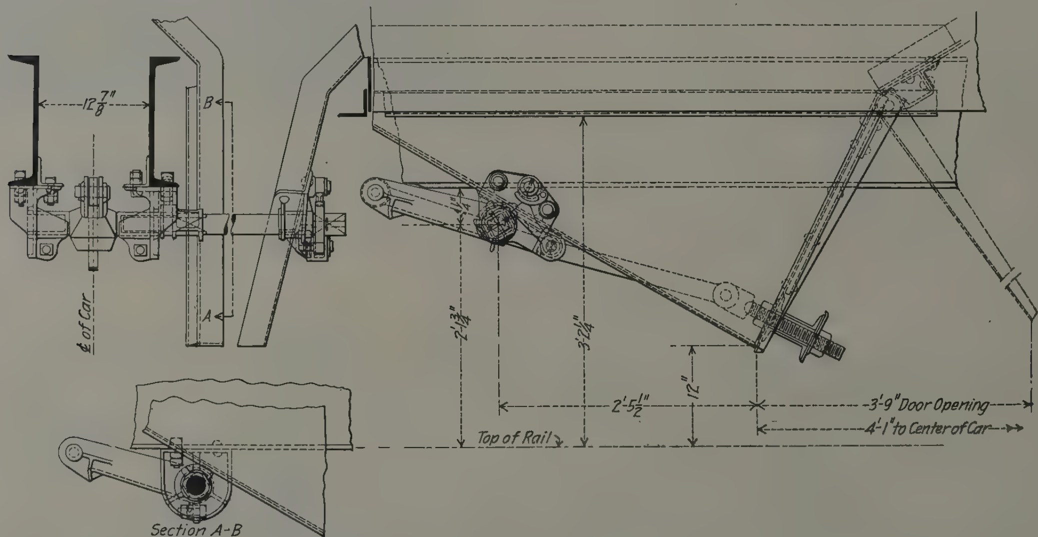


Fig. 814—Door Operating Apparatus with Lind Safety Clutch for All-Steel Hopper Car. Pressed Steel Car Company.

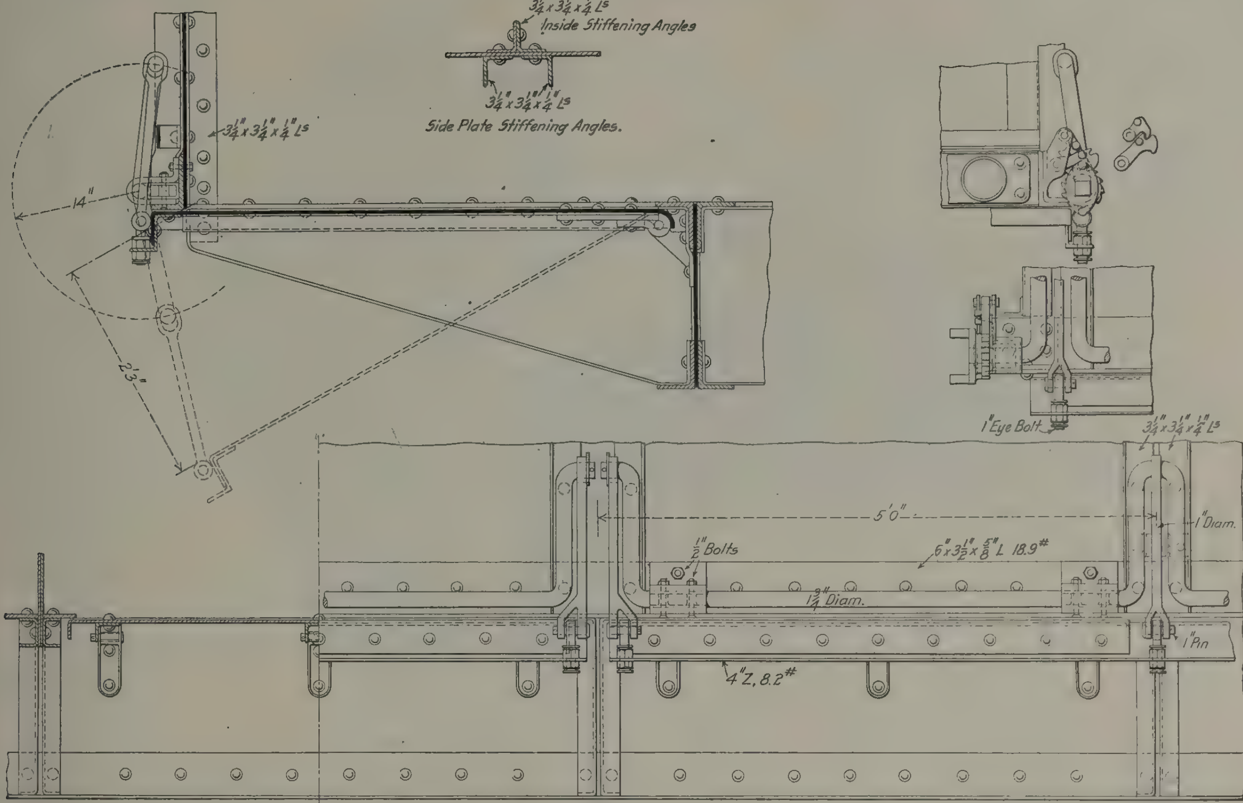


Fig. 815—Empire Drop Door Operating Apparatus for General Service Car. National Railway Appliance Company.

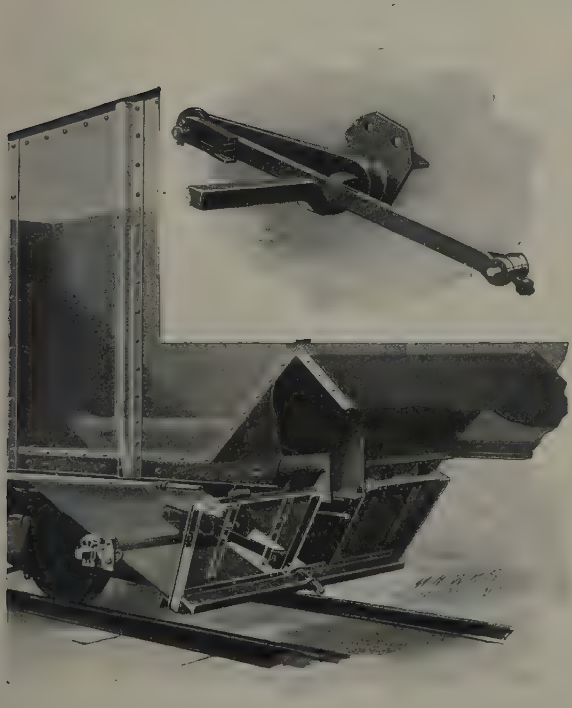


Fig. 816—Dunham Hopper Door Device. Applied to All-Steel Self Clearing Hopper Car.

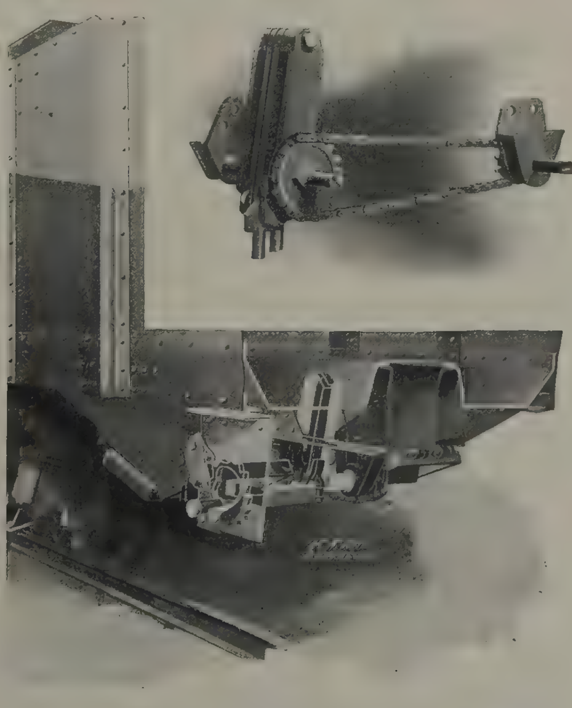


Fig. 817—Dunham Hopper Door Device. Applied to All-Steel Hopper Gondola Car.

National Railway Appliance Company.

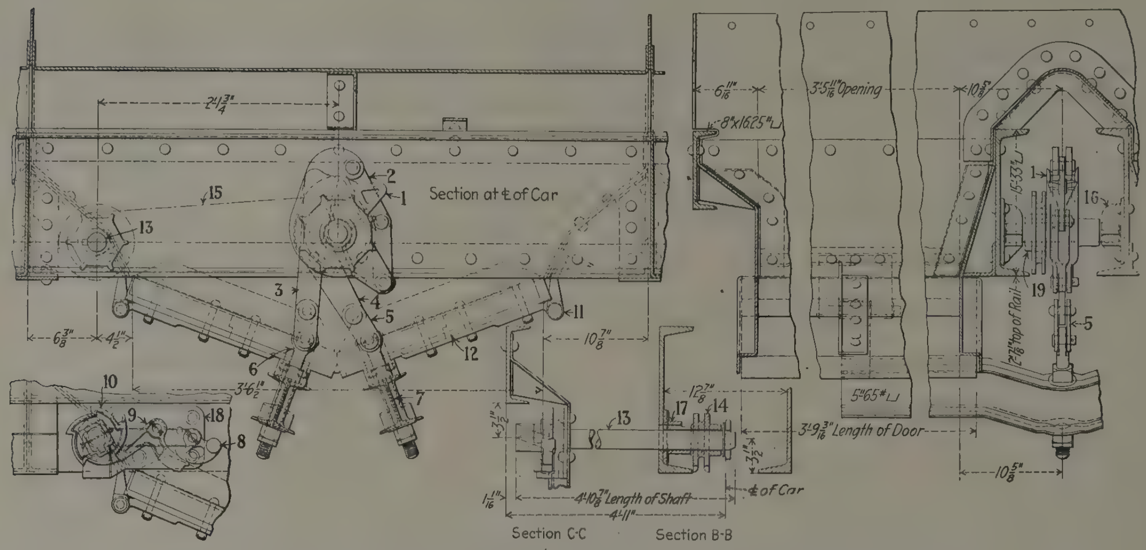


Fig. 818—Simonton Door Operating Mechanism. Standard Steel Car Company.

Parts of Dumping Apparatus, Fig. 818.

1 *Door Operating Sheaves with Arm*
2 *Link*
3 *Left Hanger*
4 *Right Hanger*
5 *Link*
6 *Door Eye Bolt*
7 *Door Stiffener*
8 *Latch Dog*
9 *Door Operating Shaft Pawl*
10 *Door Operating Shaft Ratchet*
11 *Hinge and Hinge Butt*
12 *Door*
13 *Door Operating Shaft*
14 *Door Operating Shaft Sprocket Wheel*
15 *Door Operating Chain*
16 *Sheave Wheel Bearing*
17 *Door Operating Shaft Bearing*
18 *Door Operating Shaft Pawl and Dog Bearing*
19 *Door Operating Sheave Sprocket Wheel*

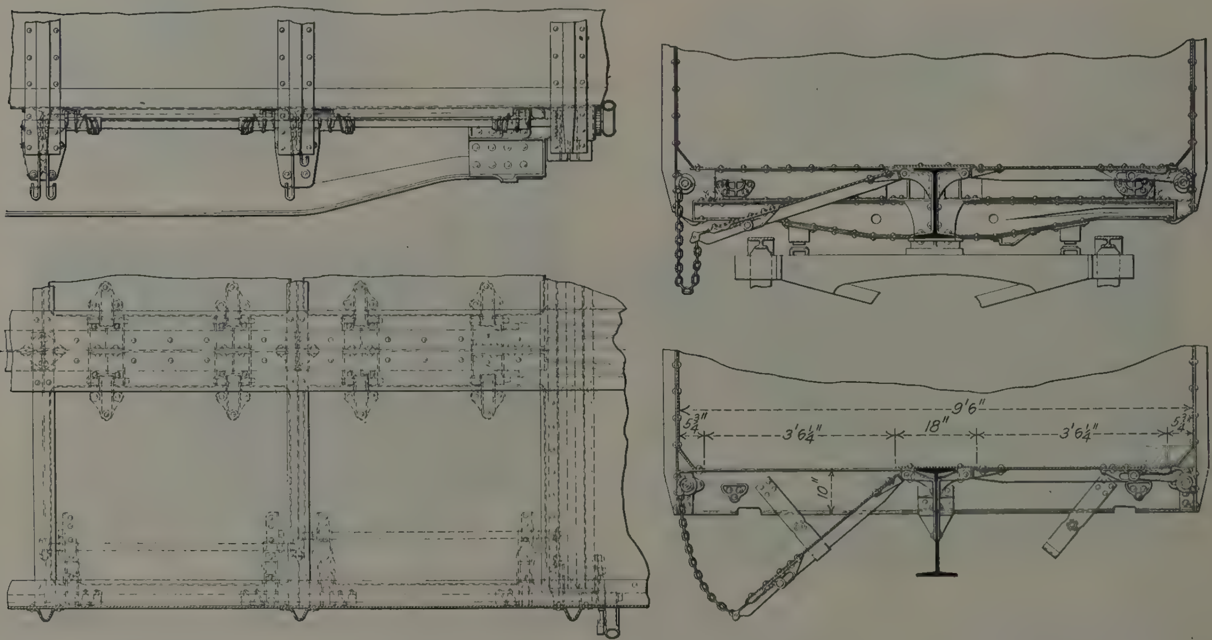


Fig. 819—Bettendorf Drop Door Mechanism for Illinois Central 50-Ton Capacity Gondola Car. The Bettendorf Company.

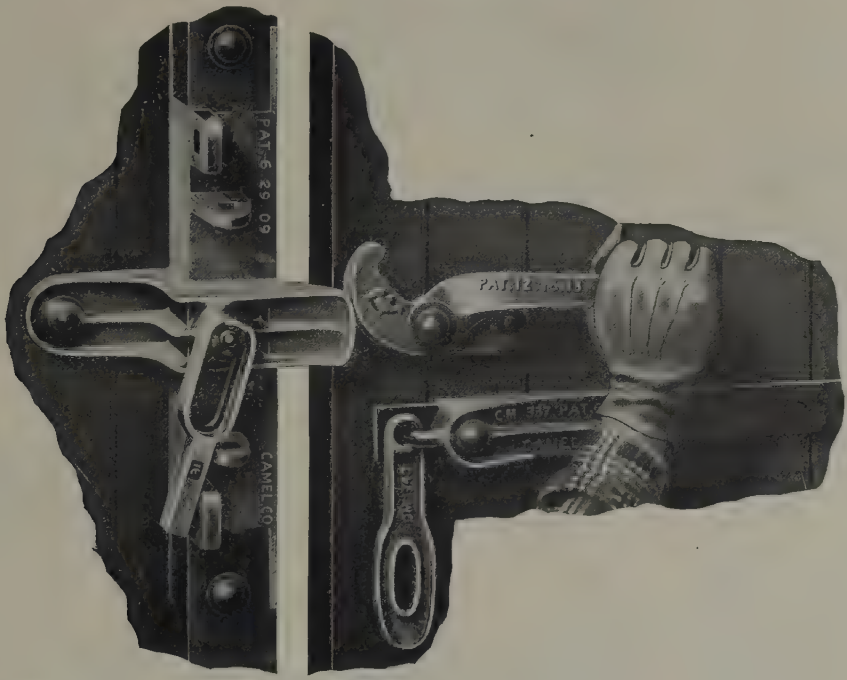


Fig. 820—Camel Combination Door Stop and Lever with Door Starter. Camel Company.

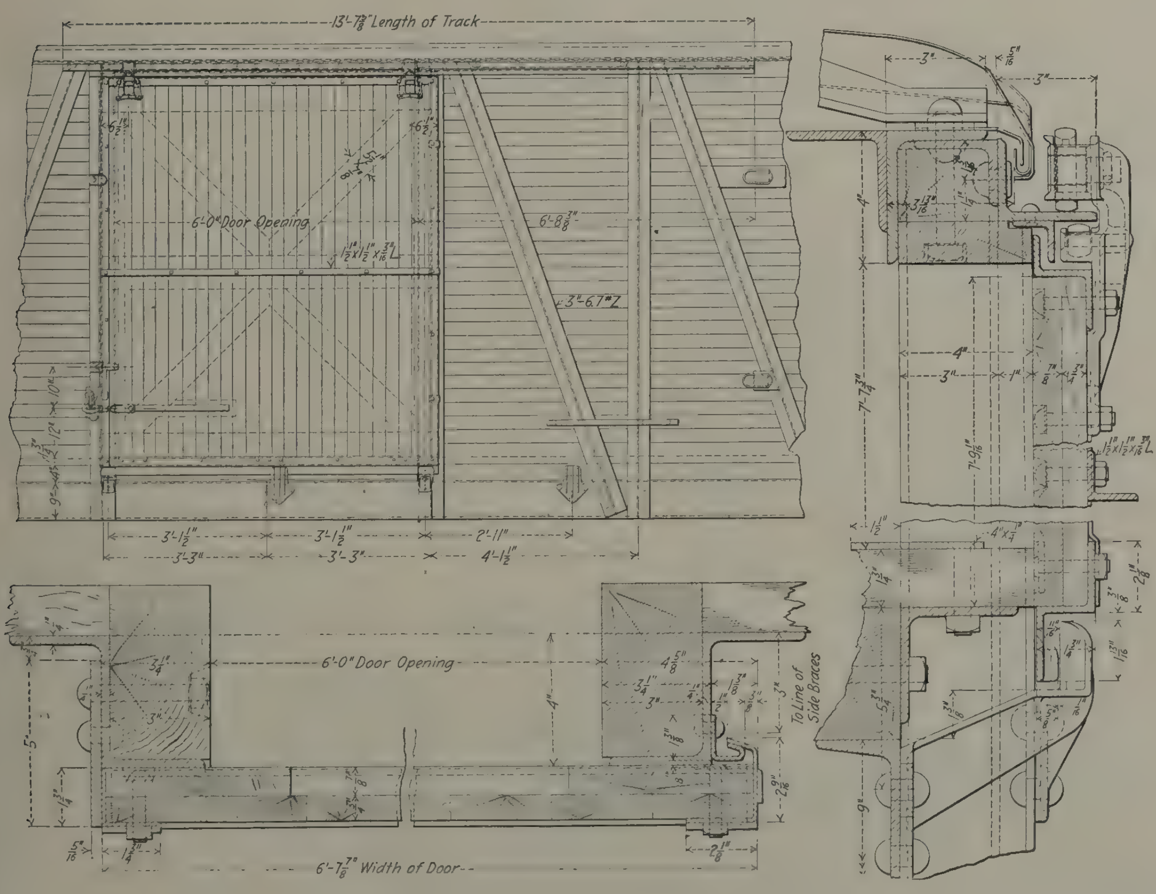


Fig. 821—Camel Door No. 30 for Steel Superstructure, Single Sheathed Box Car. Camel Company.

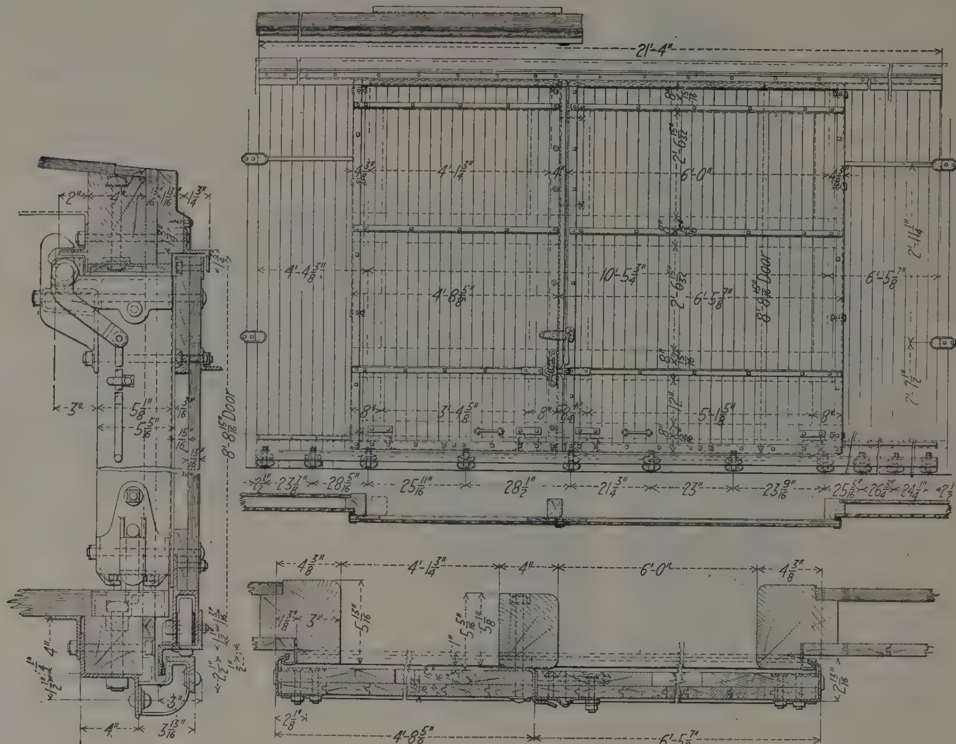


Fig. 822—Camel-Gilroy Bottom Hung Door for Automobile Car. Camel Company.

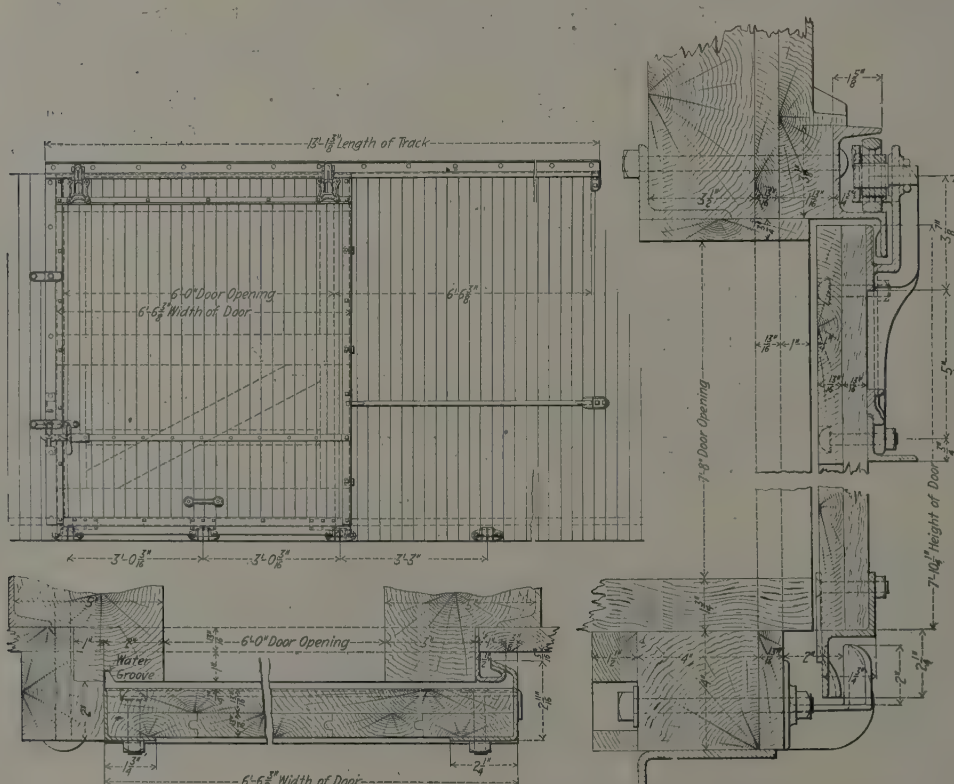


Fig. 823—Camel Box Car Door No. 27. Camel Company.

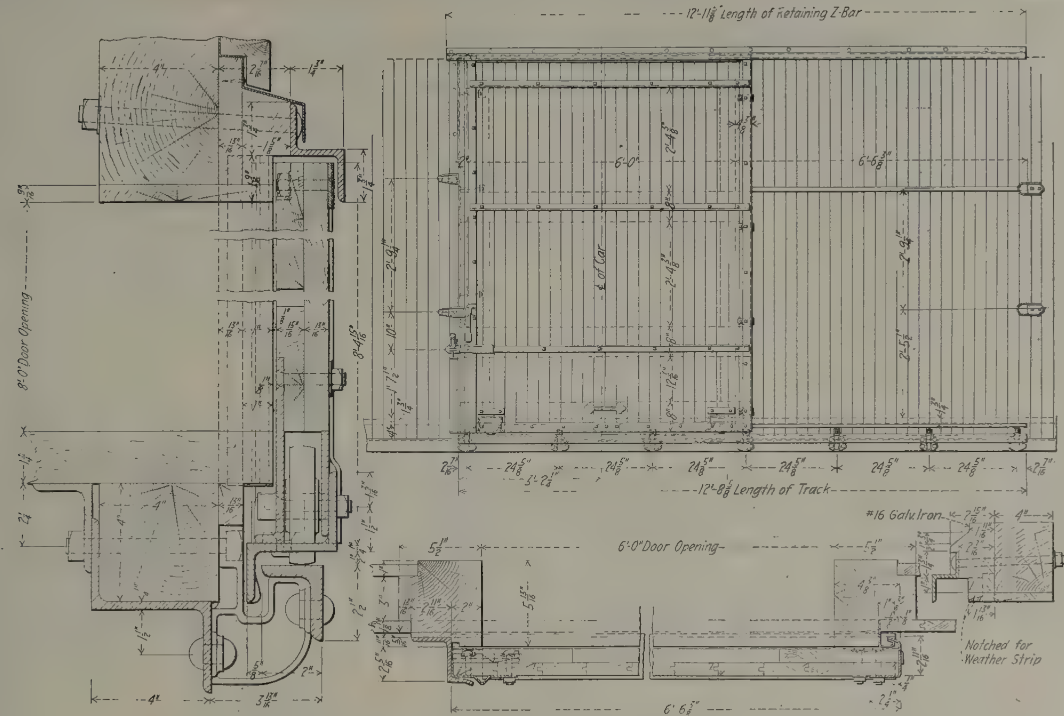


Fig. 824—Gilroy Car Door. Chicago Car Door Company.

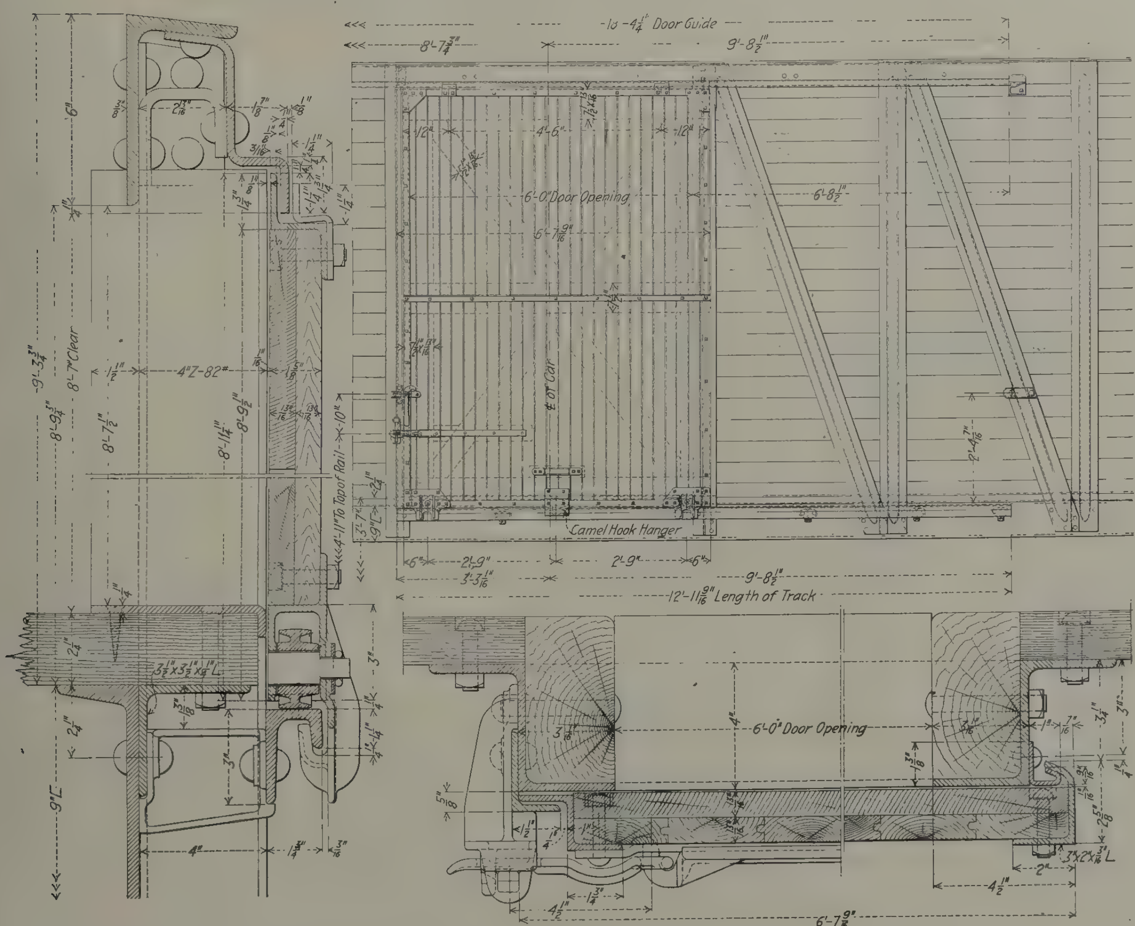


Fig. 825—Camel No. 50 Bottom Hung Door Applied to U. S. Government Single Sheathed Box Car. Camel Company.

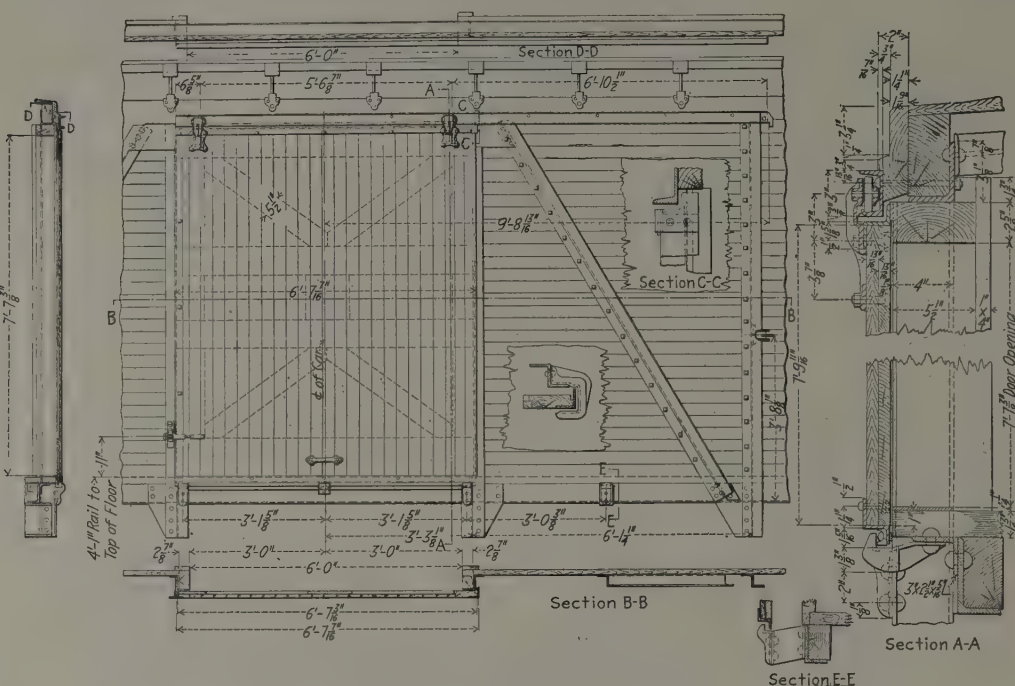


Fig. 826—Jones Peerless Car Door for Box Cars. Jones Car Door Company.

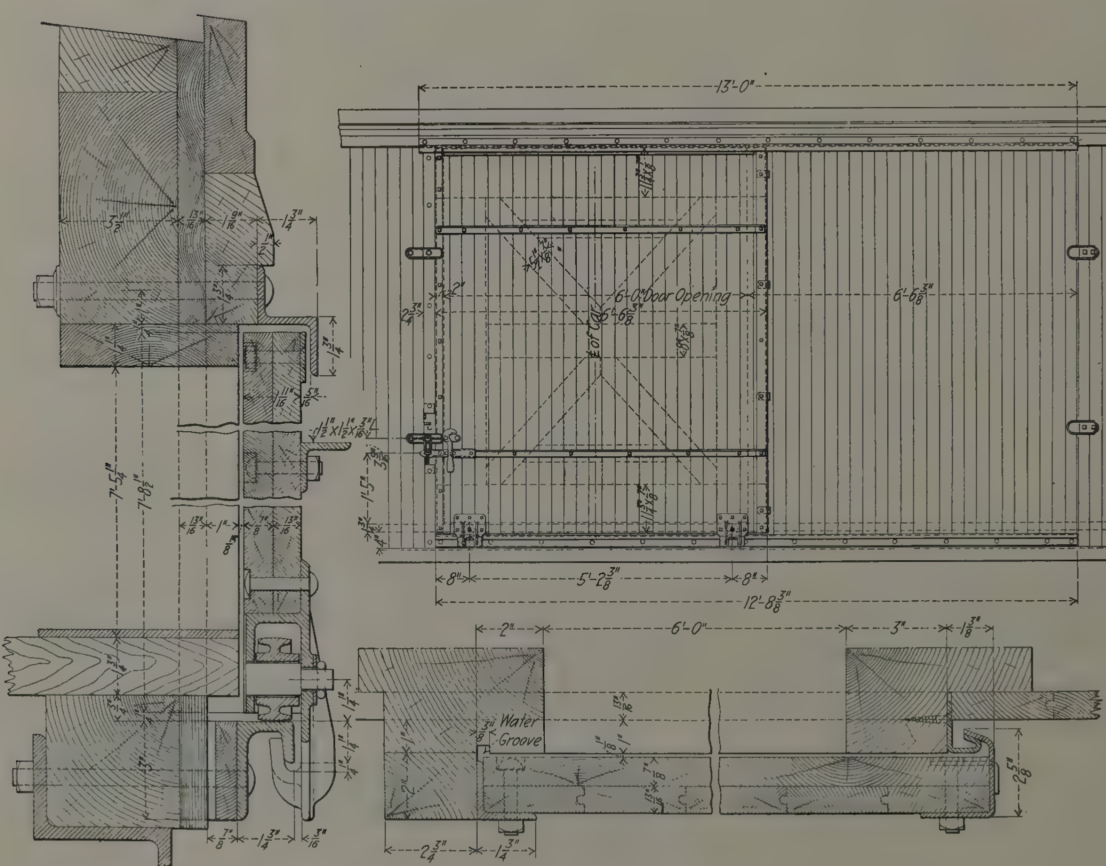


Fig. 827—Camel Door No. 50 for Double Sheathed Box Cars. Camel Company.

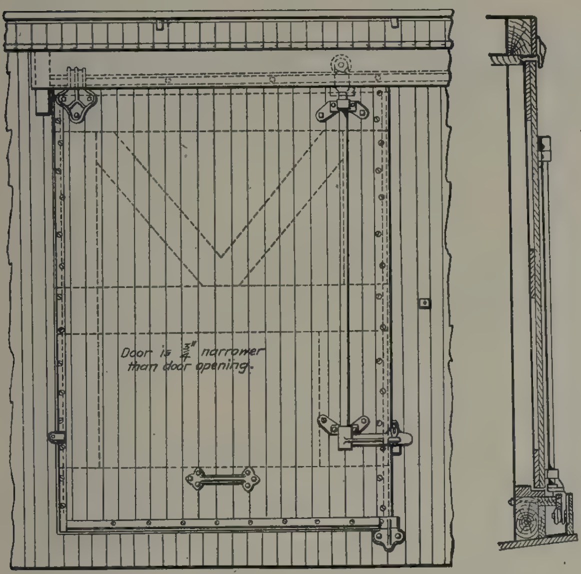


Fig. 828—St. Louis Flush Car Door.

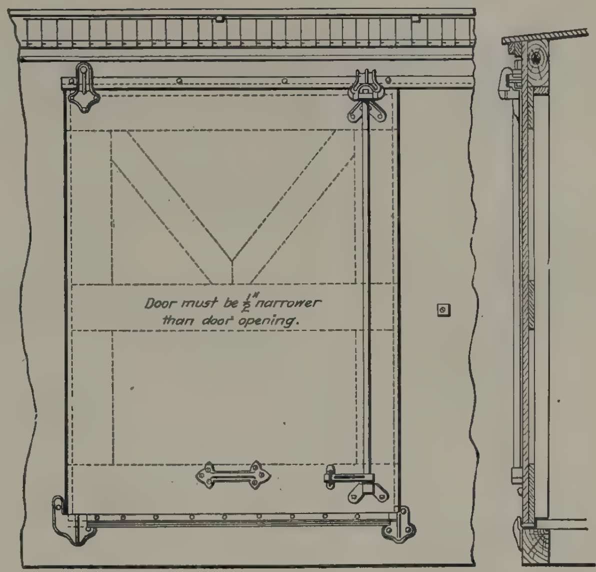


Fig. 829—Western Flush Car Door.

Western Railway Equipment Company.

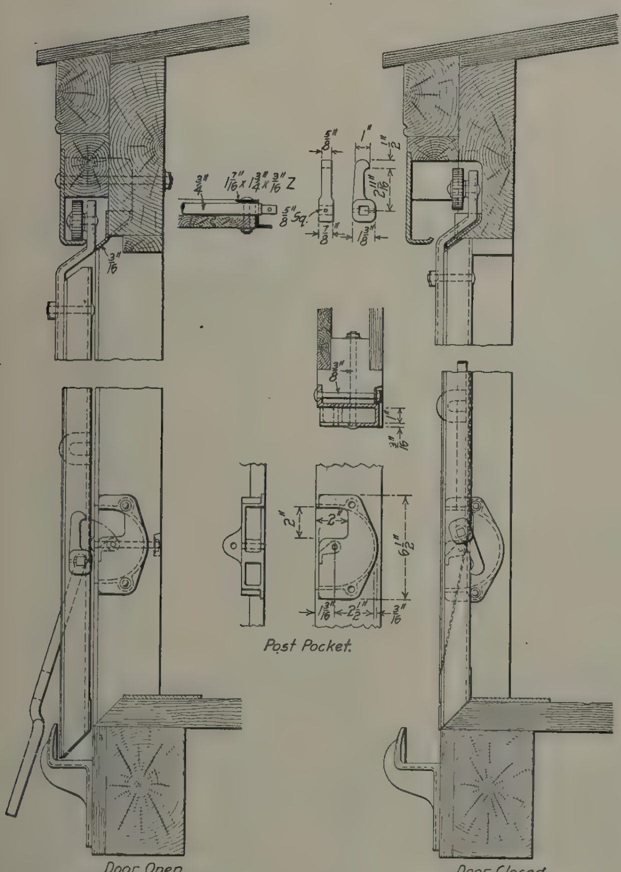


Fig. 830—Ohio Flush Box Car Door. Ralston Steel Car Company.

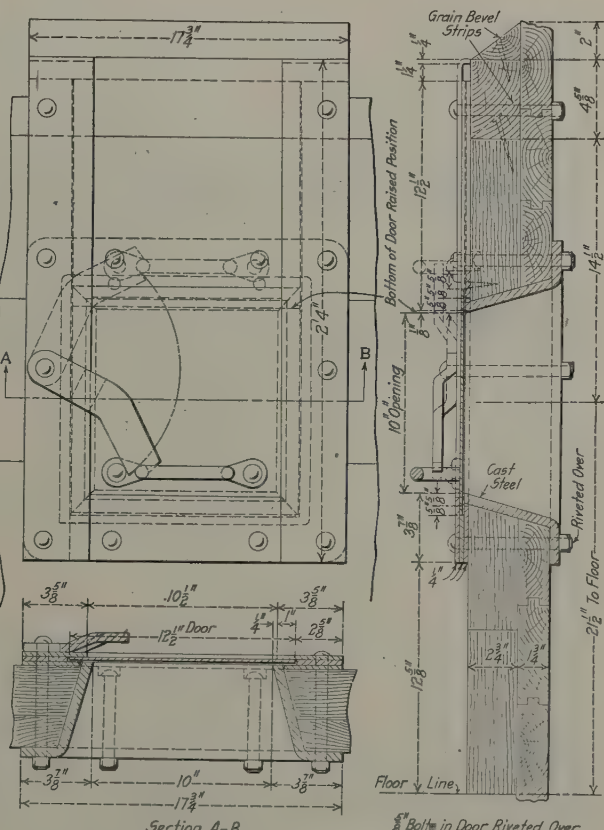


Fig. 831—Lower Rail End Door Used on Canadian Government Railways Box Cars.

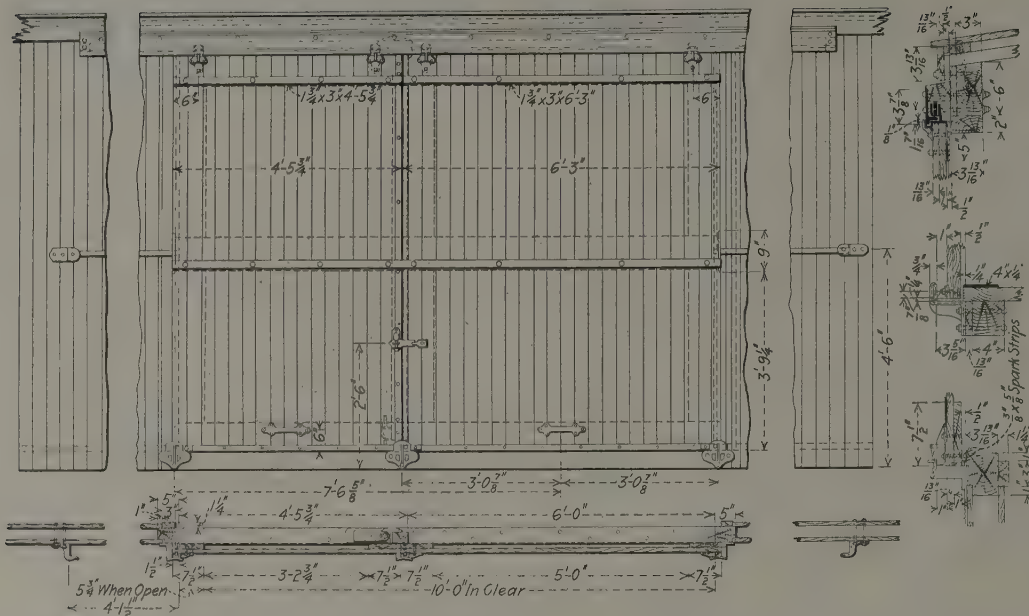


Fig. 832—Two-Piece Side Door for Automobile Box Car. Western Steel Car & Foundry Company.

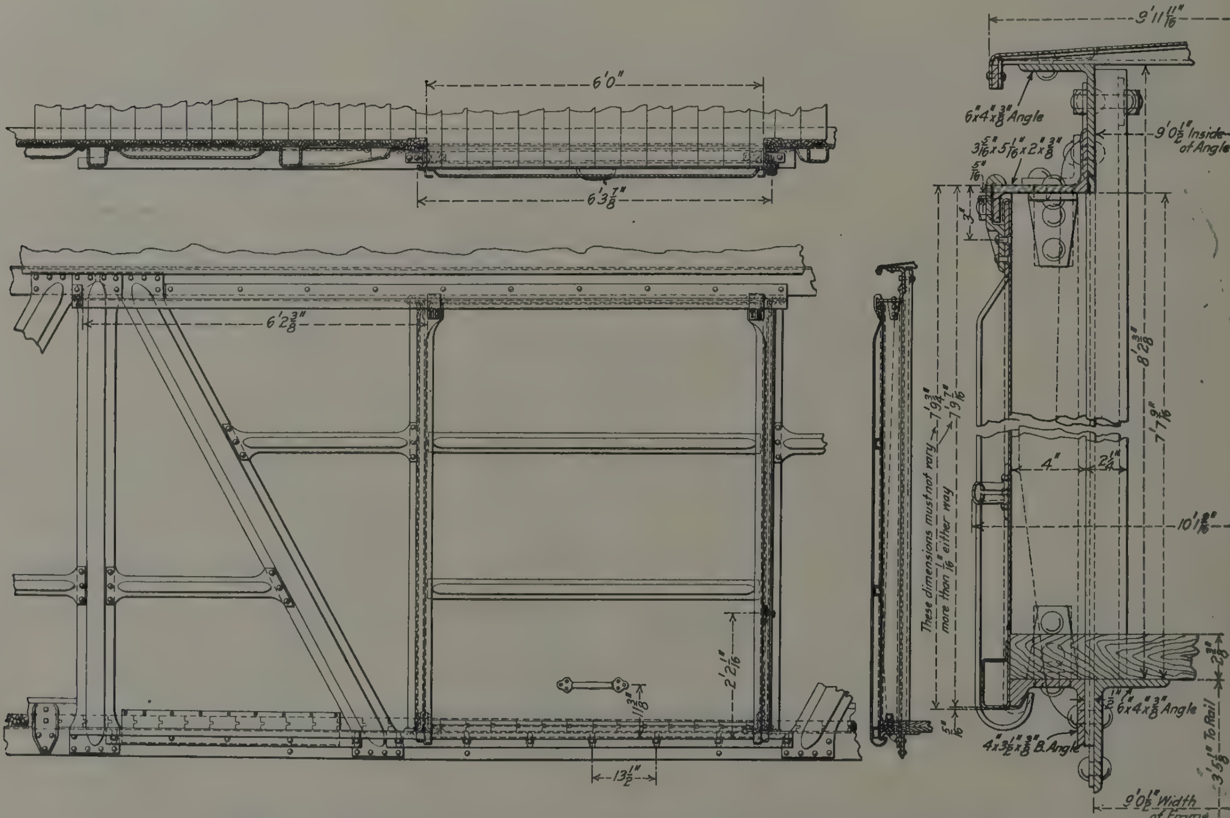


Fig. 833—All-Steel Door Used on Pennsylvania Railroad Steel Frame Box Car.

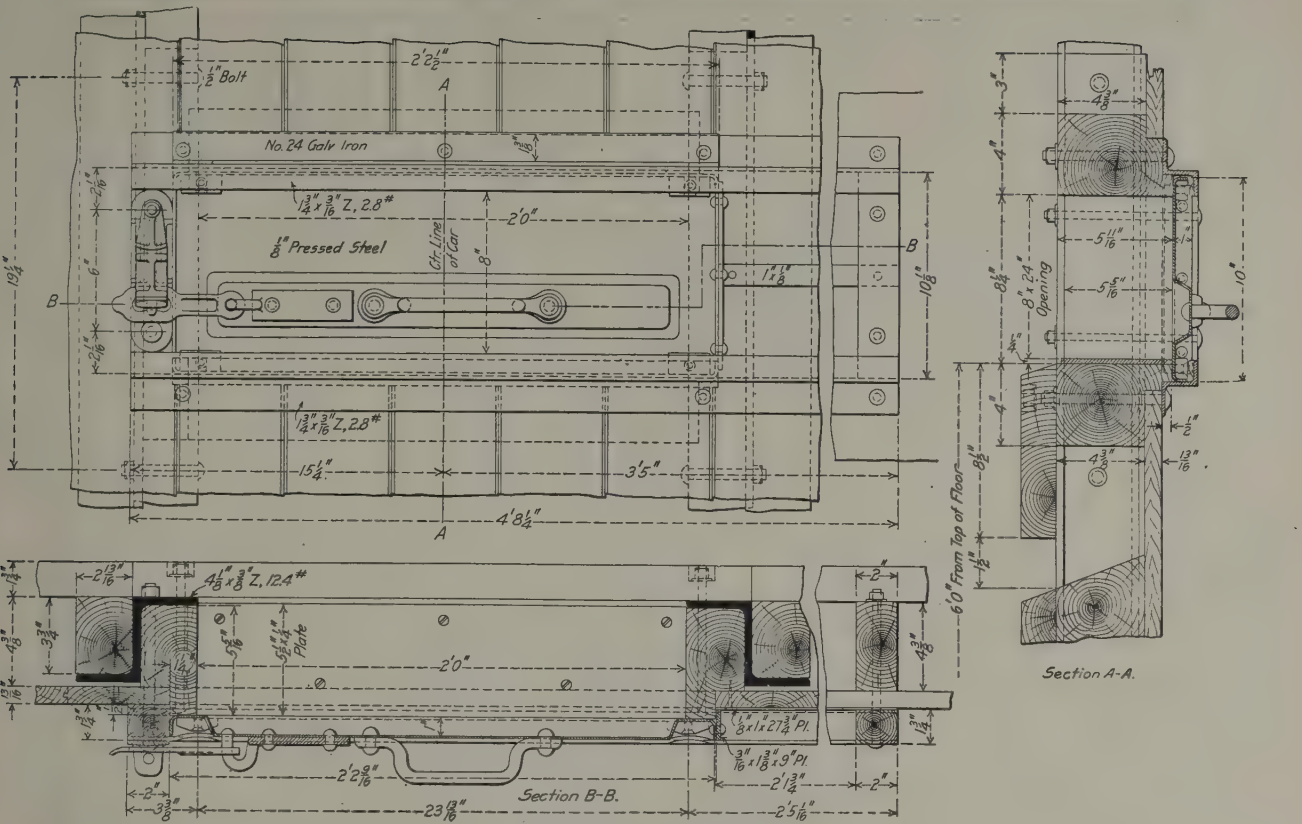


Fig. 834—End Door for Atchison, Topeka & Santa Fe Box Car.

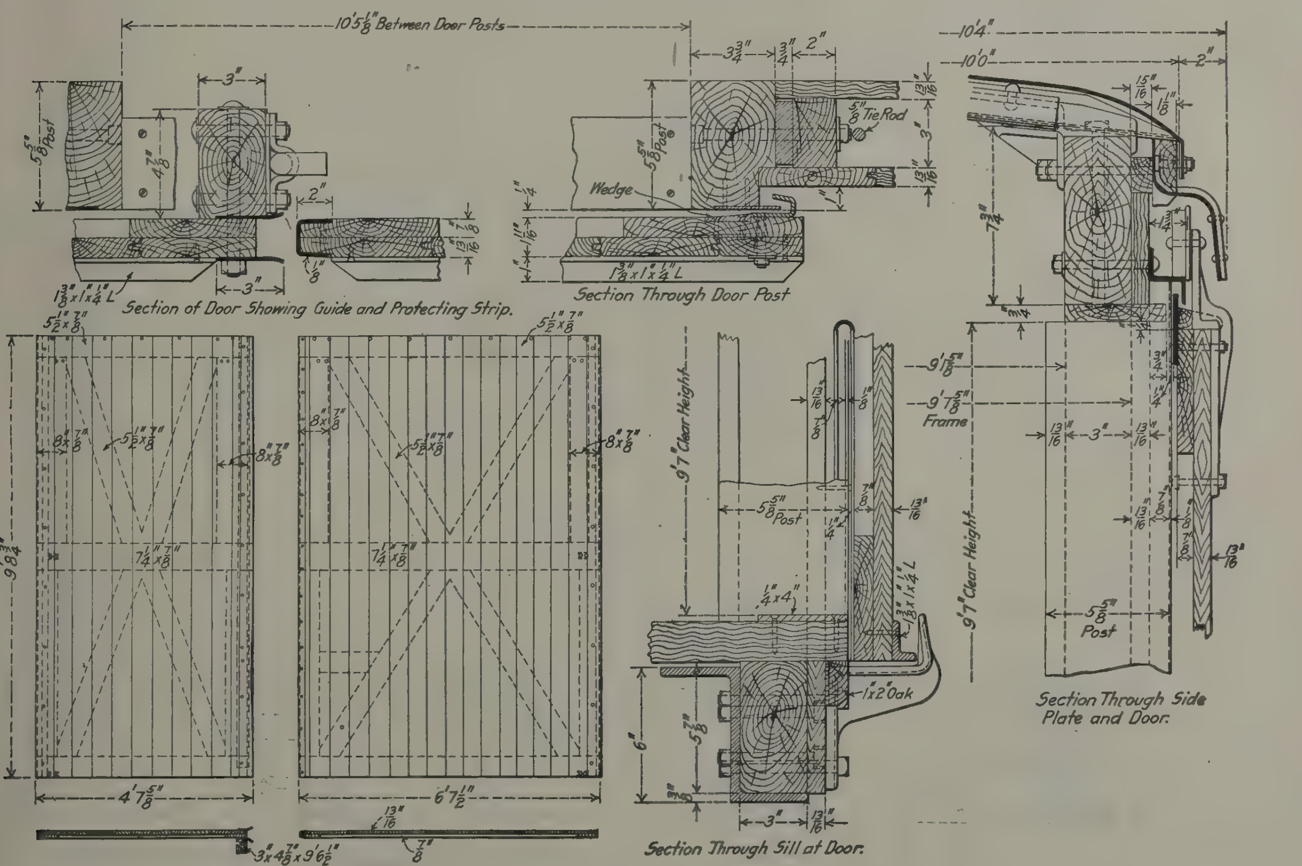


Fig. 835—Side Door for Chicago, Milwaukee & St. Paul Automobile Car.

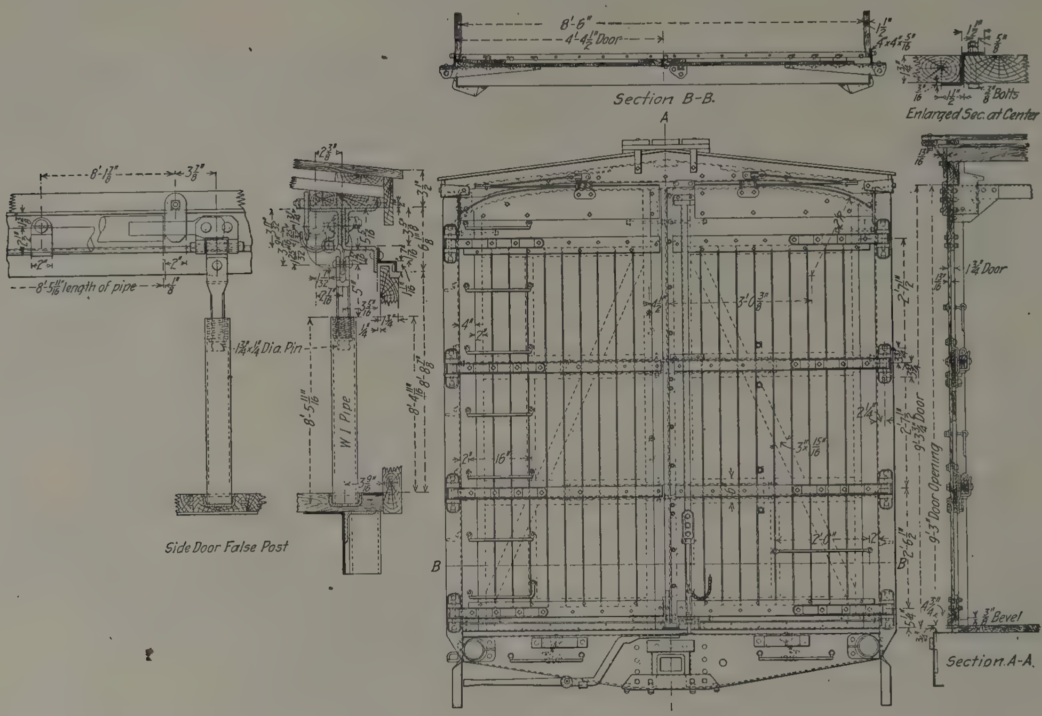


Fig. 836—End Door and False or Movable Post for Side Door of Erie Railroad Automobile Box Car. American Car & Foundry Company.

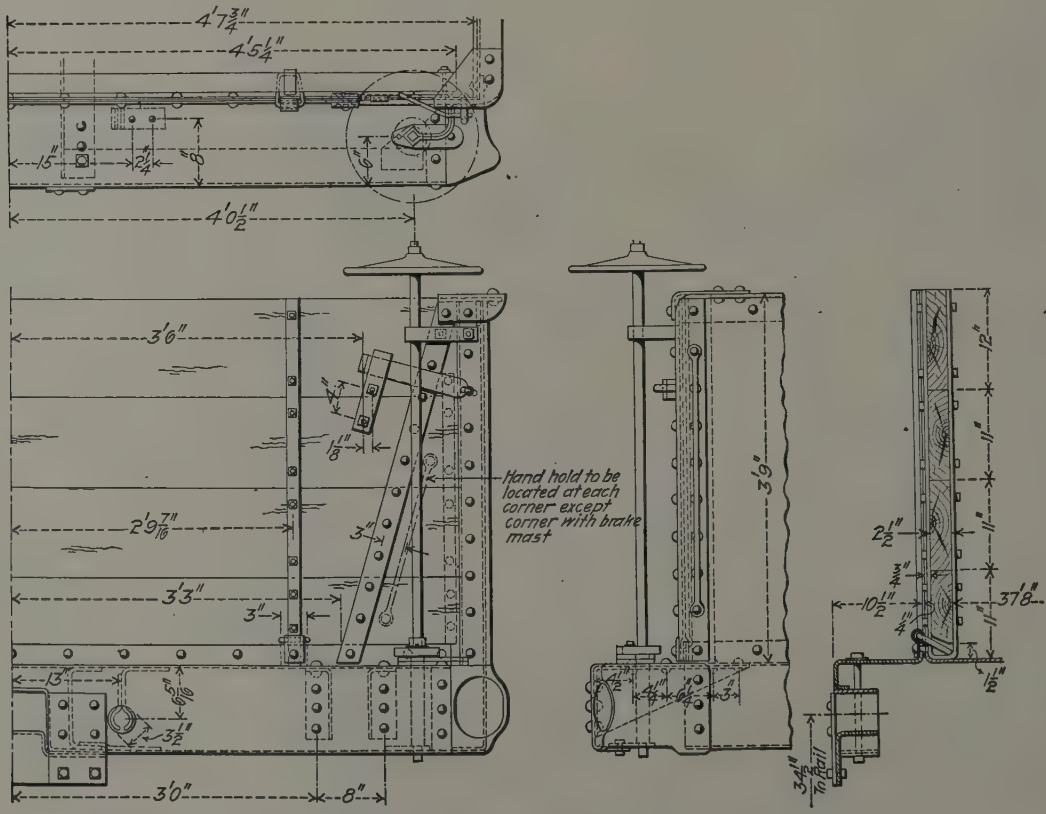


Fig. 837—Drop End Door for Pennsylvania Railroad Gondola Car.

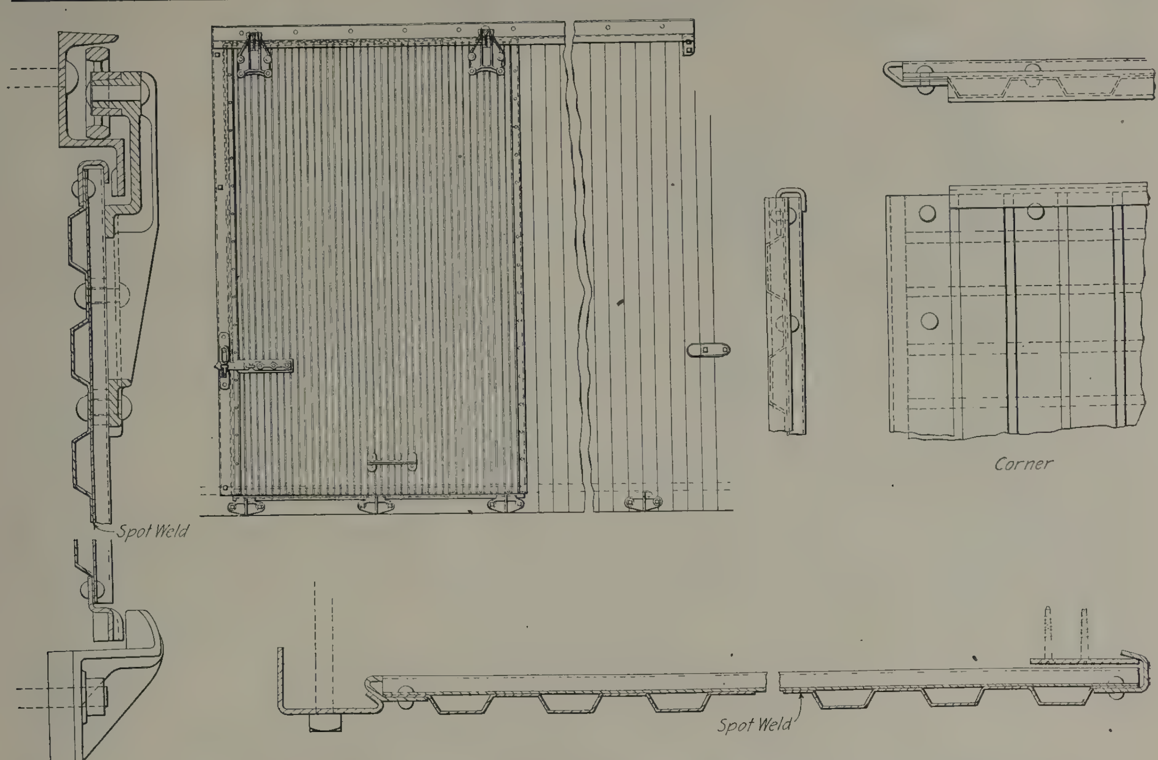


Fig. 838—Titanlite Steel Freight Car Door. Tuco Products Corporation.

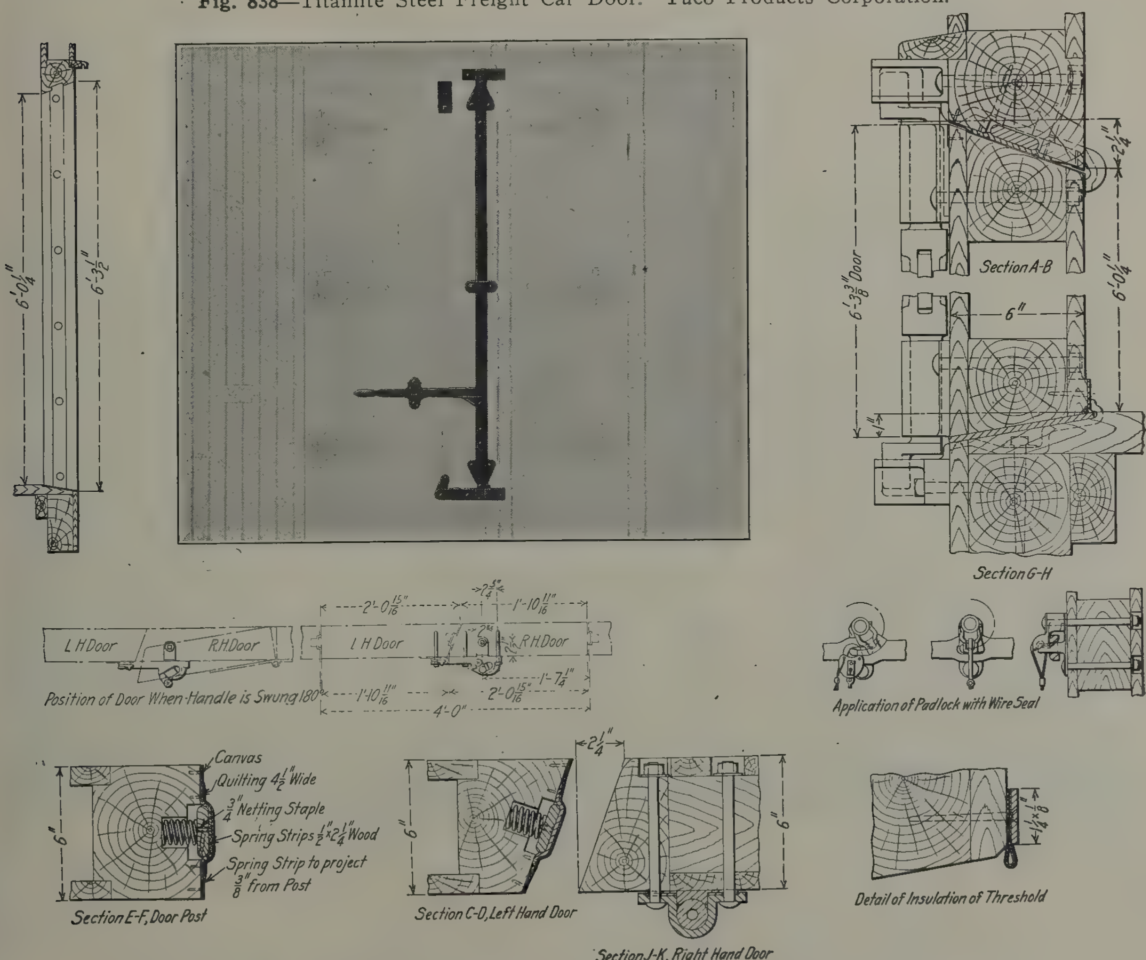


Fig. 839—Miner Refrigerator Car Door Fastener and La Flare Insulation. W. H. Miner.

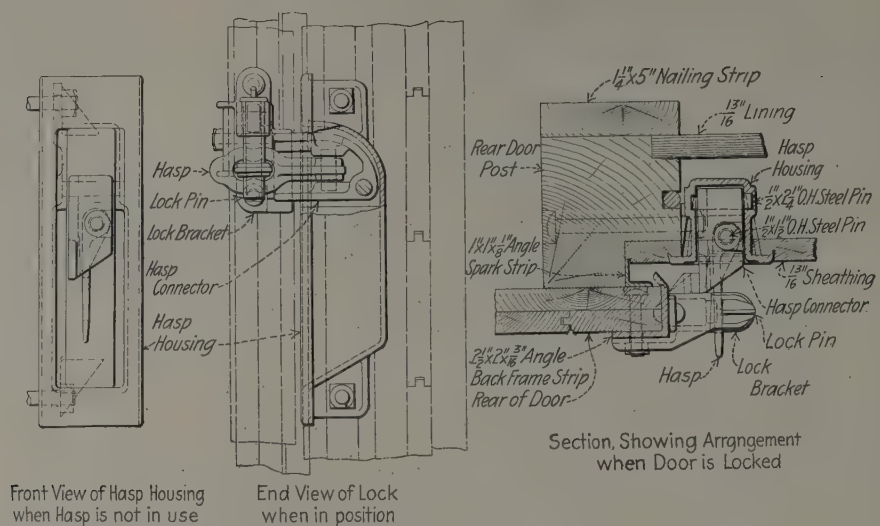


Fig. 840—Box Car Door Locking Device. Union Metal Products Company.

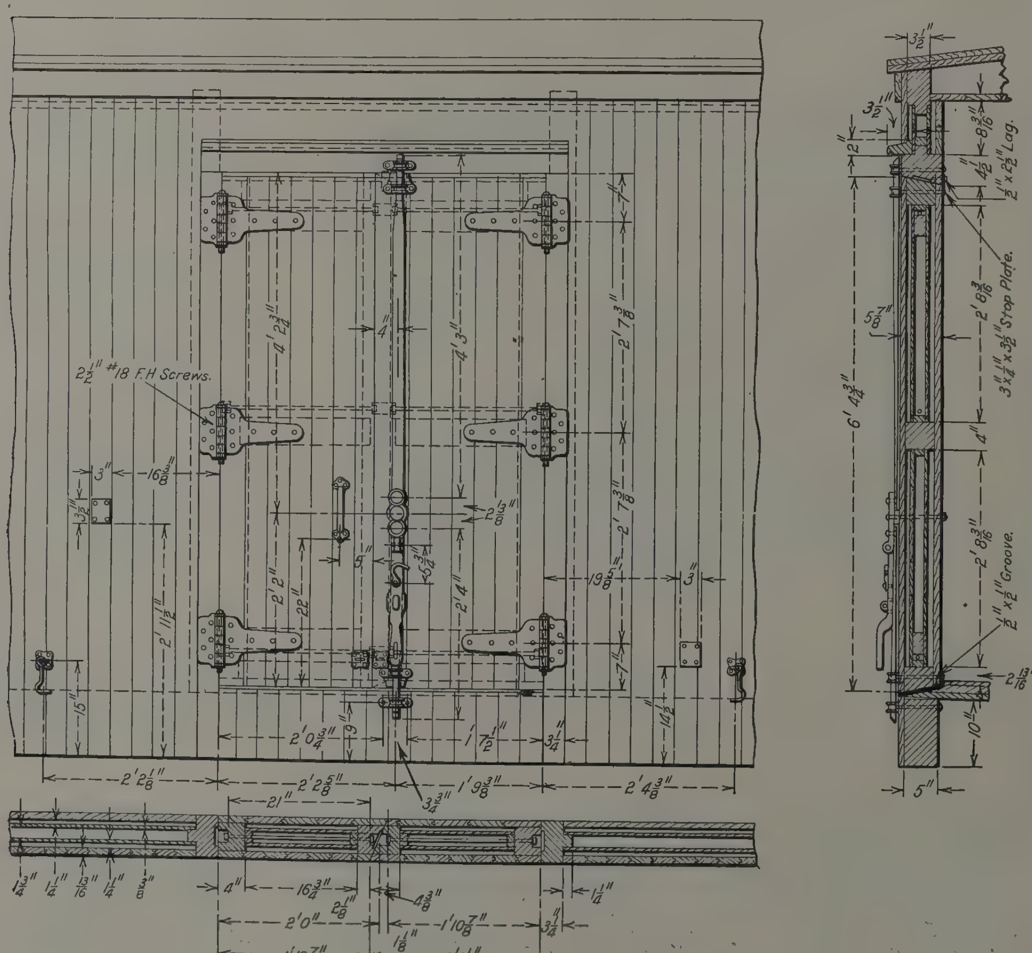


Fig. 841—Refrigerator Car Door. Marsh Refrigerator Service Company.

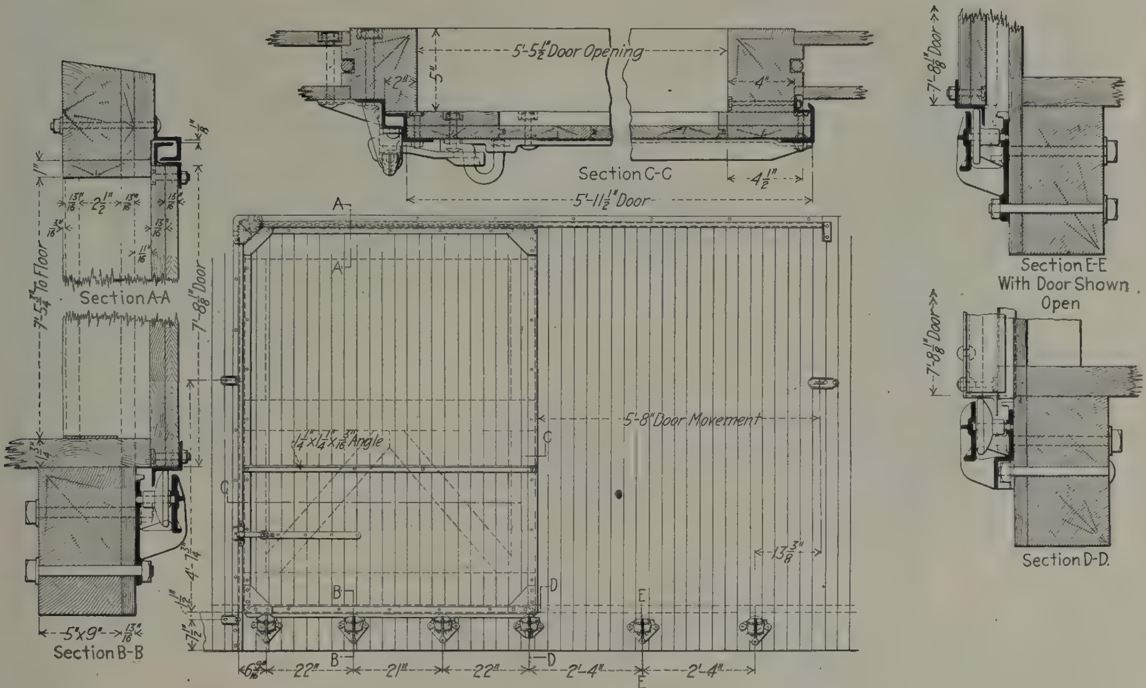
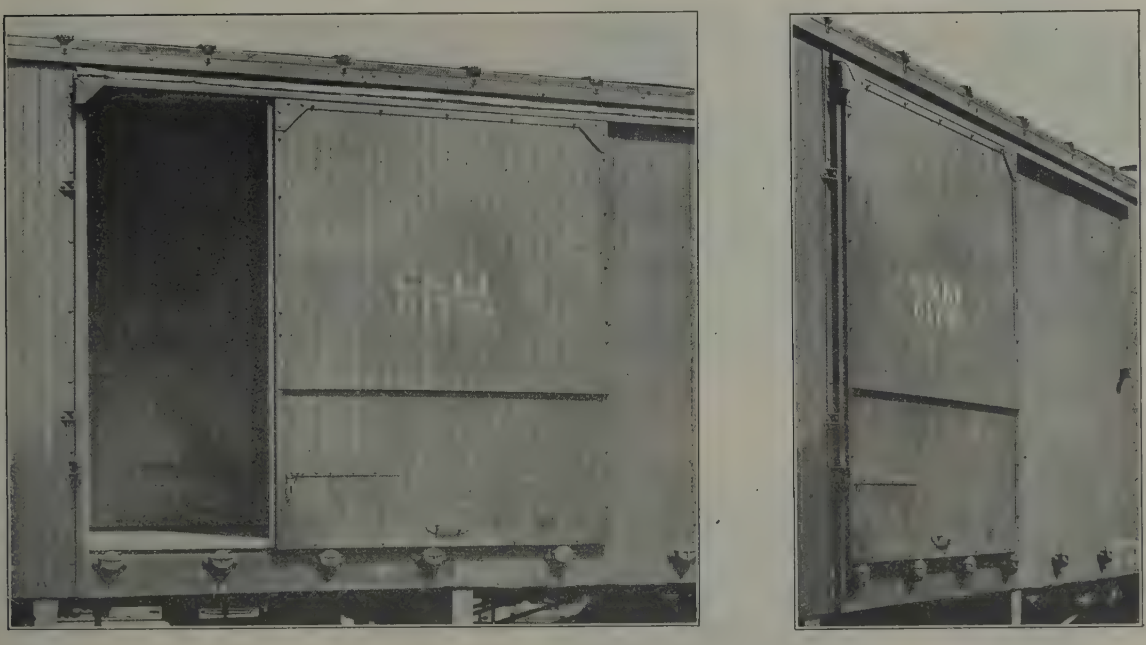


Fig. 842—Arrangement of National Box Car Door. Union Metal Products Company.



Open. Closed.

Fig. 843—National Car Door. Union Metal Products Company.

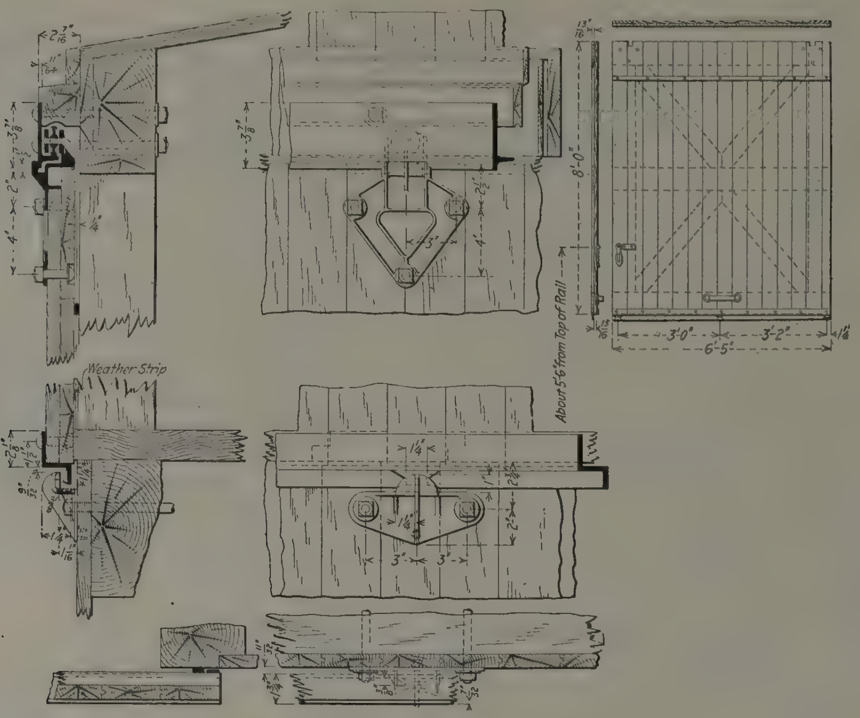


Fig. 844—Details of Application of Detroit Door. Hutchins Car Roofing Company.

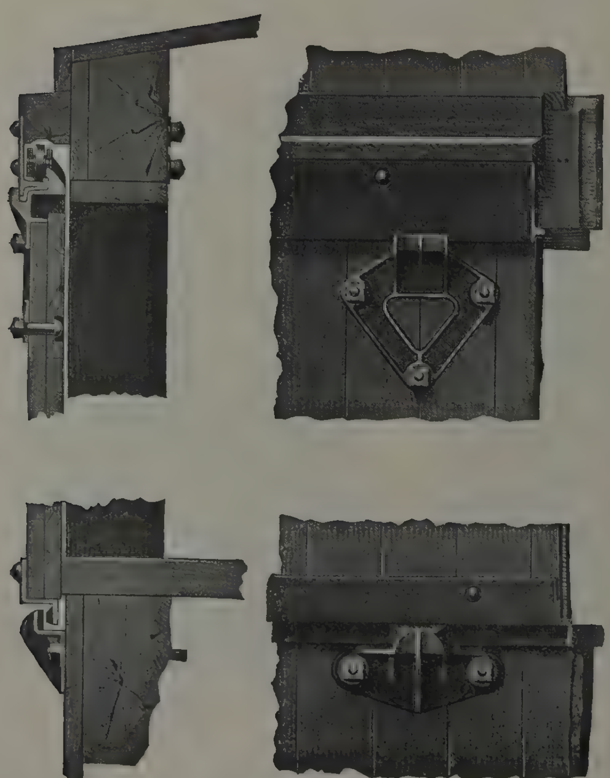
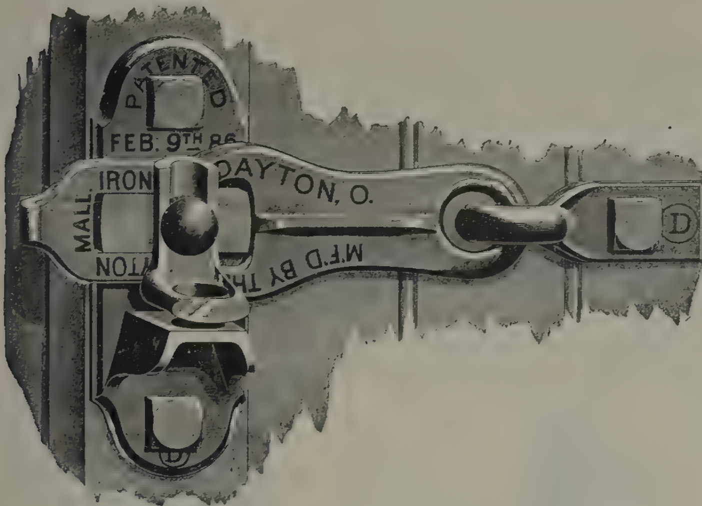
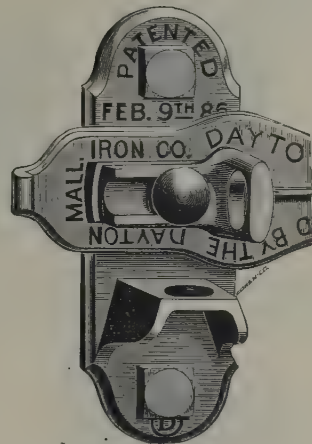


Fig. 845—Detroit Door Fixtures. Hutchins Car Roofing Company.

Fig. 846—Refrigerator Car Door Fasteners. W. H. Miner.



Closed, Ready for Sealing.



In Position to Release Hasp.

Fig. 847—Dayton Freight Car Door Lock. Dayton Malleable Iron Company.

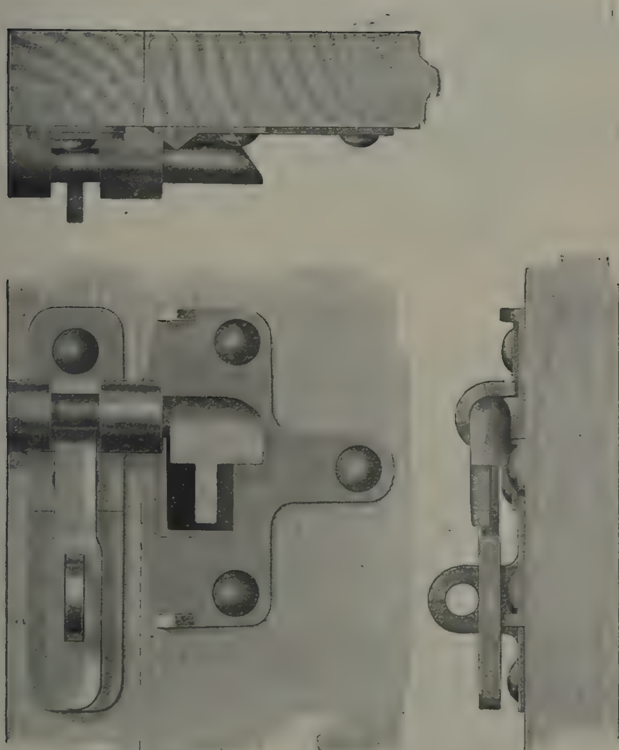


Fig. 848—Automatic Car Door Lock. Railway Utility Company.

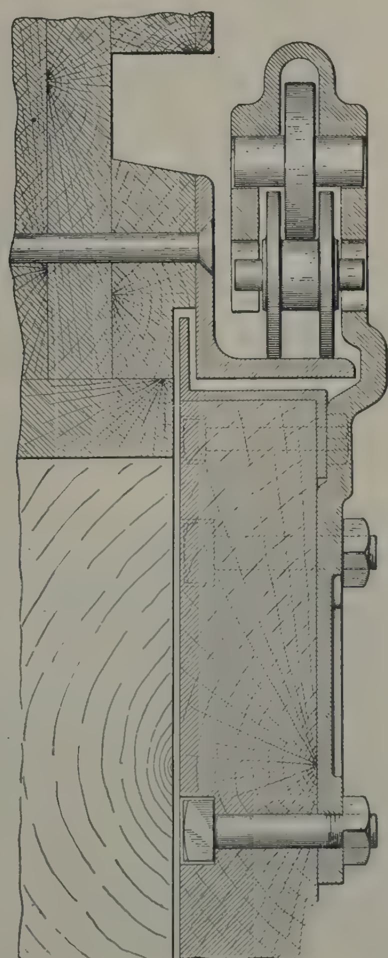


Fig. 849—Cross Section Through Utility Double Roller Car Door Hanger. Railway Utility Company.

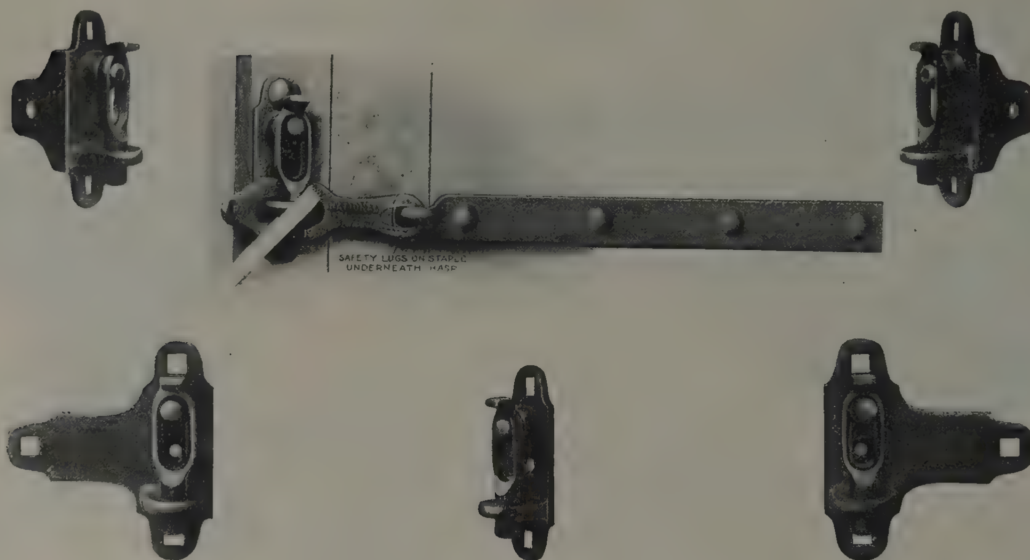


Fig. 850—National Car Door Fasteners—Locks.

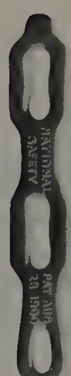


Fig. 851—
Two-Hole Hasp.

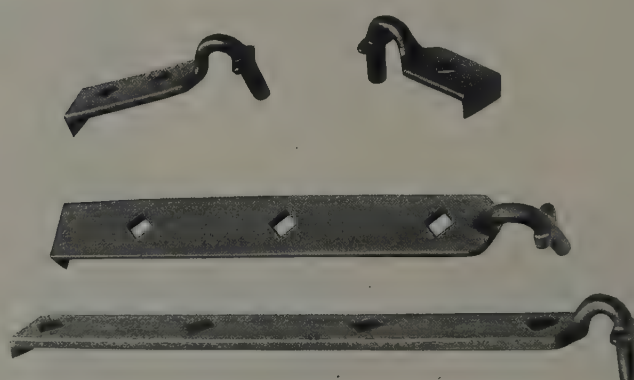


Fig. 852—National Car Door Fasteners—Staples.

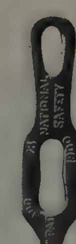


Fig. 853—
One-Hole Hasp.

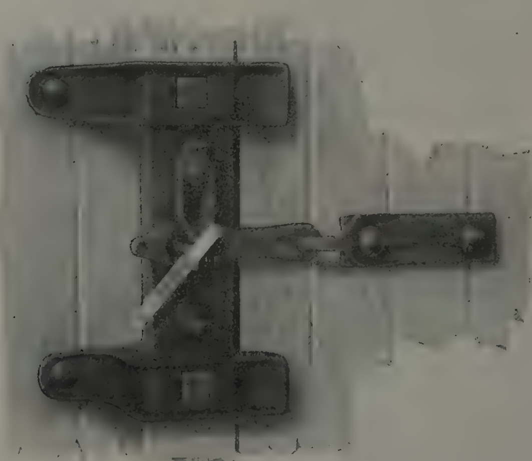


Fig. 854—National Car Door Stop and Lock Combined.

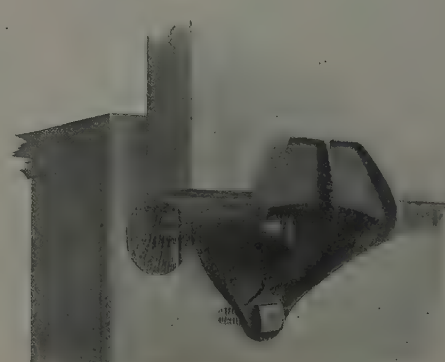


Fig. 855—National Burglar Proof Car Door Bracket.

The National Malleable Castings Company.

Fig. 856—Safety Snap Car Seal.

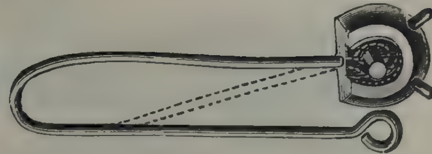


Fig. 857—Horse Shoe Car Seal.

E. J. Brooks & Company.

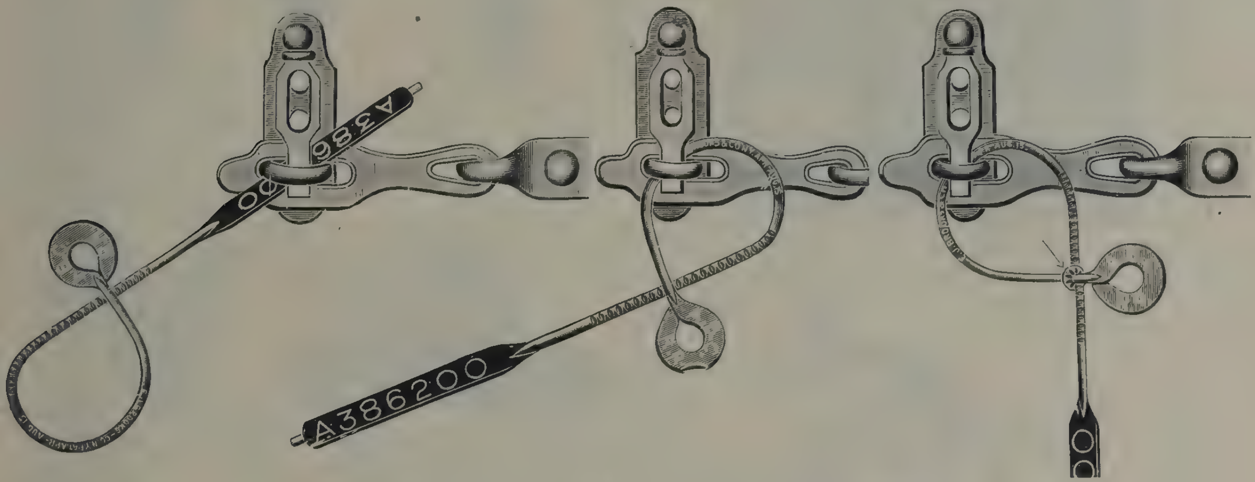


Fig. 858—Twist Lock Car Seal. E. J. Brooks & Company.

Fig. 859—Automatic Freight Car Door Lock—About to Close.

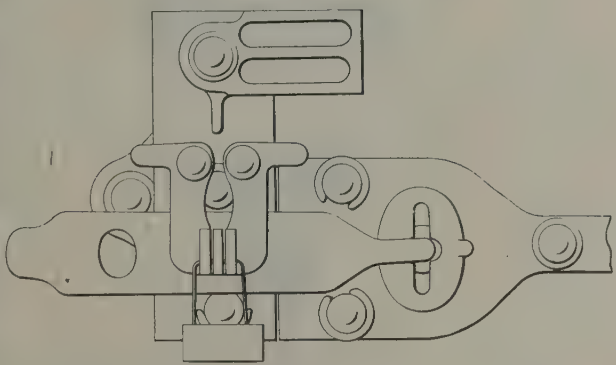


Fig. 861—Universal Gibraltar Car Door Fastener. Universal Car Seal & Appliance Company.

Fig. 860—Automatic Freight Car Door Lock—Closed. The Gustin-Bacon Manufacturing Co.

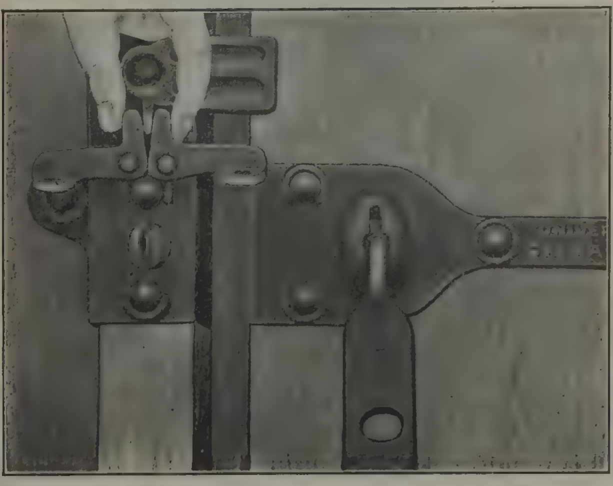


Fig. 862—Universal Simplex Car Door Fastener. Universal Car Seal & Appliance Company.

Fig. 863—Yale Door Closer. Yale & Towne Manufacturing Company.

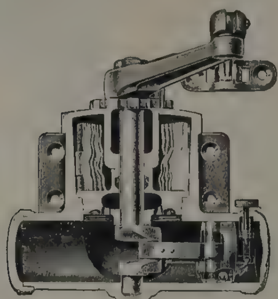


Fig. 865—Interior of Yale Door Closer, Model Y. Yale & Towne Manufacturing Company.

Fig. 867—Baggage Car Sliding Door Hanger. James L. Howard & Company.

Fig. 869—Four Button Push Switch for Remote Control of Magnetic Air Valves for Pneumatic Door Operators. Consolidated Car Heating Company.

Fig. 864—Sliding Door Hangers. Russell & Erwin Manufacturing Company.

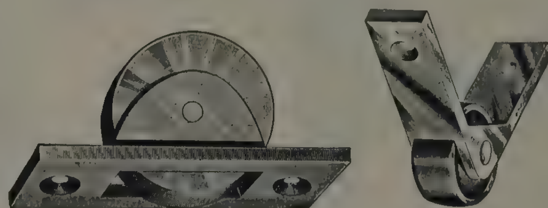


Fig. 866—Door Bottom and Corner Rollers. Dayton Manufacturing Company.

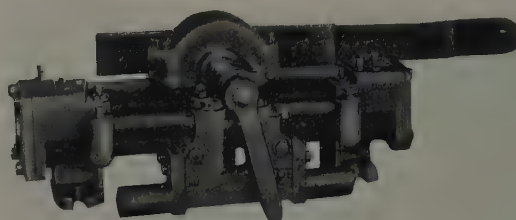


Fig. 868—Pneumatic Door Operator. Consolidated Car Heating Company.

Fig. 870—Signal Light Box for Motorman's Automatic Starting Signal, Indicating All Doors of Train Closed. Consolidated Car Heating Company.

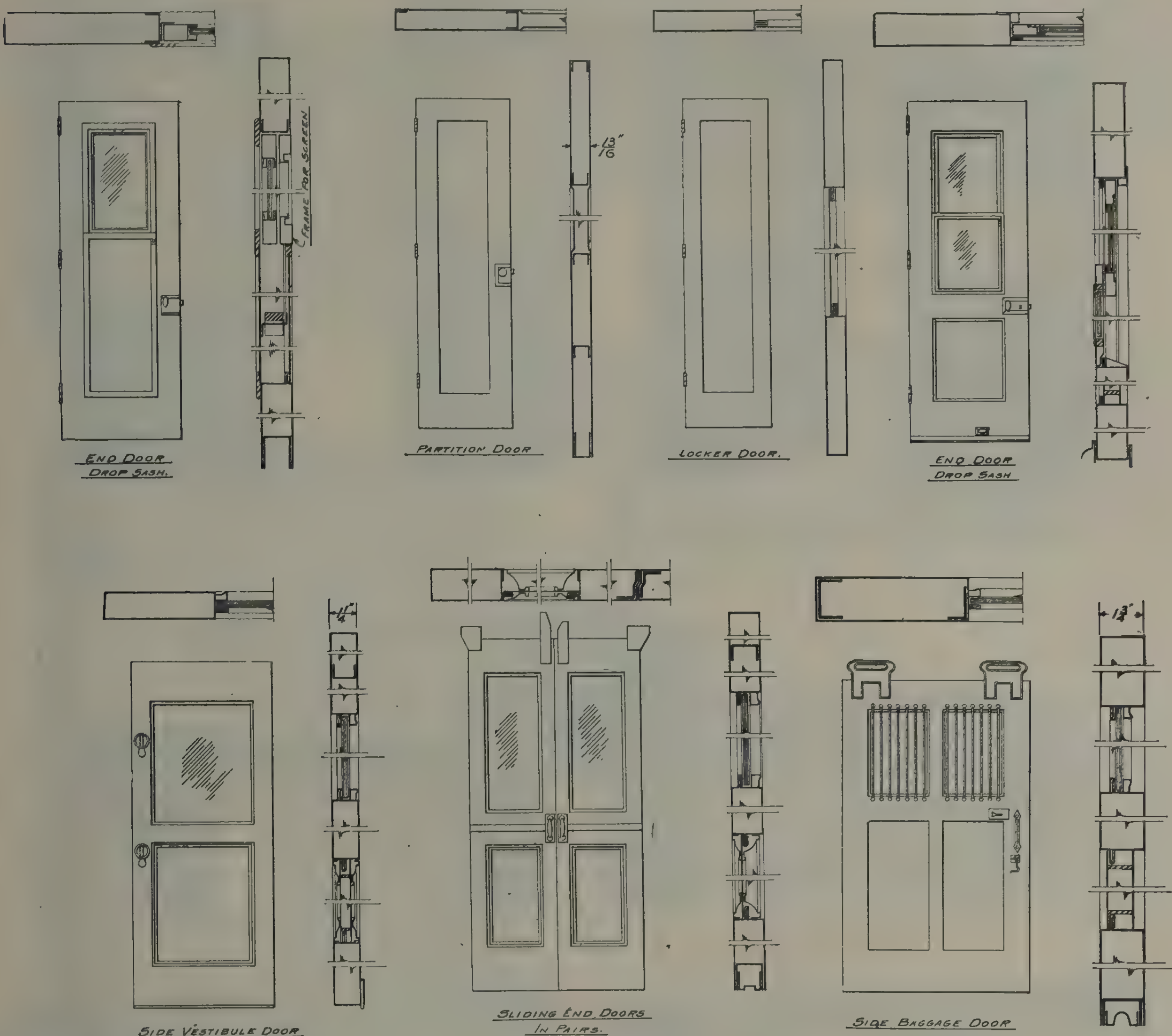


Fig. 871—Hollow Metal Doors. Hale & Kilburn Company.

Fig. 872—Sherburne Car Door Holder. Sherburne & Company.

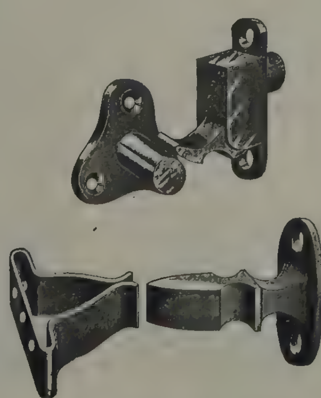


Fig. 873—Door Holders. Adams & Westlake Company.

Fig. 874—Door Stop. Russell & Erwin Manufacturing Company.

Sliding Doors. End Door.

Fig. 875—Steel Doors for Hudson & Manhattan Tunnel Cars. Hale & Kilburn Company.

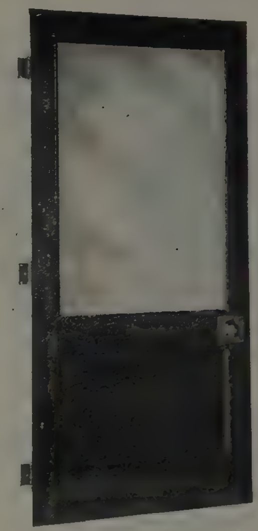


Fig. 876—Steel End Door for Steel Coaches. Hale & Kilburn Company.

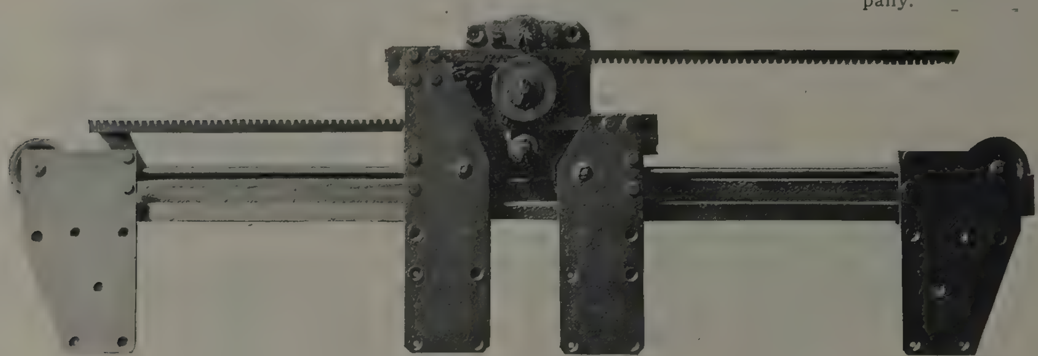


Fig. 877—Double Sliding Door Fixture. James L. Howard & Company.

Inside. Outside.

Fig. 878—Steel Vestibule, End and Saloon Doors for Pennsylvania Railroad Steel Coaches. Hale & Kilburn Company.

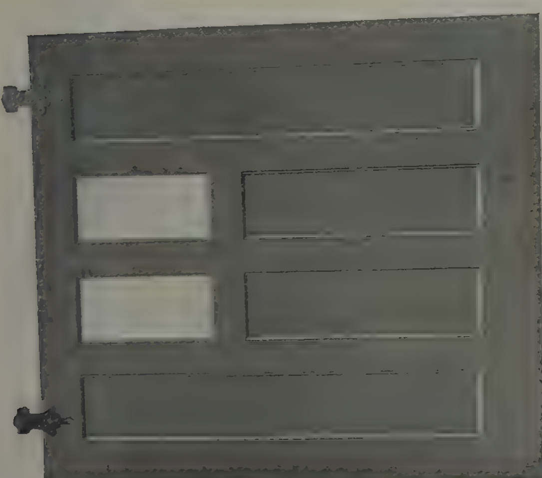


Fig. 879—Hollow Steel Baggage Car Door.
Grinden Art Metal Company.

Fig. 880—Hollow Steel Doors for Steel Subway Cars.
Grinden Art Metal Company.

Fig. 881—Peerless Steel Baggage Car Door.
Dunbar Manufacturing Co.

Fig. 882—Steel Vestibule Side Door, without Panel.

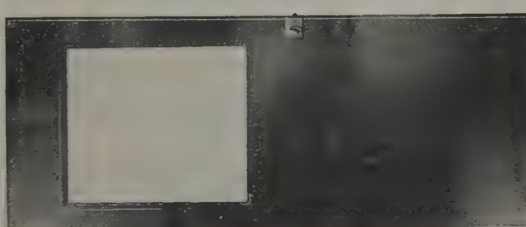


Fig. 883—Steel Vestibule Door with Panel.

Fig. 884—Body End Panel Door with Round Corners and Glass Beading.

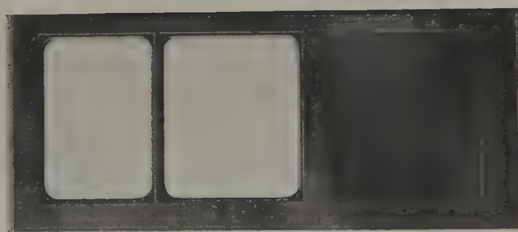


Fig. 885—Steel Sliding Side Door. Two Lights of Glass, with Round Corners and Beading.

Fig. 886—End Steel Door, Drop Sash and Half Panel Construction.

Dunbar Manufacturing Company.

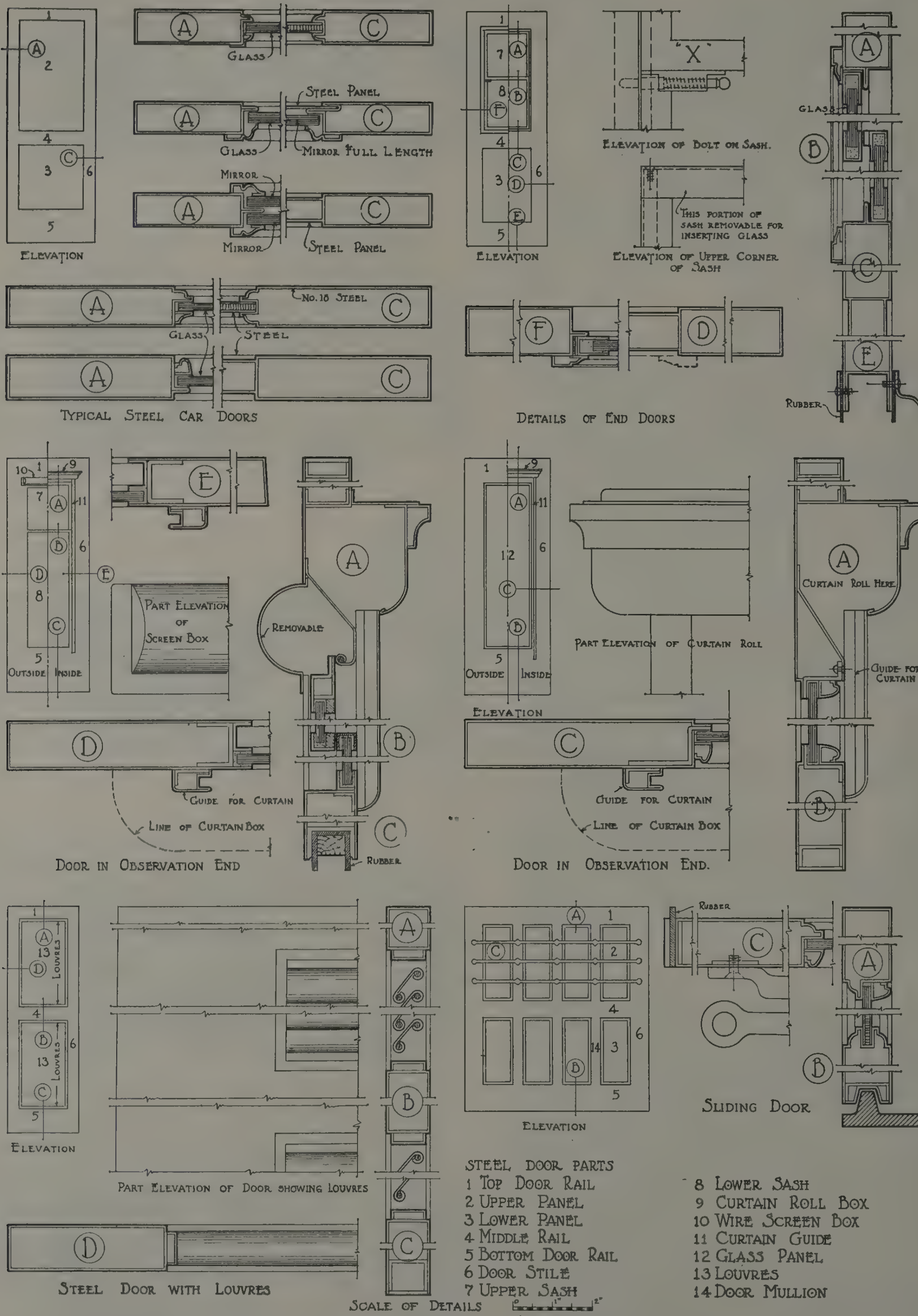


Fig. 887—Steel Doors and Parts for Passenger Train Cars. Dahlstrom Metallic. Door.

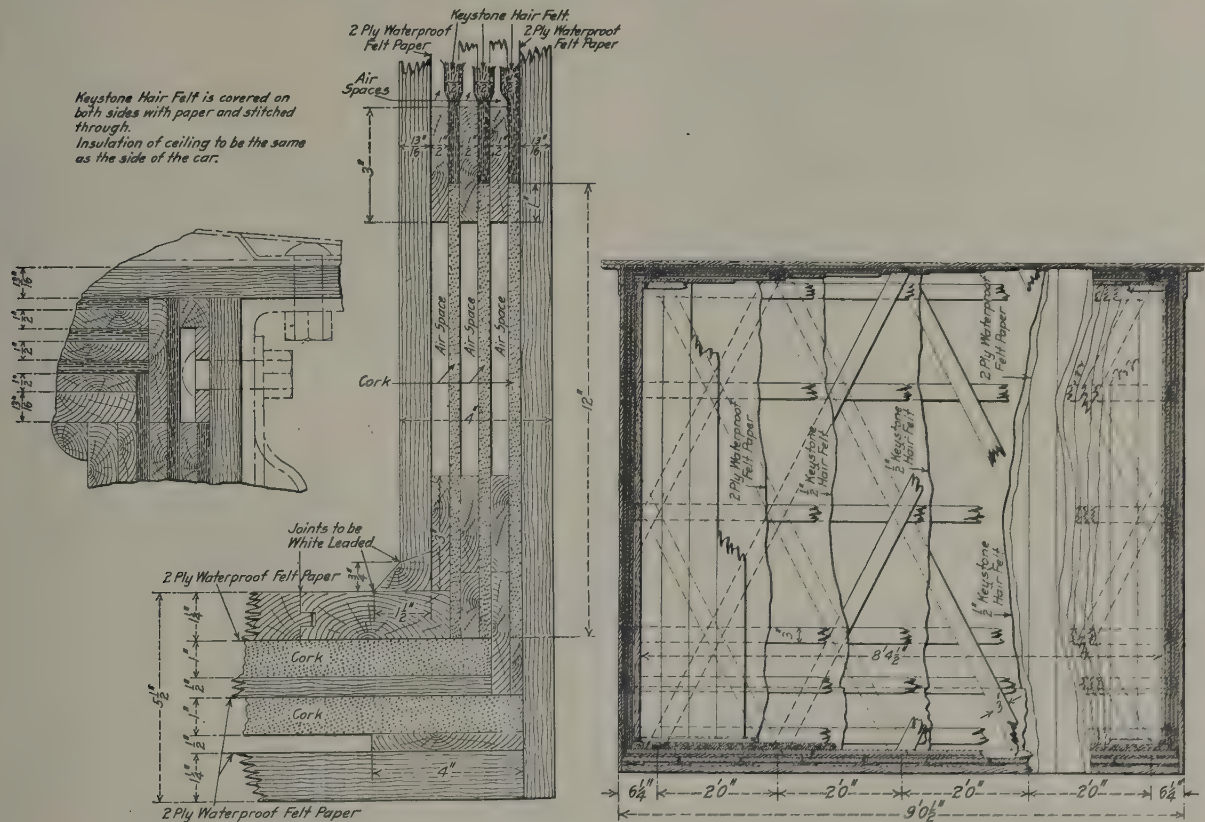


Fig. 888—Insulation Details for Pennsylvania Railroad Steel Frame Refrigerator Cars.

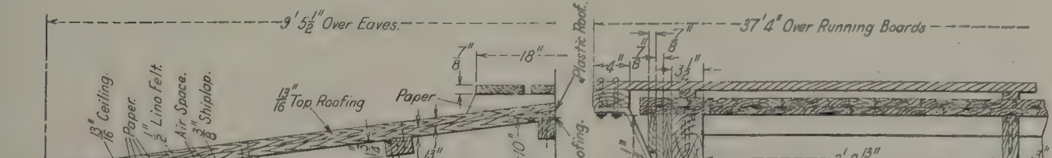


Fig. 889—Refrigerator Car Insulation Details. Marsh Refrigerator Service Company.

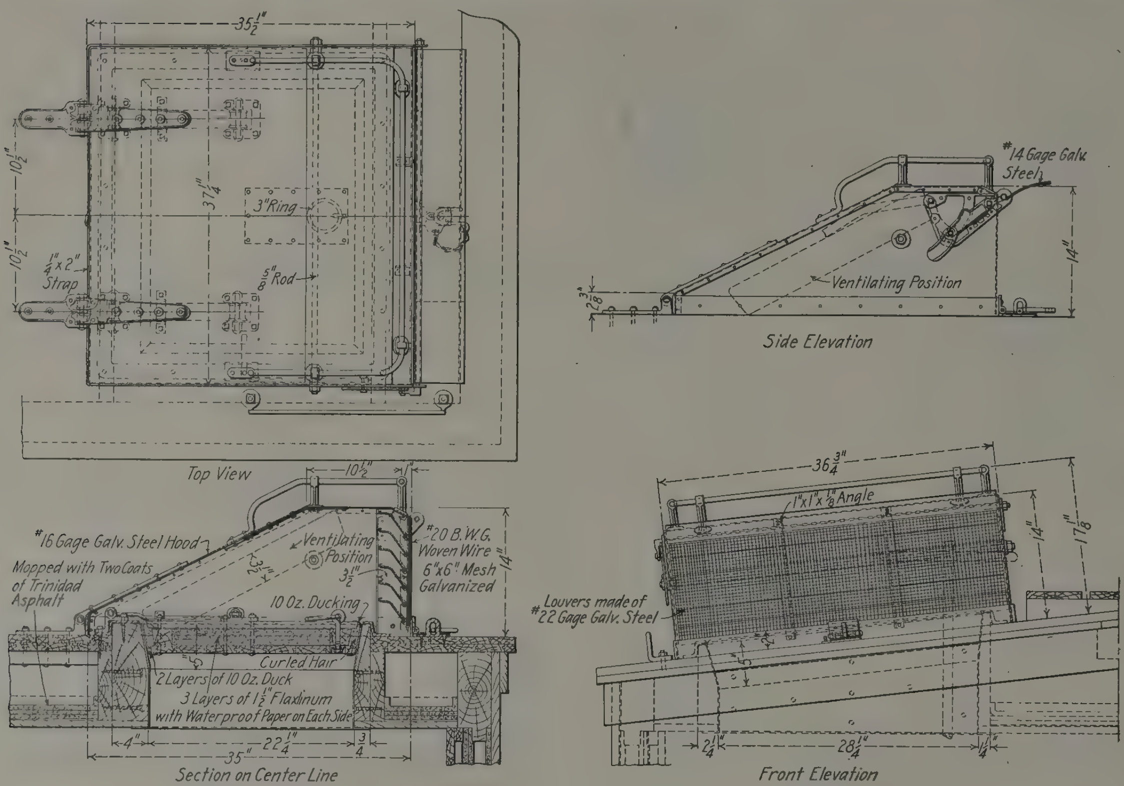


Fig. 890—Bohn Standard Ventilator and Plug for Refrigerator Cars. Bohn Refrigerator Company.

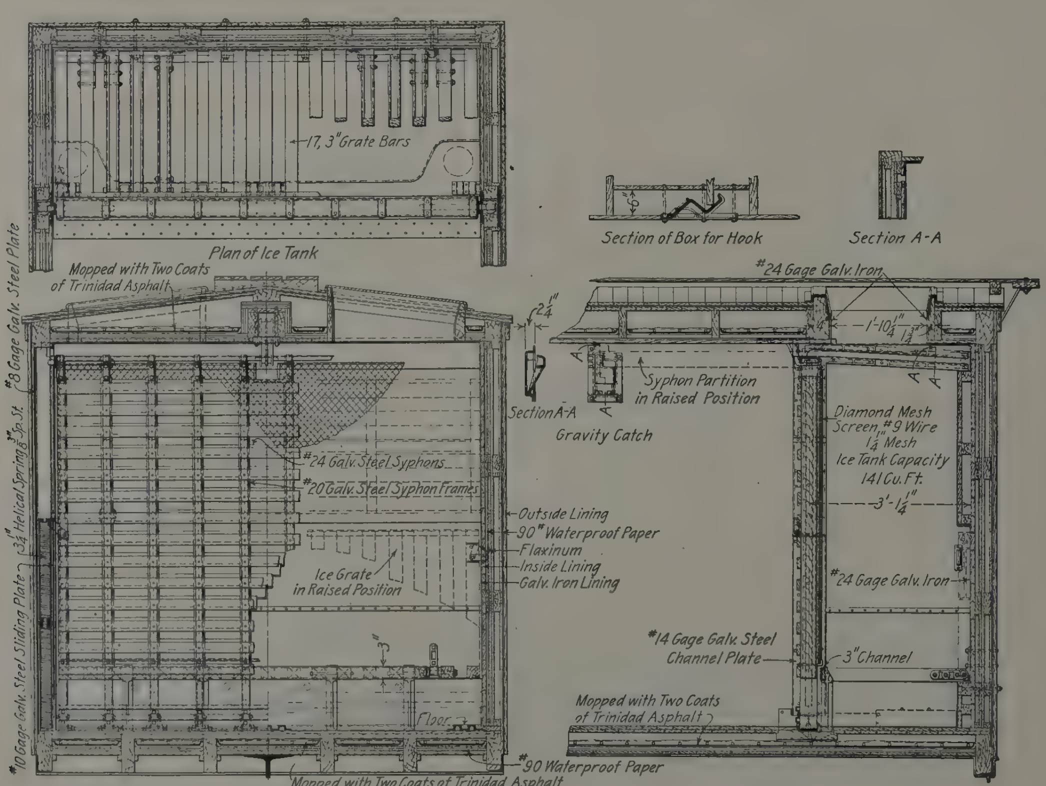
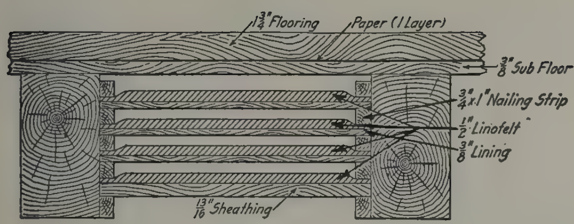
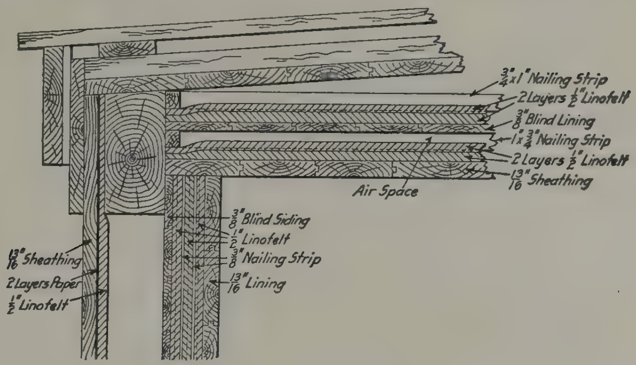


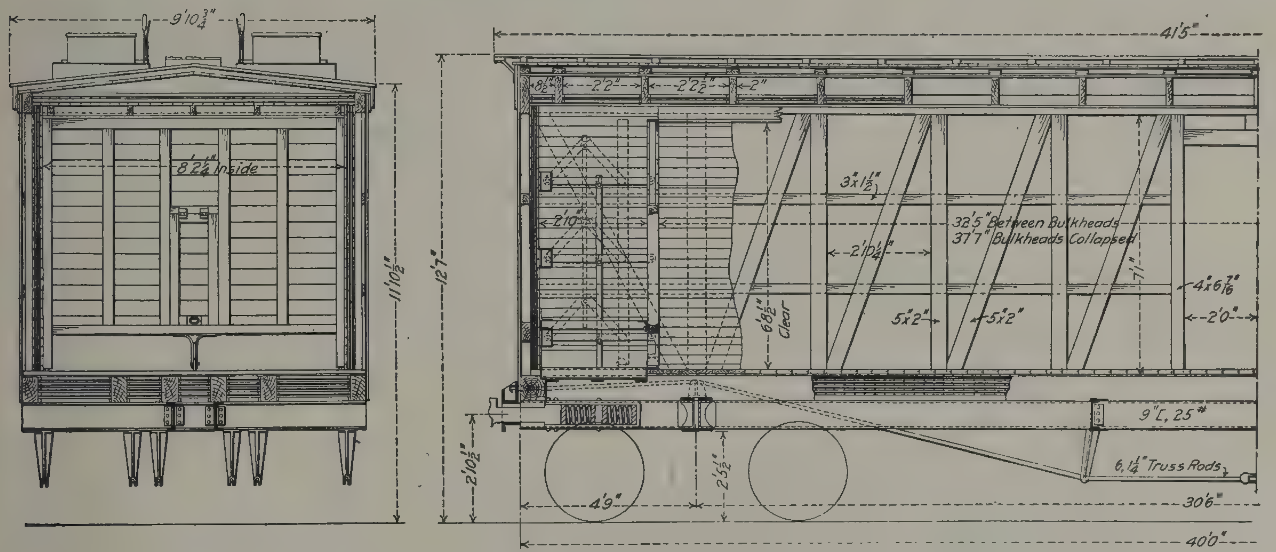
Fig. 891—Bohn Standard Collapsible Bulkhead for Refrigerator Cars. Bohn Refrigerator Company.



Floor.

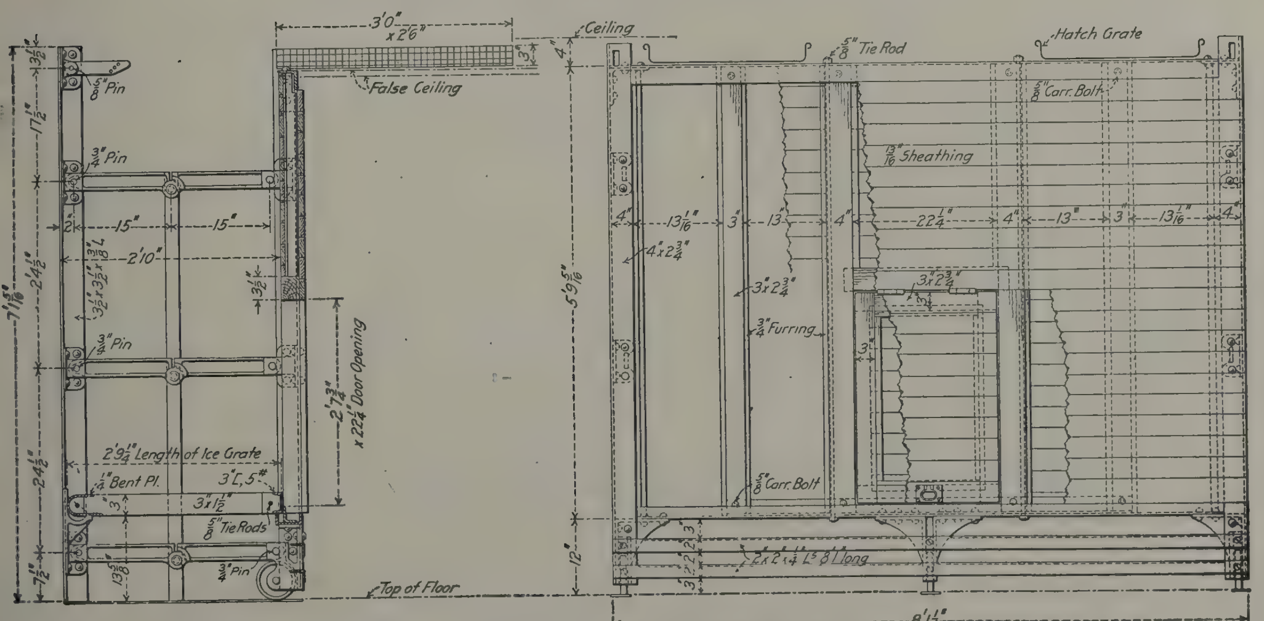


Roof.



Car Body.

Fig. 892—Refrigerator Car Insulation. Union Fibre Company.



Cross Section. Elevation Showing Framing. Front Elevation.

Fig. 893—Collapsible Ice Bunker for Refrigerator Car. Union Fibre Company.

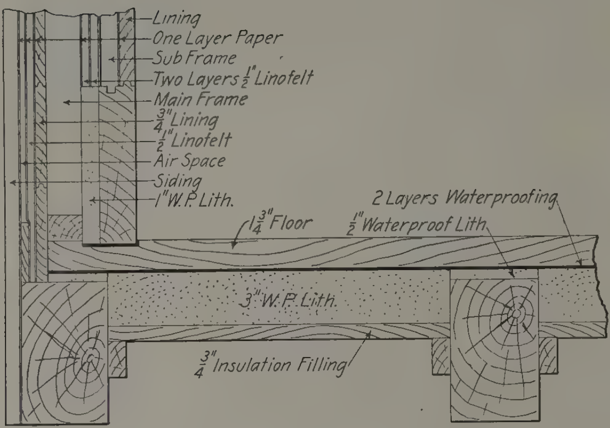


Fig. 894—Detail of Improved Refrigerator Car Insulation. Union Fibre Company.

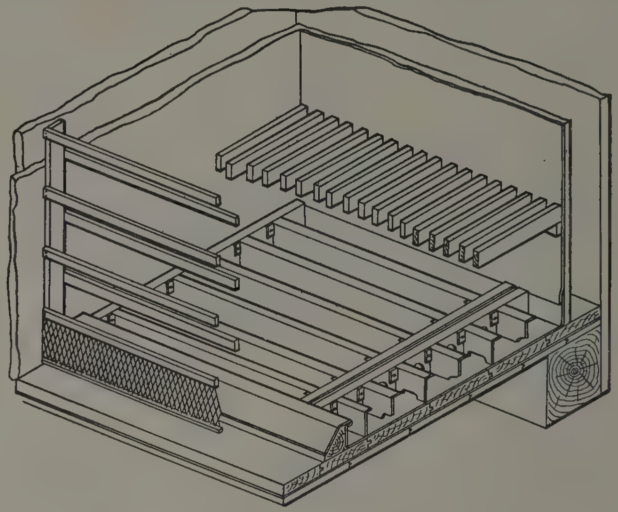


Fig. 895—Non-Splash Drip Pan for Collapsible Ice Bunker. Union Fibre Company.

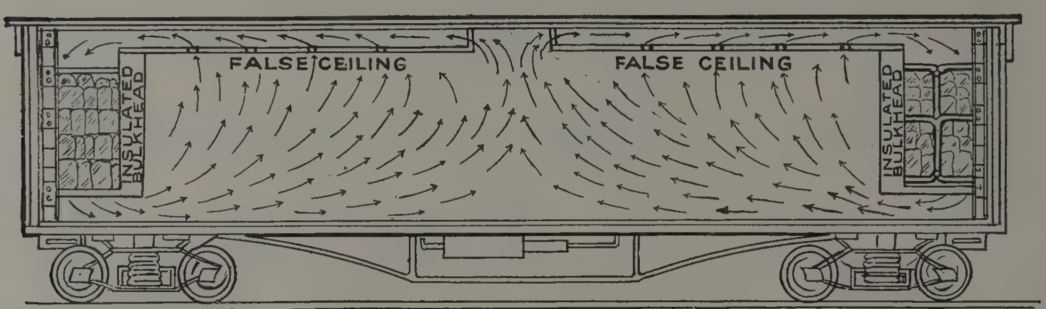


Fig. 896—Diagram of Refrigerator Car, Union Fibre Company's Patent System, Showing Air Circulation.

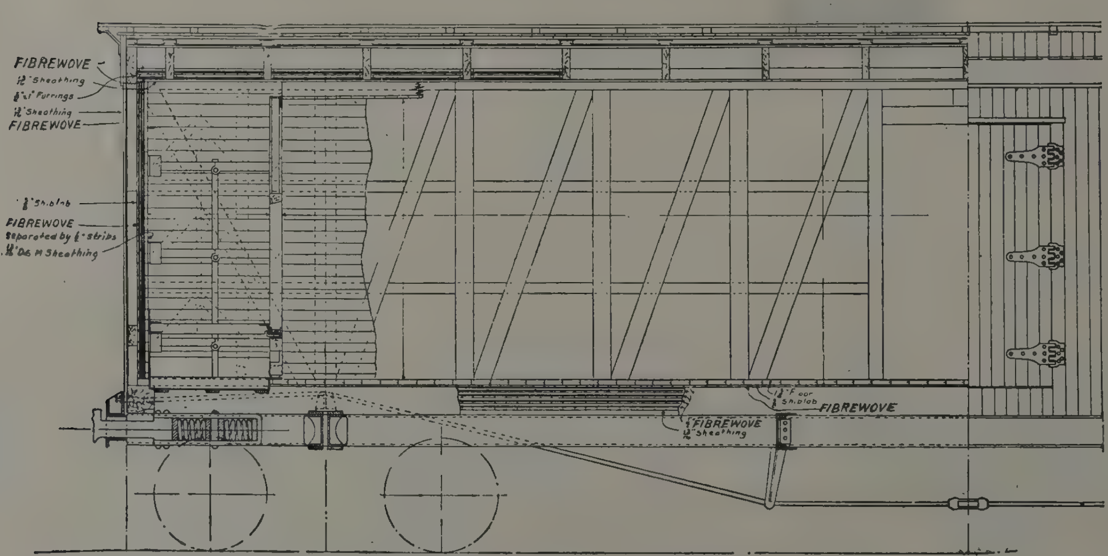


Fig. 897—Application of Fibrewove Insulating Paper to Refrigerator Car. Philip Carey Company.

Fig. 898—Alcohol Burner for Alcohol Heating & Lighting Company's Heaters.

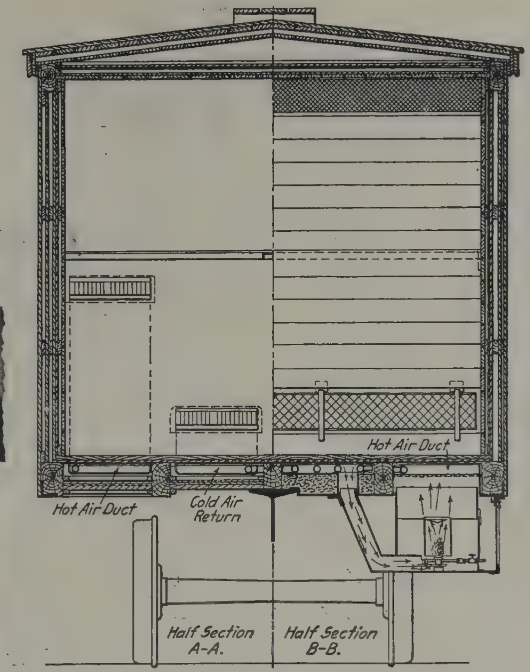


Fig. 900—Cross Sections of Refrigerator Car Shown in Fig. 901, Showing Application of Heater.

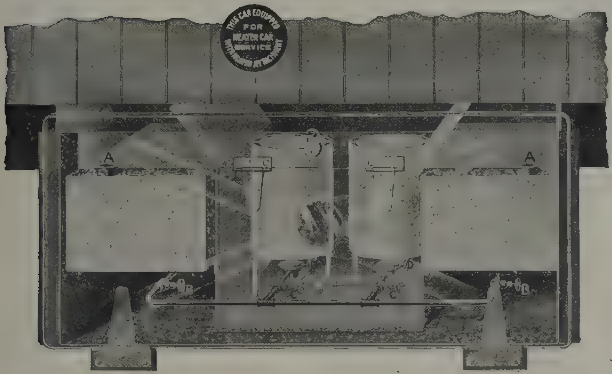


Fig. 899—Heater Box as Applied to Refrigerator Car, Showing Location of Heater Drums and Alcohol Supply Tanks.

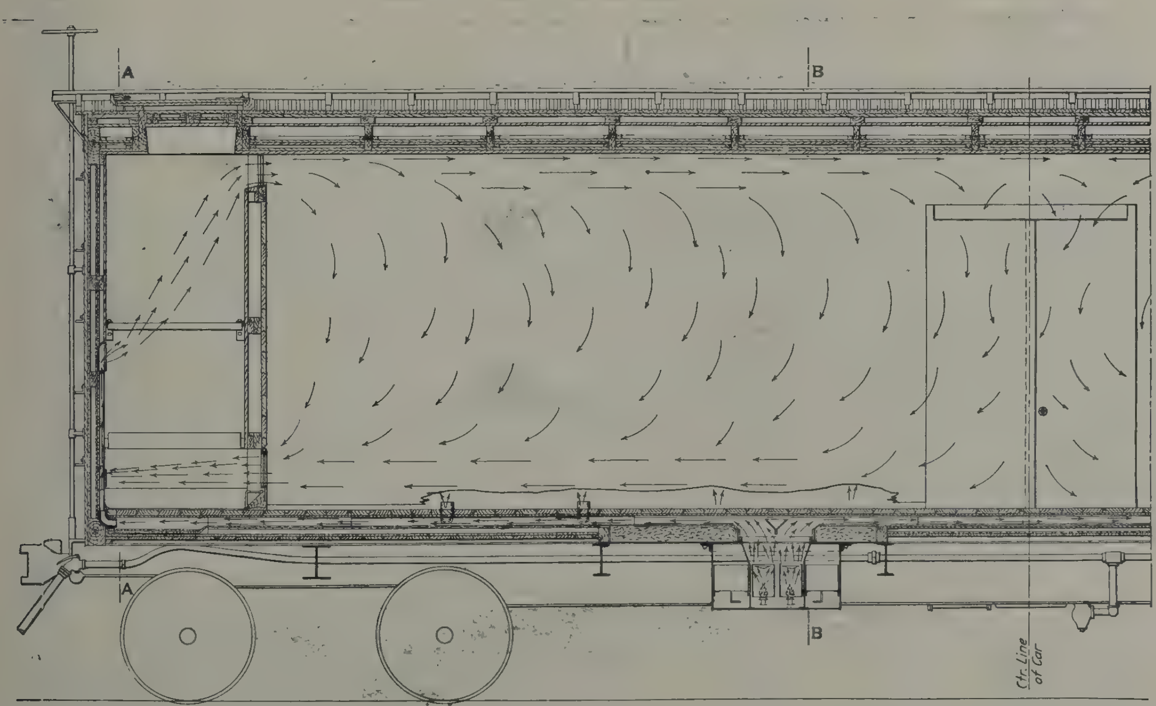


Fig. 901—Section Through Refrigerator Car Equipped with the Alcohol Heating & Lighting Company's Heating System, Showing Location of Heater and Passages, and Flow of Air Currents.

Alcohol Heating & Lighting Company.

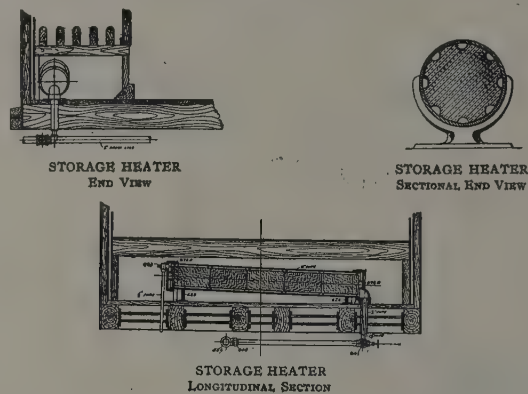


Fig. 902—Gold Improved Storage Heater for Use in Refrigerator Cars During Cold Weather. Gold Car Heating & Lighting Company.

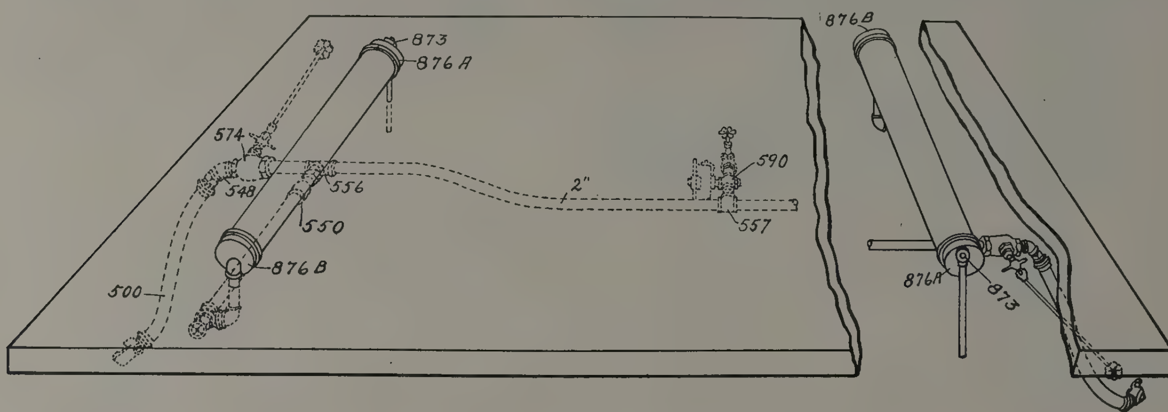


Fig. 903—Piping Arrangement for Gold Improved Storage Heaters. Gold Car Heating & Lighting Company.

Fig. 904—Gold Improved Storage Heaters as applied to a Refrigerator Car. Gold Car Heating & Lighting Company.

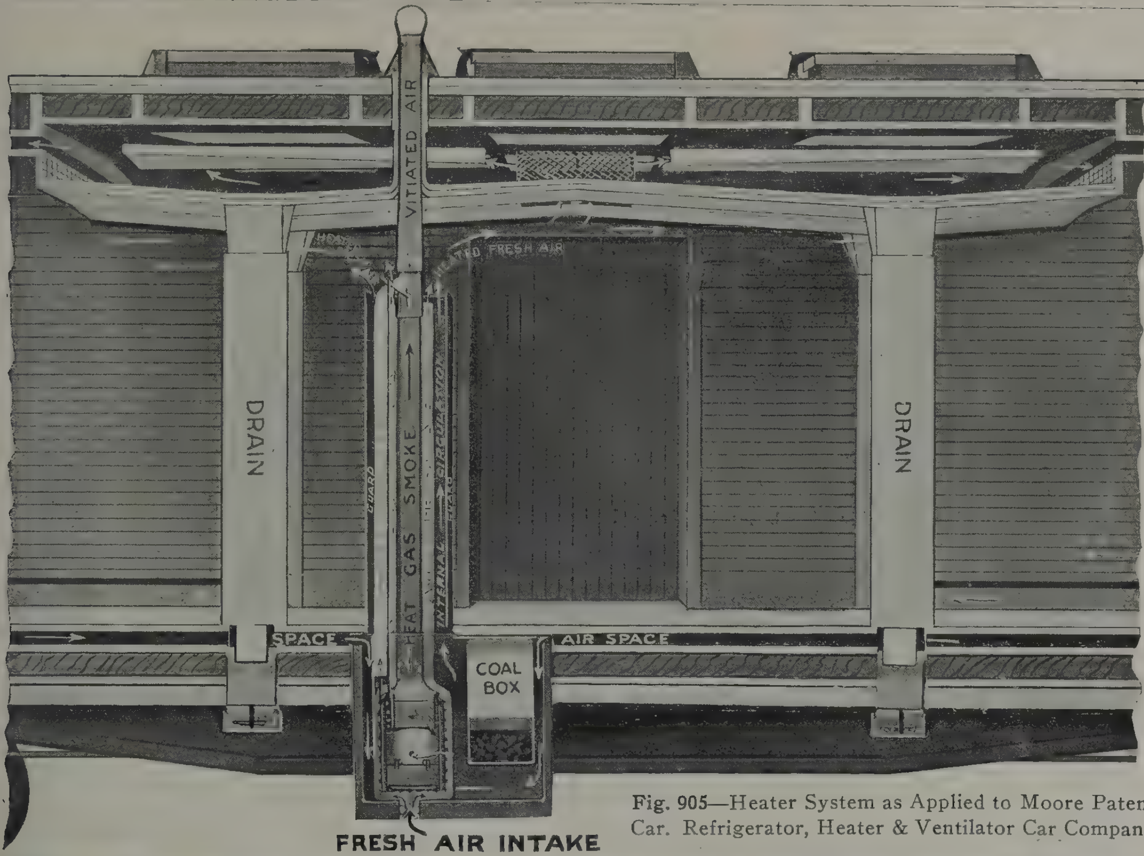


Fig. 905—Heater System as Applied to Moore Patent Car. Refrigerator, Heater & Ventilator Car Company

Fig. 906—Interior View of 36-ft. Moore Patent Car. Refrigerator, Heater & Ventilator Car Company.

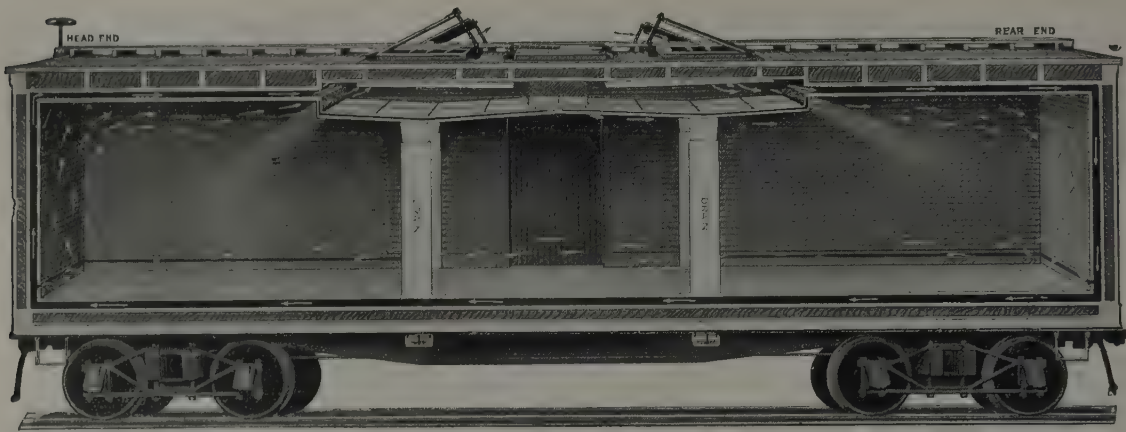


Fig. 907—Air Circulation in Moore Patent Car When Arranged for Ventilation.

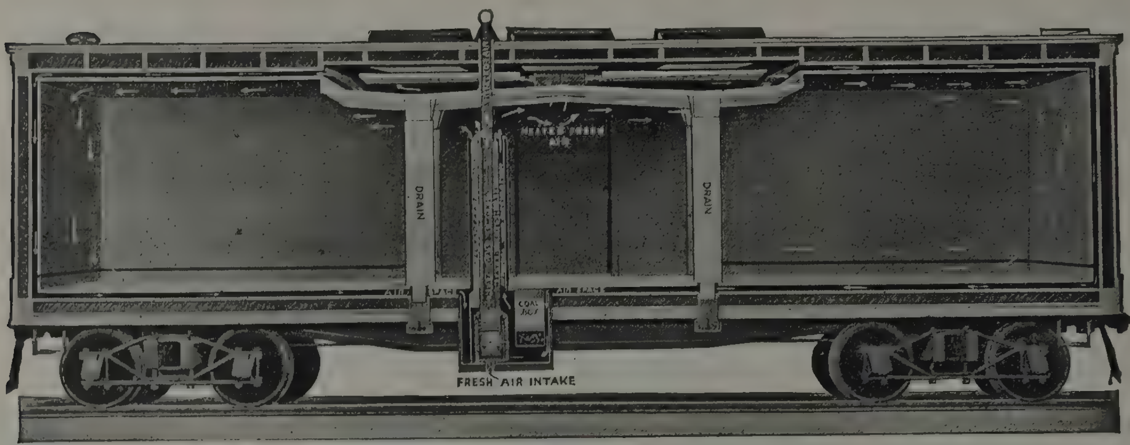


Fig. 908—Air Circulation in Moore Patent Car When Arranged for Heating.

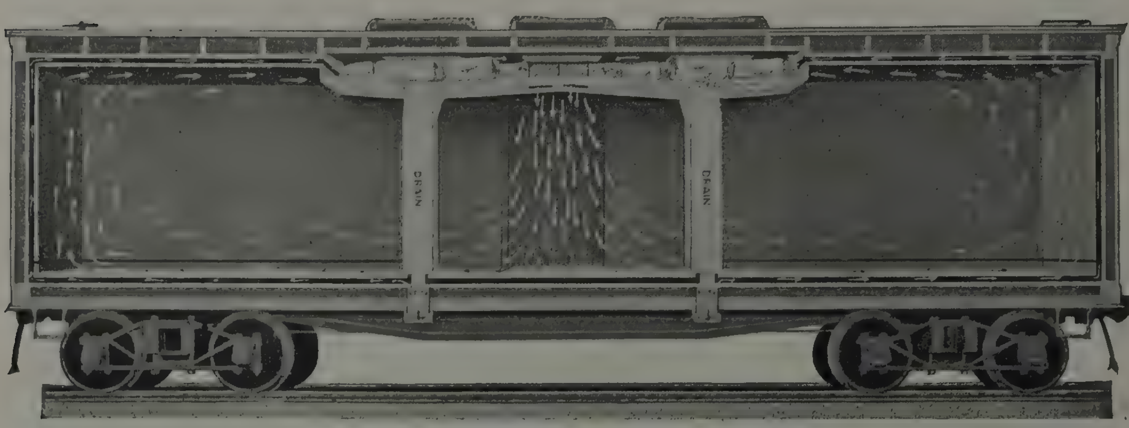


Fig. 909—Air Circulation in Moore Patent Car When Arranged for Refrigeration.
Refrigerator, Heater & Ventilator Car Company.

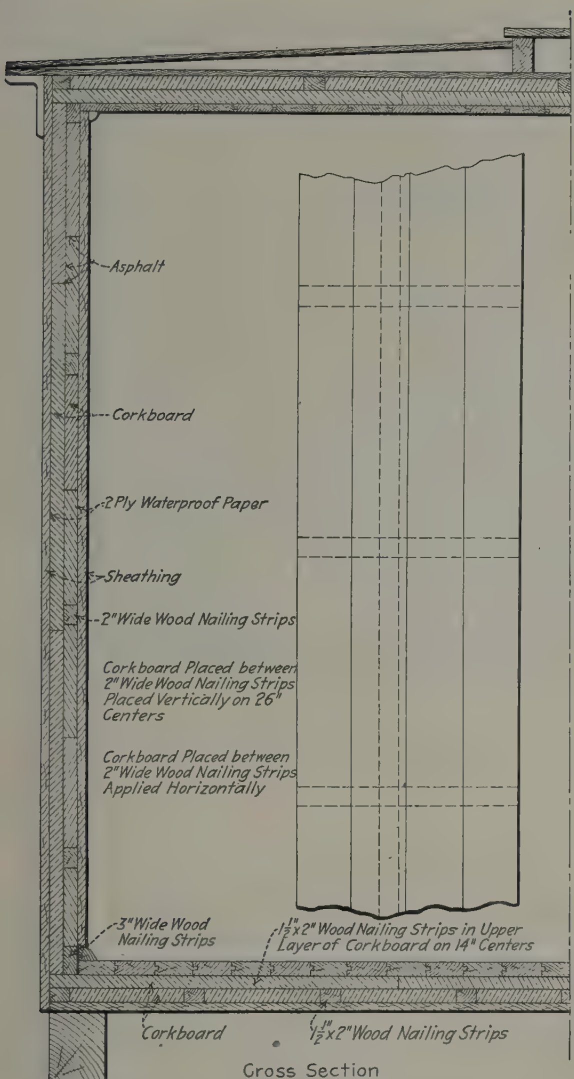


Fig. 910—Insulation for Refrigerator Car. Armstrong Cork Company.

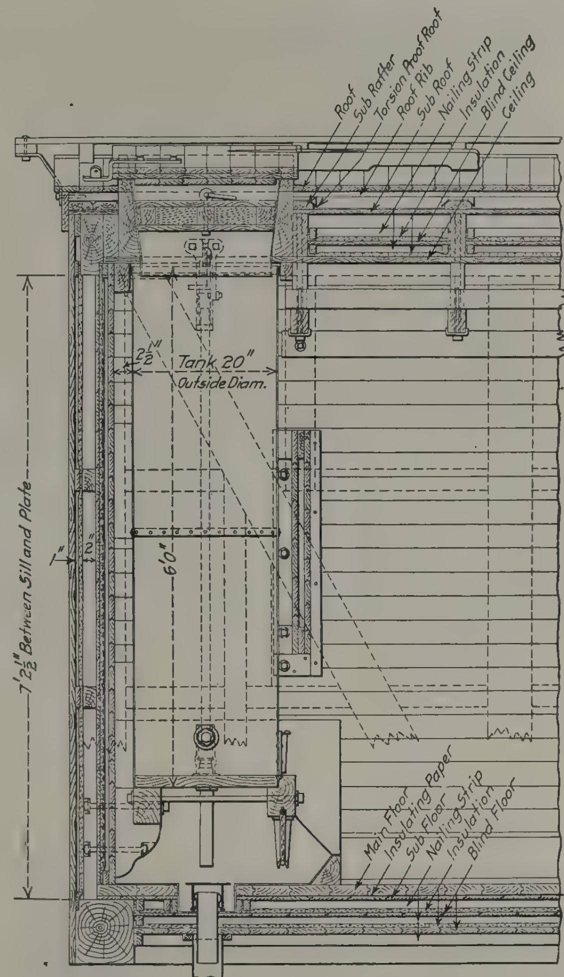


Fig. 911—Tank End of American Car & Foundry Company Standard Beef Car.

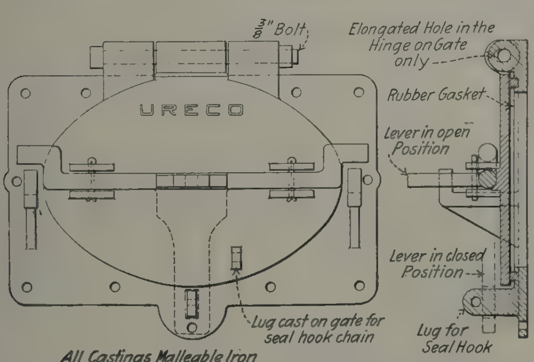


Fig. 912—Ureco Improved Water Tight Handhole for Brine Tank. Union Railway Equipment Company.

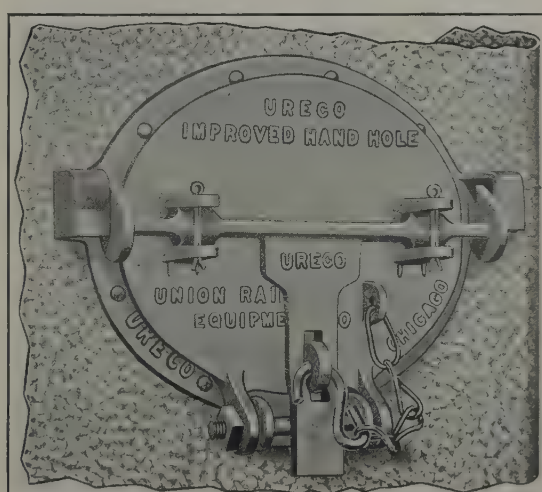


Fig. 913—Ureco Handhole for Brine Tanks. Union Railway Equipment Company.

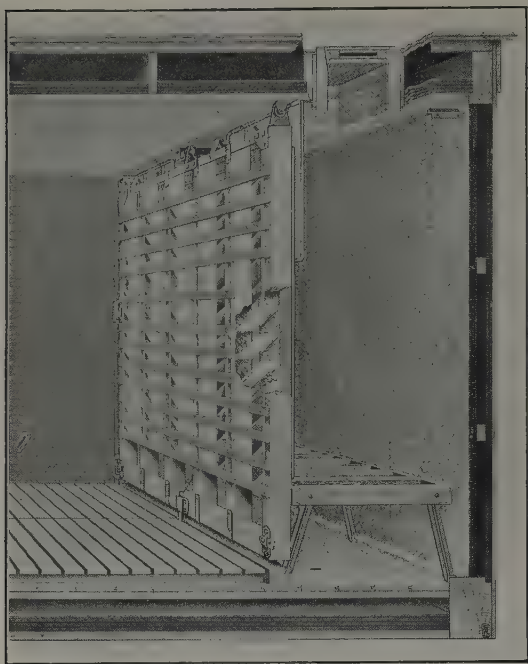


Fig. 914—Position For Icing.

Fig. 915—Folded Position.

Ureco Folding Bulkhead for Refrigerator Cars.

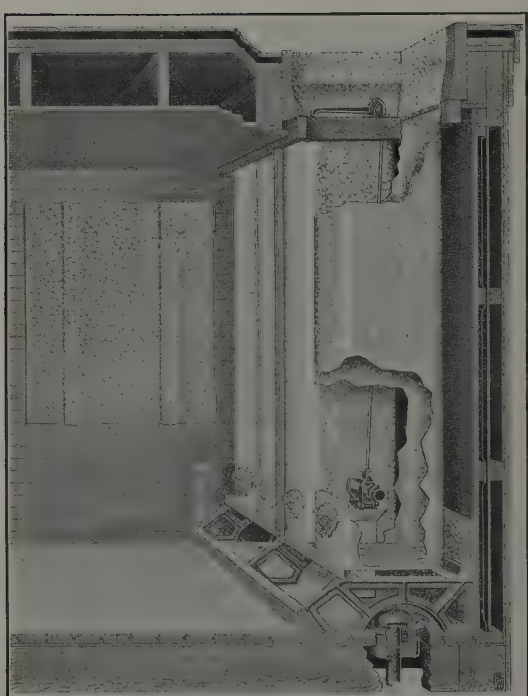


Fig. 916—Ureco Brine Retaining Valve for Refrigerator Cars.

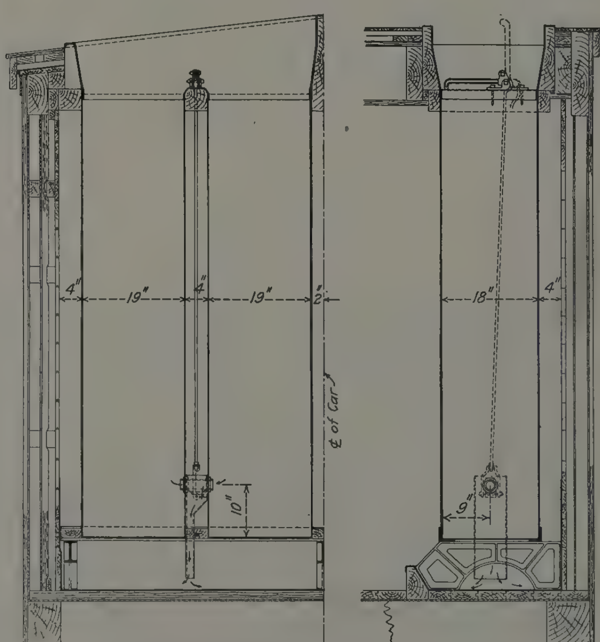


Fig. 917—Application of Ureco Valve.

Union Railway Equipment Co.

Section—Closed Applicable to Cars with Steel Ends Section—Open

Fig. 918—Wine Burglar Proof Ventilator. Wine Railway Appliance Company.

Fig. 919—Wine Lumber Door Ventilator. Wine Railway Appliance Company.

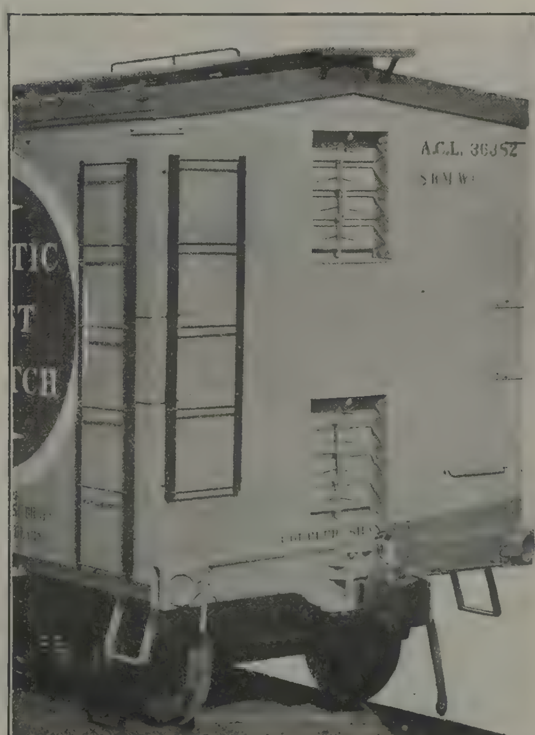


Fig. 920—Car Equipped with Wine Ventilating Shutter and Steel Ladders. Wine Railway Appliance Company.

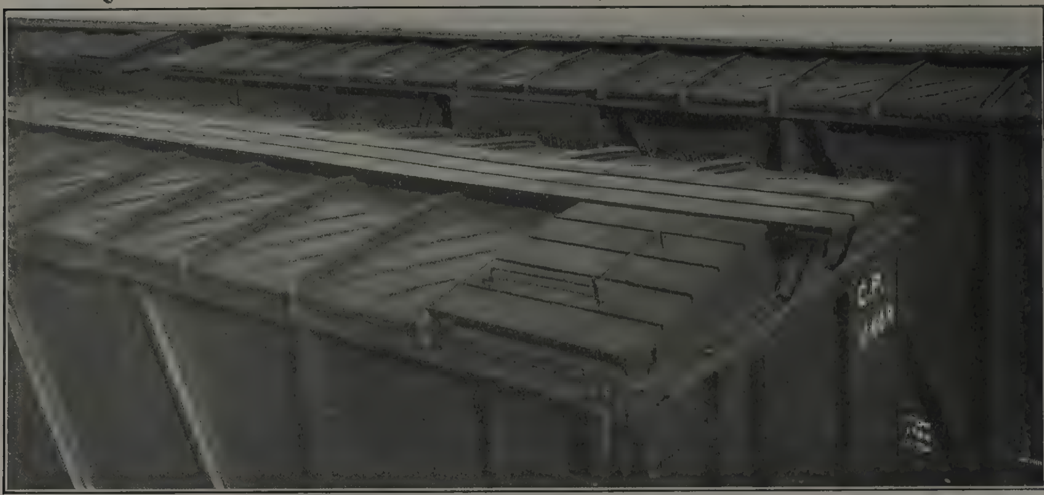


Fig. 921—Hutchins Camber All-Steel Roof. Hutchins Car Roofing Company.

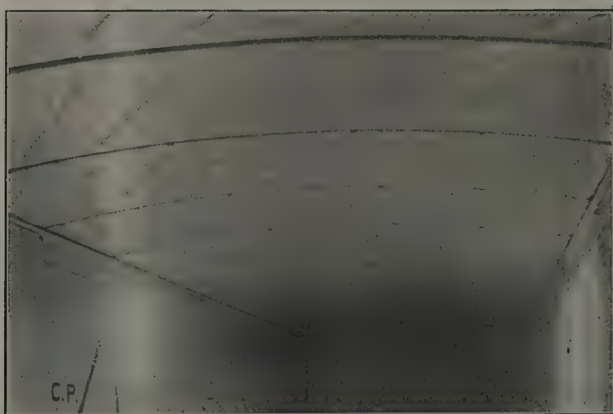
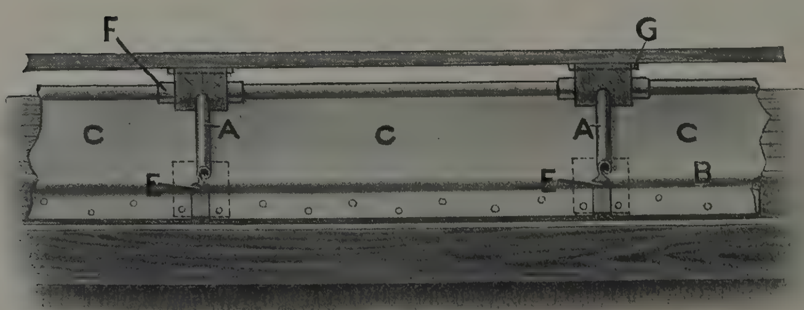


Fig. 922—Interior of Car Equipped with Hutchins Camber All-Steel Roof. Hutchins Car Roofing Company.



Parts of Hutchins Type D Roof.

A *Lock Roll Joint*
B *Torsion Eave Bead*
C *Galvanized Roofing Sheets*
E *Galvanized Joint Eave Filler Piece*
F *Galvanized Center Hood*
G *Galvanized Saddle Cover*

Fig. 923—Hutchins Type D Outside Metal Roof. Hutchins Car Roofing Company.

(*See also Fig.* 928.)

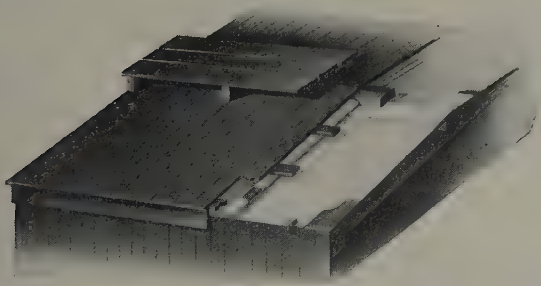


Fig. 924—Hutchins Air Space Sectional Plastic Car Roof. Hutchins Car Roofing Company.

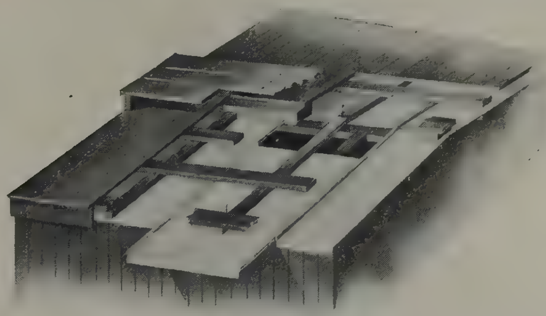


Fig. 925—Hutchins All-Metal Inside Roof. Hutchins Car Roofing Company.

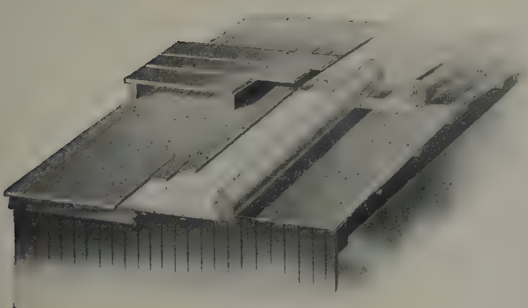


Fig. 926—Hutchins Plastic Car Roof. Hutchins Car Roofing Company.

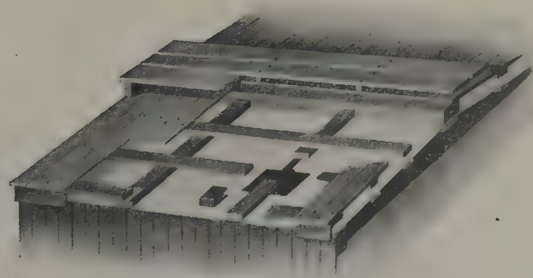


Fig. 927—Hutchins Sectional Metal Inside Roof. Hutchins Car Roofing Company.

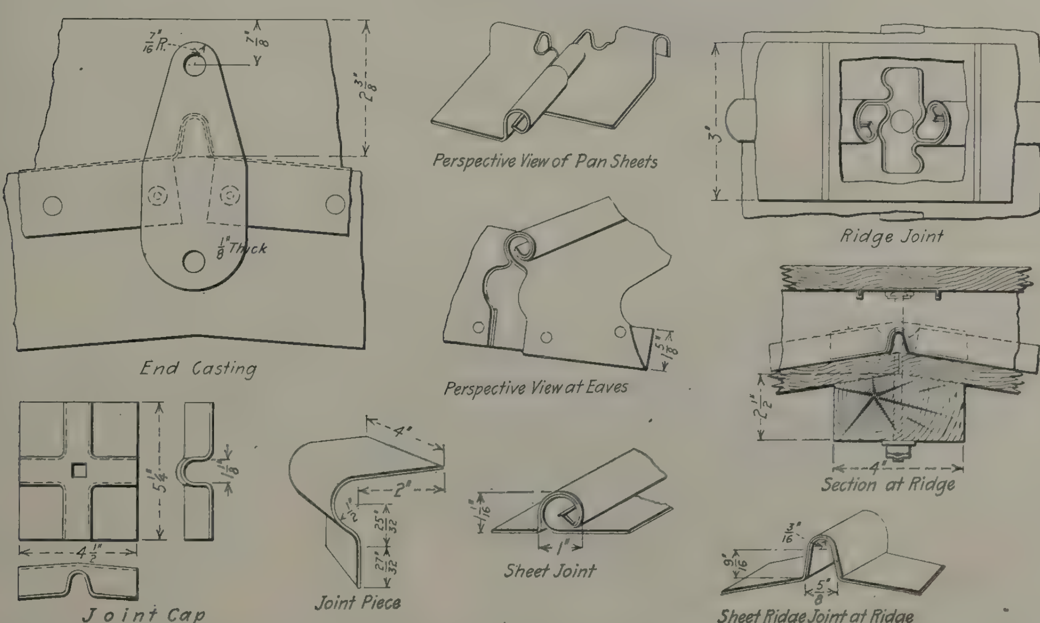


Fig. 928—Details of Hutchins Type D Outside Metal Roof. See also Fig. 923. Hutchins Car Roofing Company.

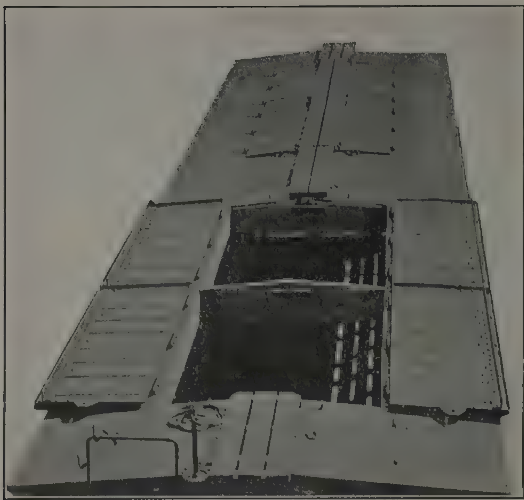


Fig. 929—Roof of General Service Car. National Dump Car Company.

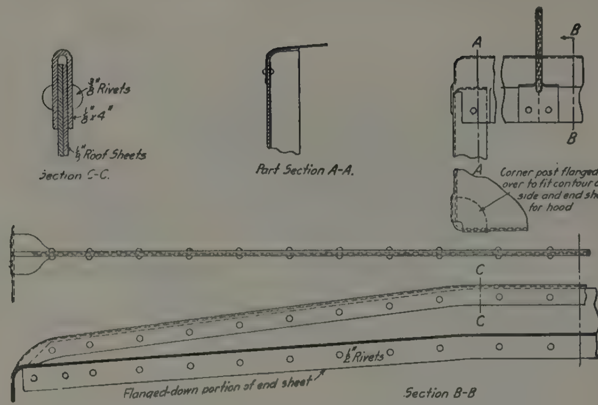


Fig. 930—Details of Steel Roof for Summers All-Steel Box Car. Summers Steel Car Company

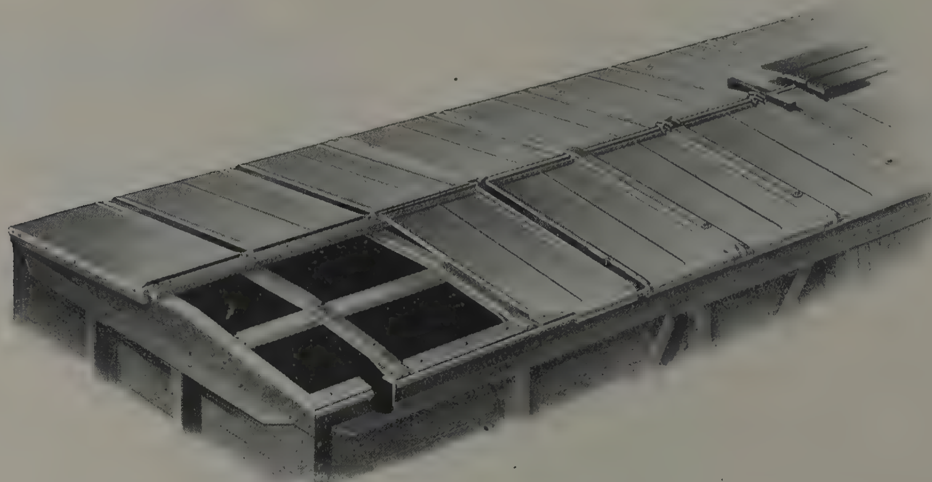


Fig. 931—Hutchins All-Steel Steel Carline Roof Applied to Steel Frame Car. Hutchins Car Roofing Company.

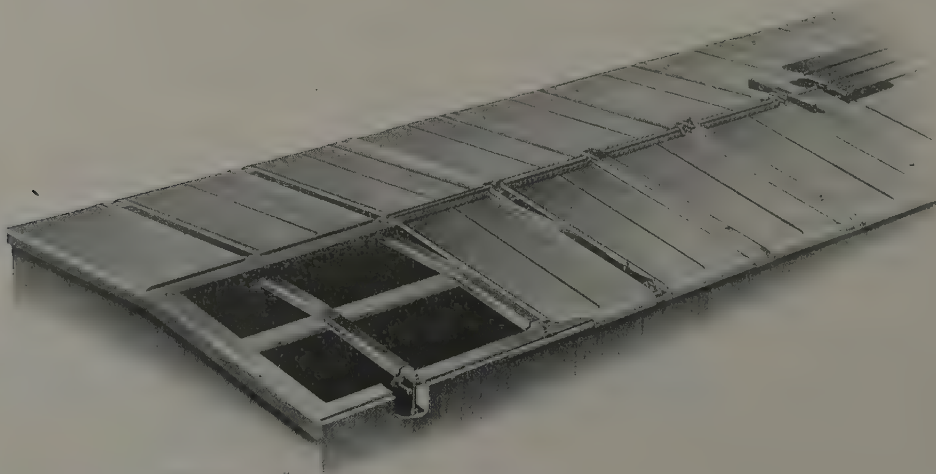


Fig. 932—Hutchins All-Steel Steel Carline Roof Applied to Wooden Car. Hutchins Car Roofing Company.

Fig. 933—Chicago Improved Winslow Type B Inside Metal Roof.
Chicago-Cleveland Car Roofing Company.

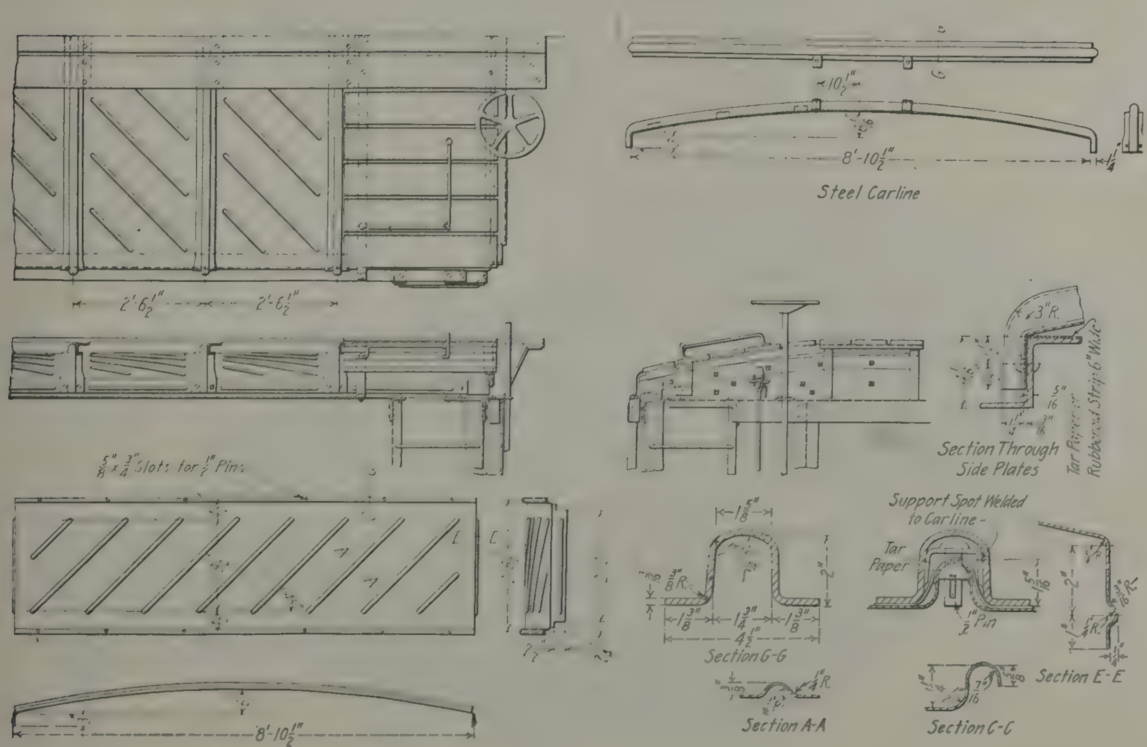


Fig. 934—Hutchins Camber All-Steel Roof. Hutchins Car Roofing Company.

Fig. 935—National Standard Roofing for Freight and Passenger Cars. Tuco Products Corporation.

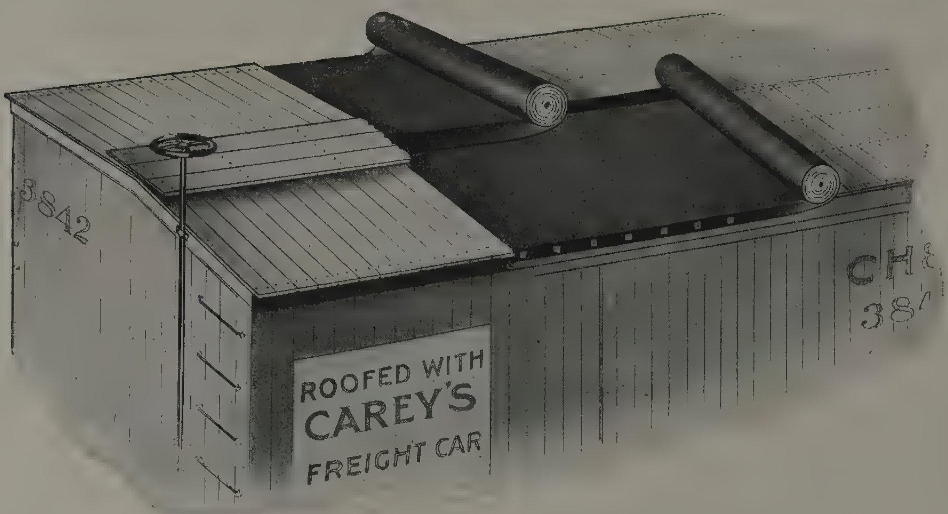


Fig. 936—Application of Carey's Three-Ply Burlap Center Freight Car Roofing. Philip Carey Company.

Fig. 937—Ureco Type "A" Flexible Outside Metal Car Roof. Union Railway Equipment Company.

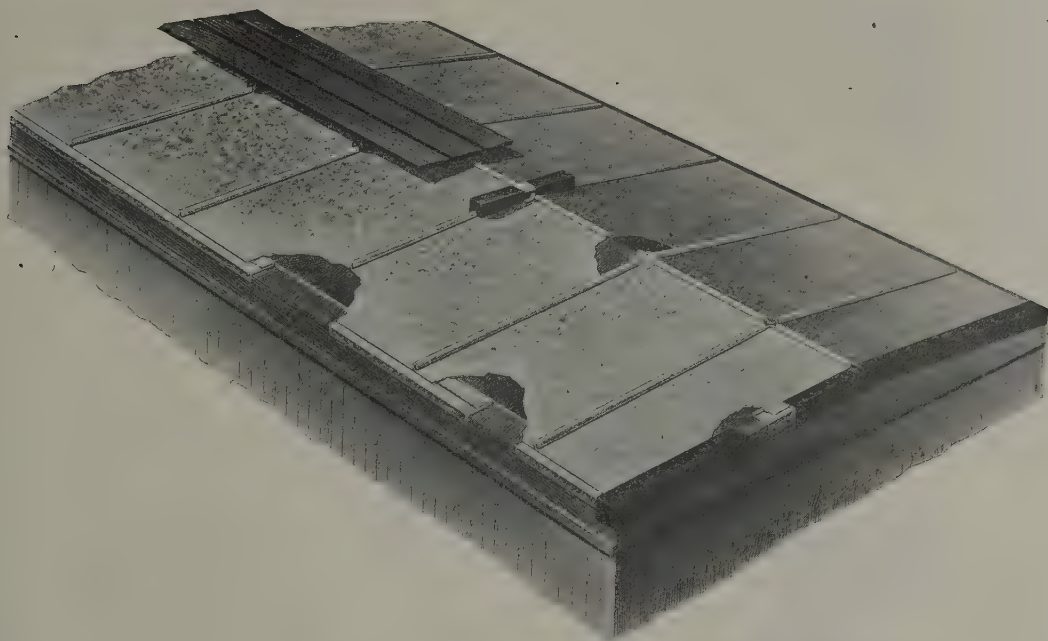


Fig. 938—Improved XLA Flexible Roof. Standard Railway Equipment Company.

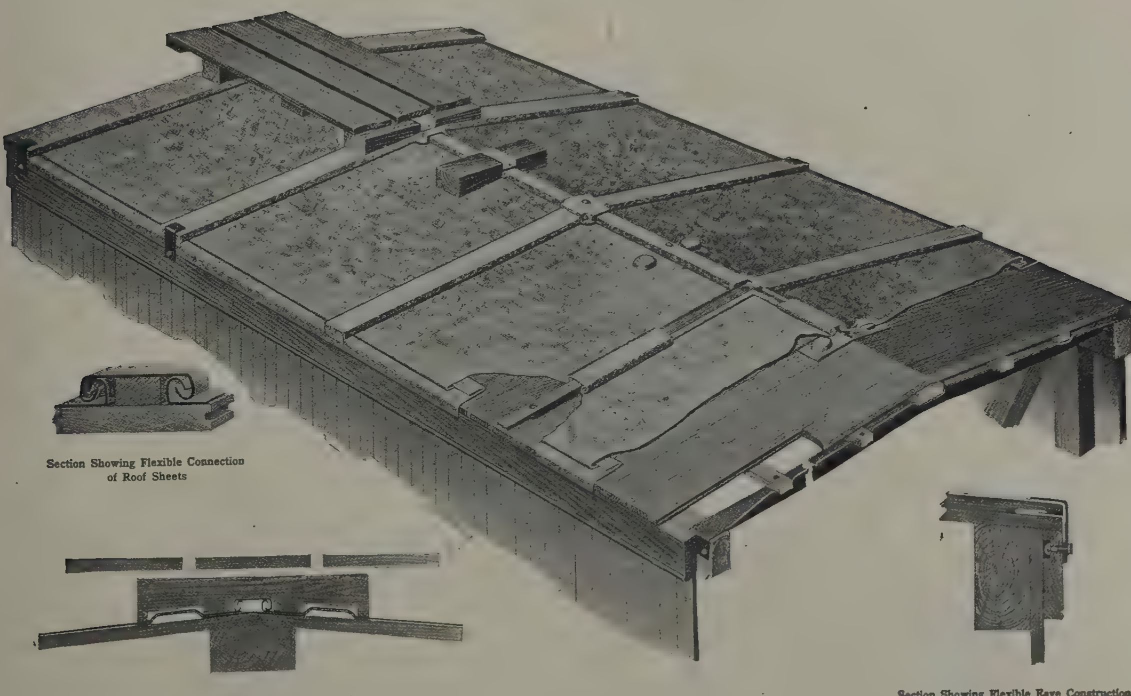


Fig. 939—XLA Flexible Roof. The Standard Railway Equipment Company.

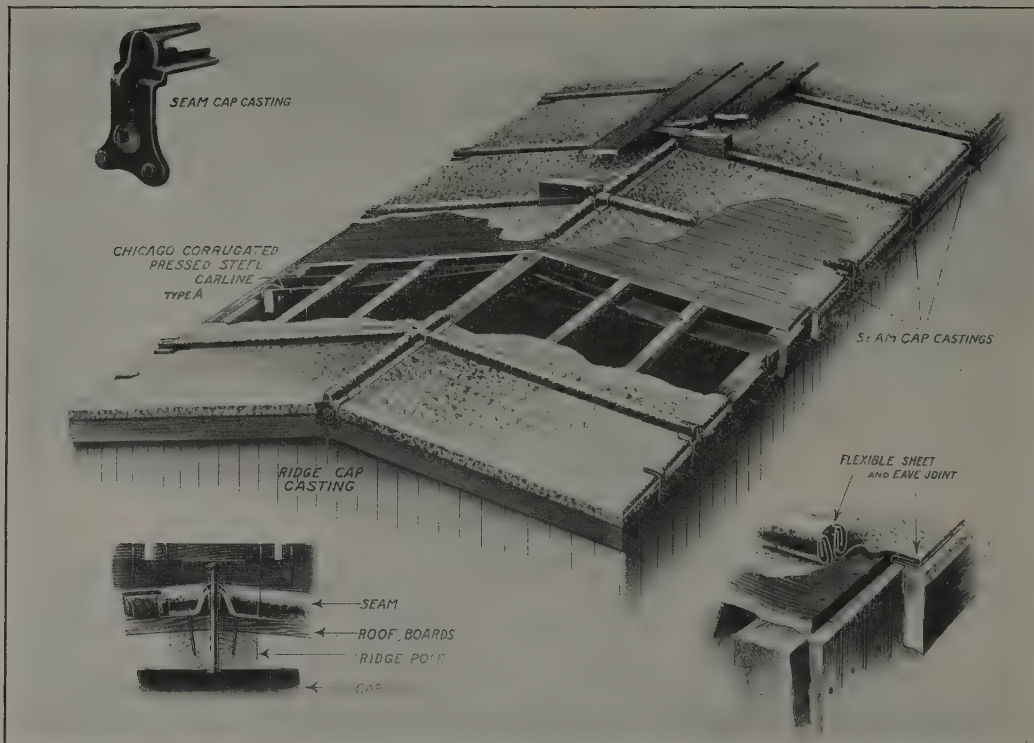


Fig. 940—Superior Flexible Outside Metal Roof. Chicago-Cleveland Car Roofing Company

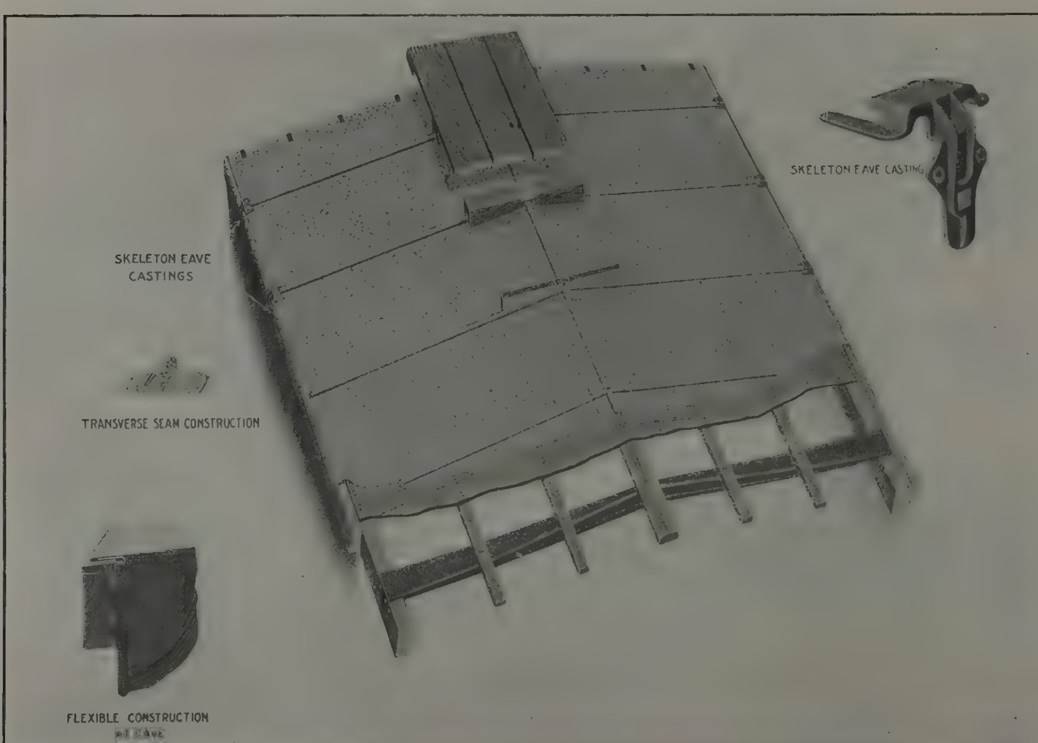


Fig. 941—Chicago Flexible Outside Metal Roof No. 20-A-1. Chicago-Cleveland Car Roofing Company.

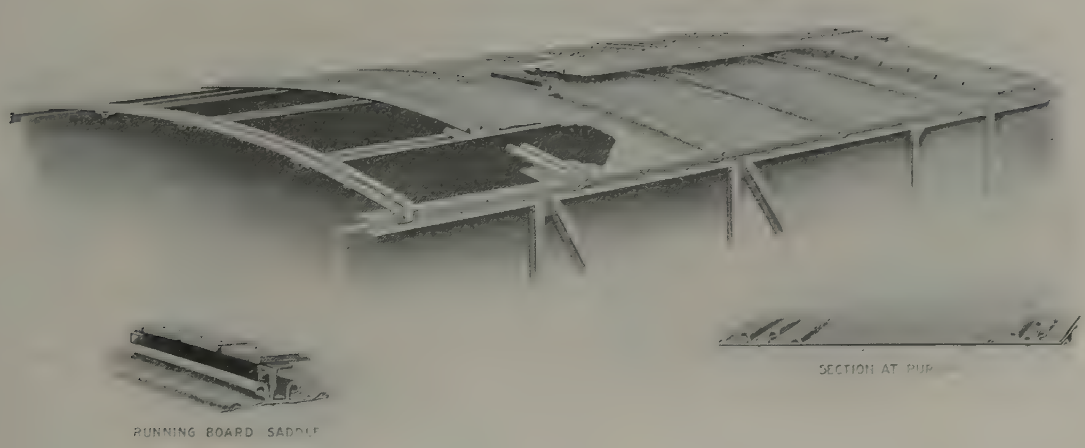


Fig. 942—Chicago Common-Sense, All Steel, Steel Carline Roof No. 100-A.

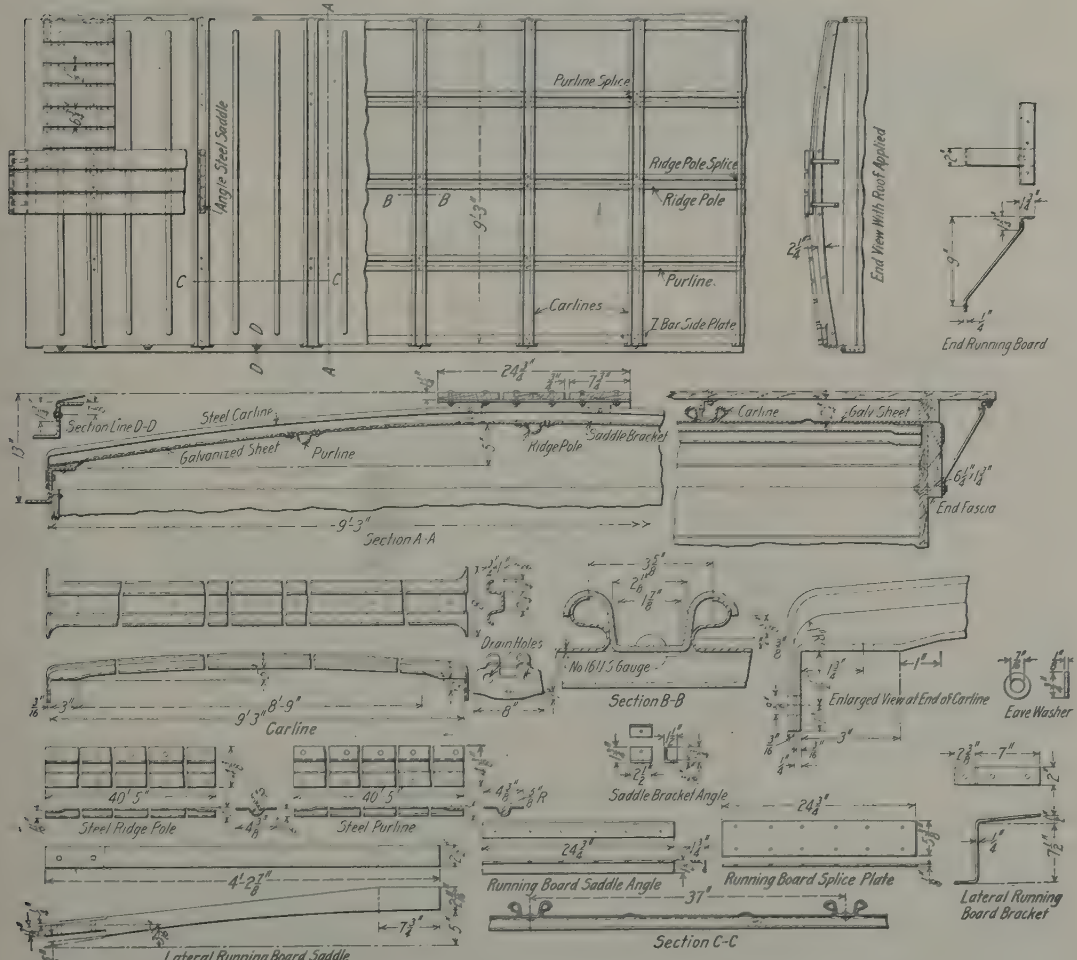


Fig. 943—Chicago Common-Sense All-Steel Steel Carline Roof No. 100

Chicago-Cleveland Car Roofing Company.

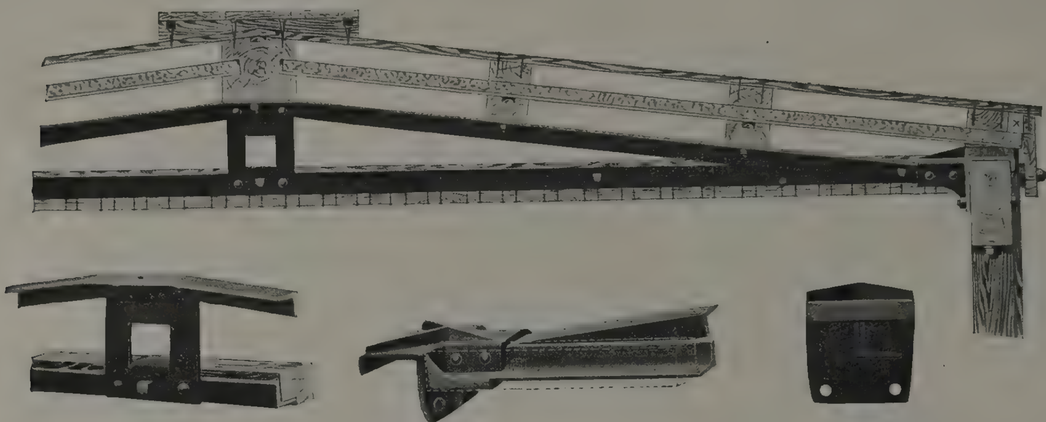


Fig. 944—General arrangement of Chicago Trussed Steel Carline No. 21 for Box and Refrigerator Cars. Chicago-Cleveland Car Roofing Company.

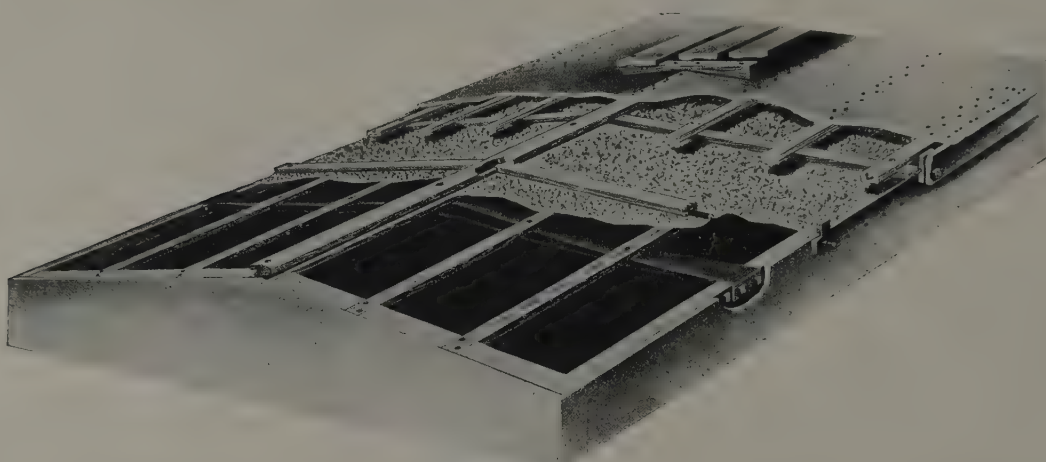


Fig. 945—Chicago Improved Inside Metal Roof No. 2. Chicago-Cleveland Car Roofing Company.

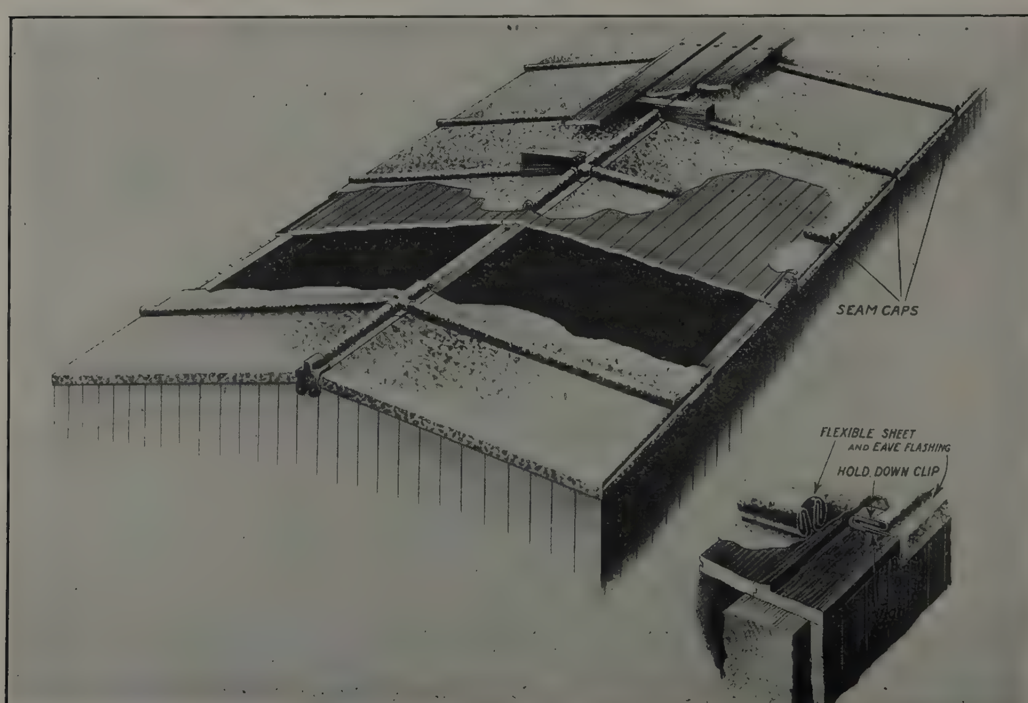


Fig. 946—Flexible Outside Metal Roof. Chicago-Cleveland Car Roofing Company.

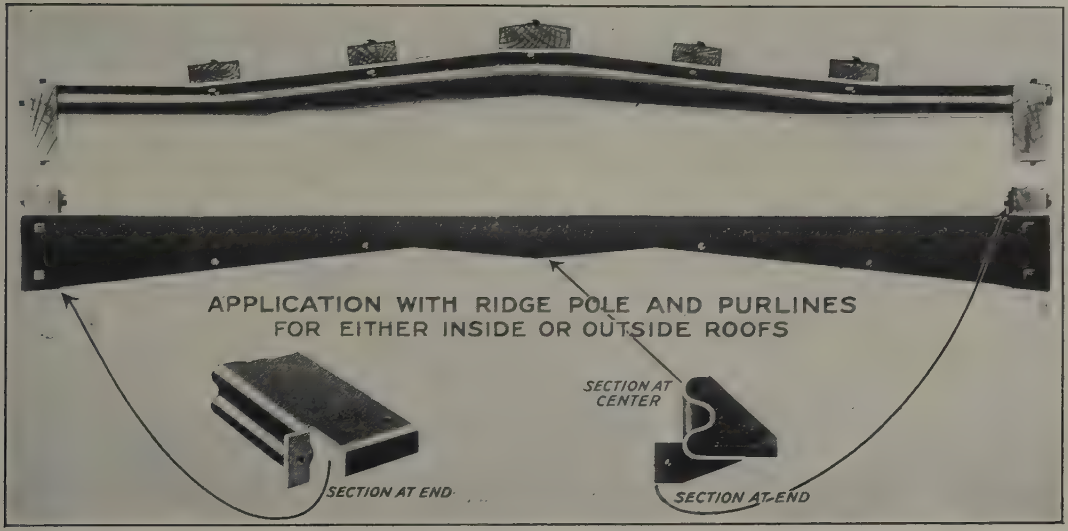


Fig. 947—Corrugated Pressed Steel Carline. Chicago-Cleveland Car-Roofing Company.

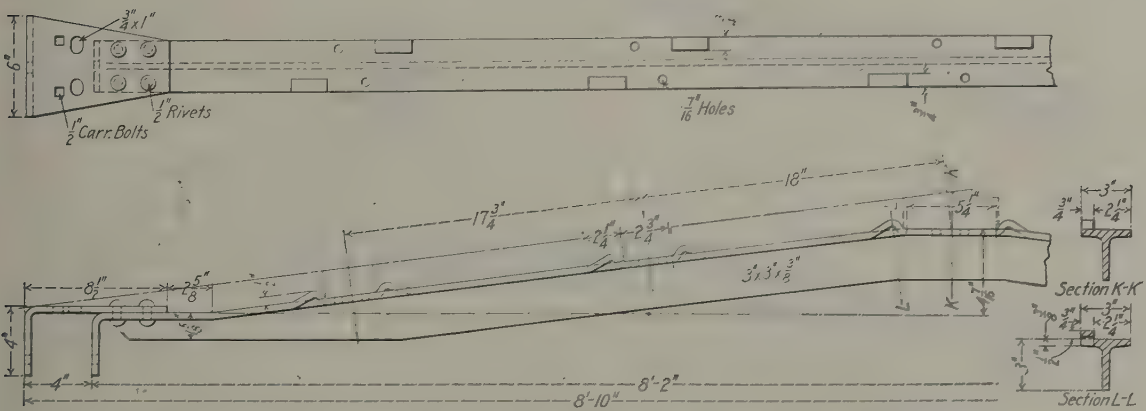


Fig. 948—Rolled Steel Carline for Use in New York Central Lines Car Repairs.

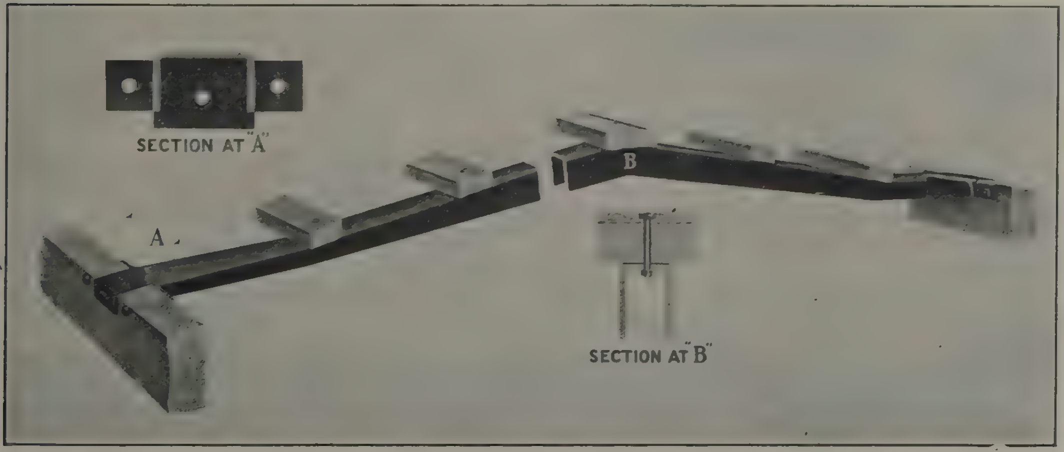


Fig. 949—Pressed Steel Carline. Chicago-Cleveland Car Roofing Company.

Fig. 950—Camel Angle Carline. The Camel Company.

Fig. 951—Western Steel Carline. Western Railway Equipment Company.

Fig. 952—Ureco Malleable Iron Carline. Union Railway Equipment Company.

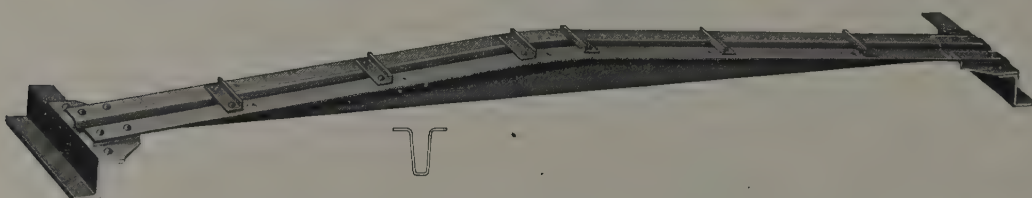


Fig. 953—Pressed Steel Carline Type U-2. The Standard Railway Equipment Company.

Fig. 954—Forged Steel Carline. The Standard Railway Equipment Company.

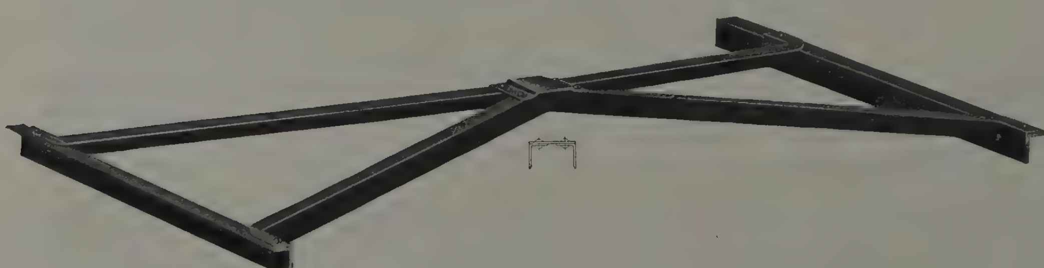


Fig. 955—Ideal Carline. The Standard Railway Equipment Company.

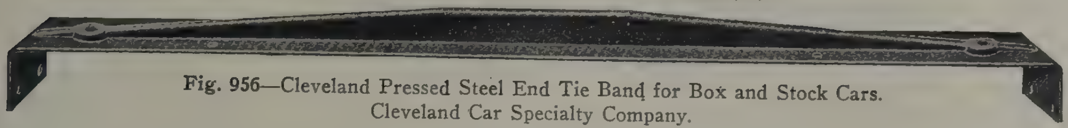


Fig. 956—Cleveland Pressed Steel End Tie Band for Box and Stock Cars.
Cleveland Car Specialty Company.

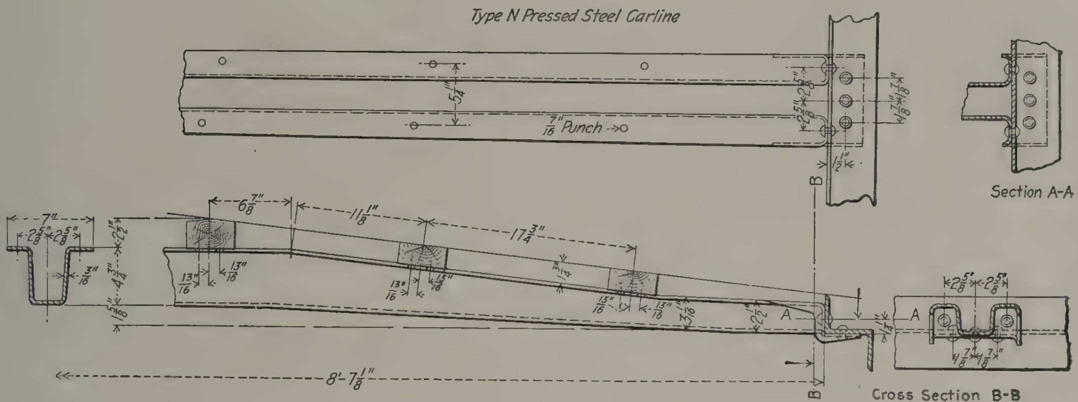


Fig. 957—Pressed Steel Carline Type N. Cleveland Car Specialty Company.

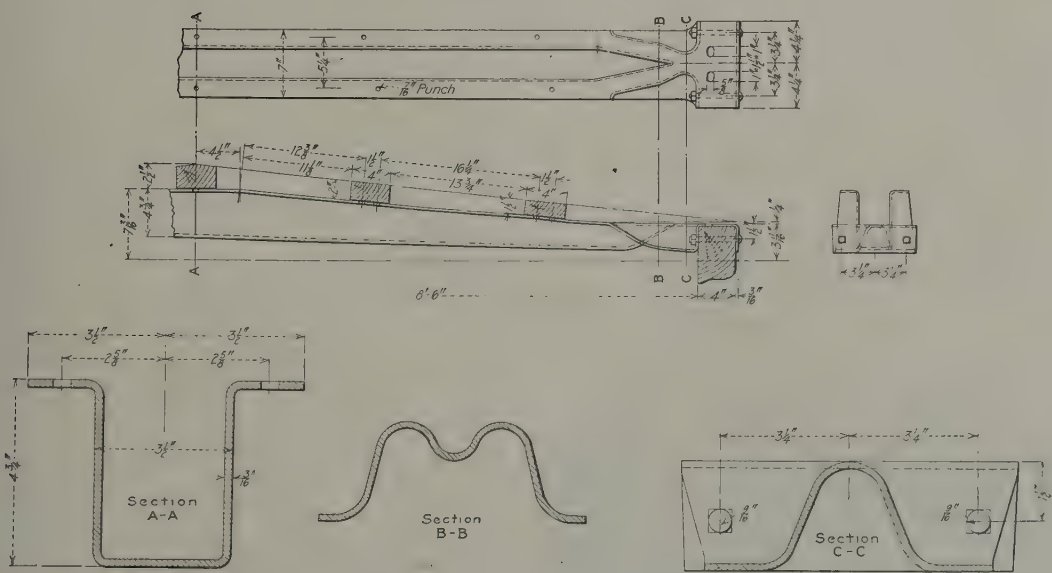


Fig. 958—Pressed Steel Carline Type M. Cleveland Car Specialty Company.

Fig. 959—Cleveland Pressed Steel Carline. Cleveland Car Specialty Company.

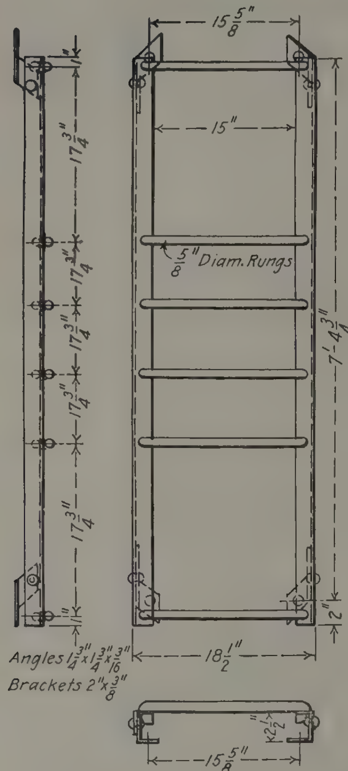


Fig. 960—Safety Appliance Ladder. Allegheny Forging Company.

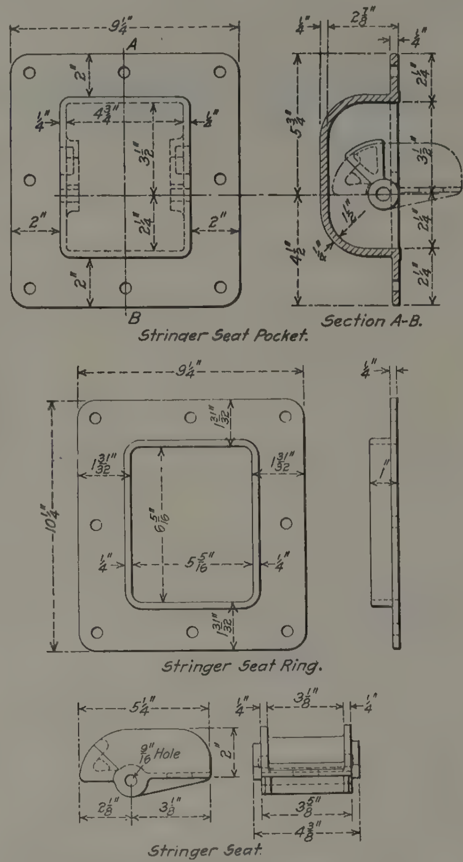


Fig. 961—Upper Deck Stringer Pocket for Union Pacific Steel Automobile Cars.

Fig. 962—Wine "Safety First" Car Ladder. The Wine Railway Appliance Company.

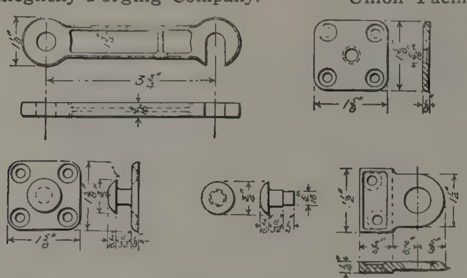


Fig. 963—Dog, Hasp and Seal Plate for Doors and Drawers.

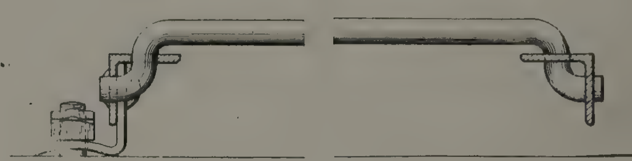


Fig. 964—Wine Ladder Bracket. Wine Railway Appliance Company.

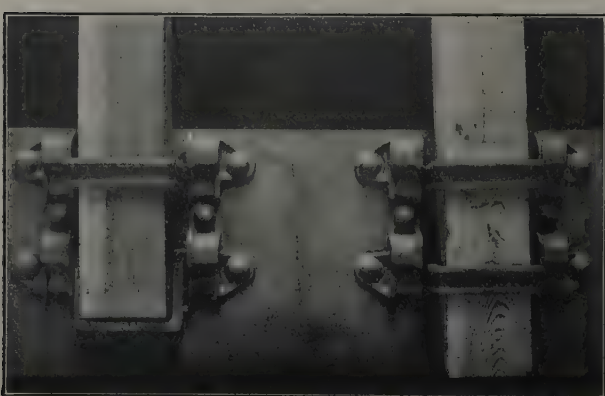


Fig. 965—American Car & Foundry Company Collapsible Stake Pocket.

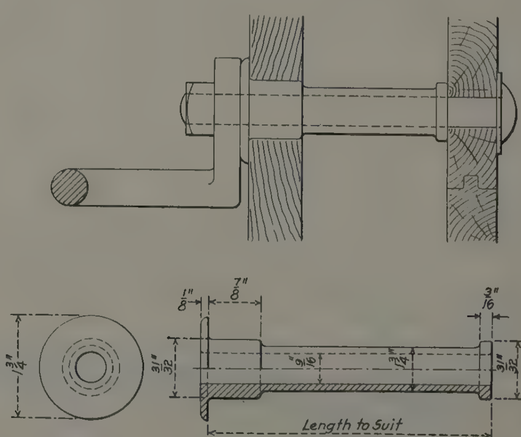


Fig. 966—Safety Appliance Thimble. Waugh Draft Gear Company.

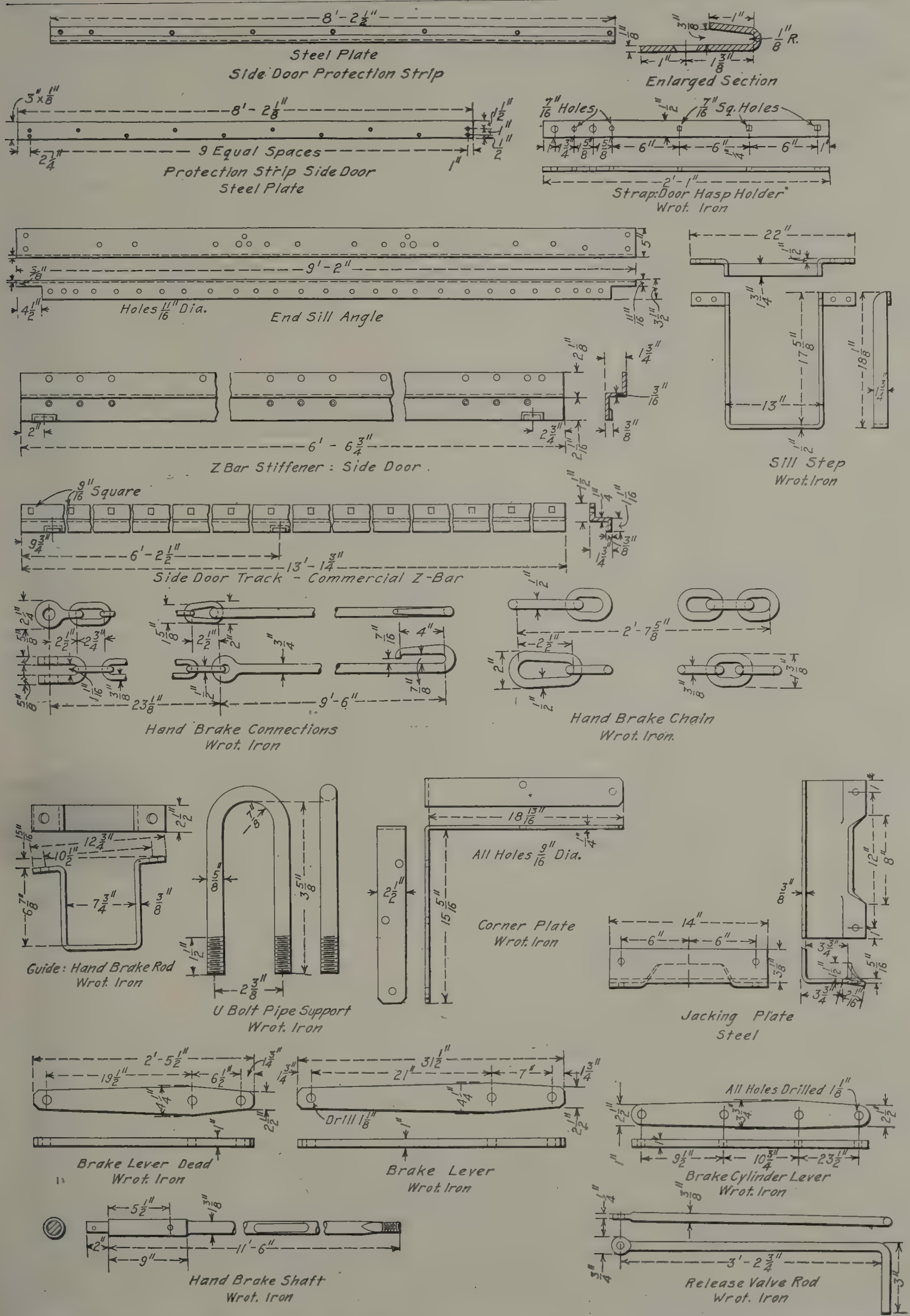


Fig. 967—Details Used on New York Central Steel Underframe Box Car. Side Door Protection Strip, Strap, Door Hasp Holder, Door Stiffener and Door Track Furnished by the Camel Company.

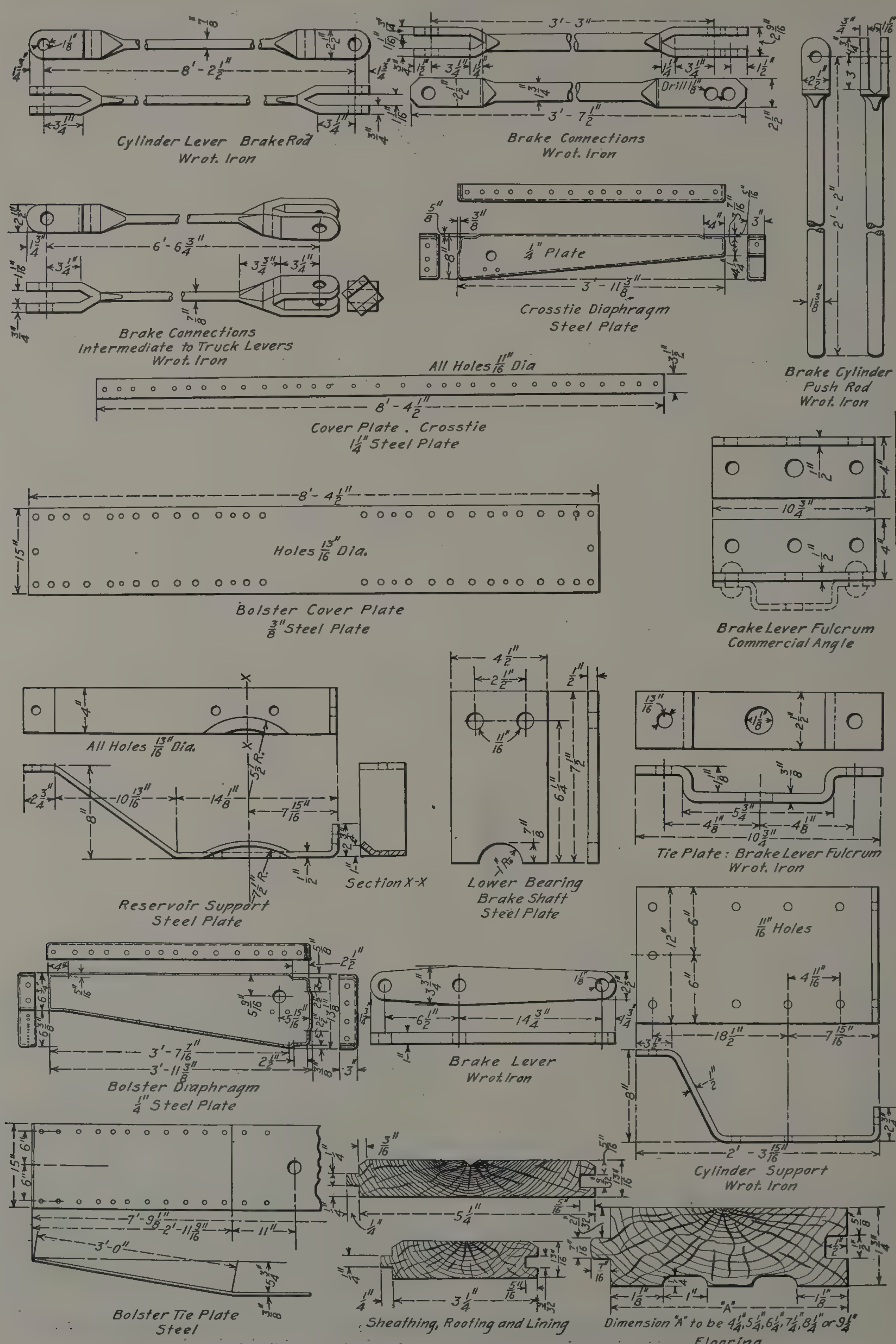


Fig. 968—Details Used on New York Central Steel Underframe Box Car.

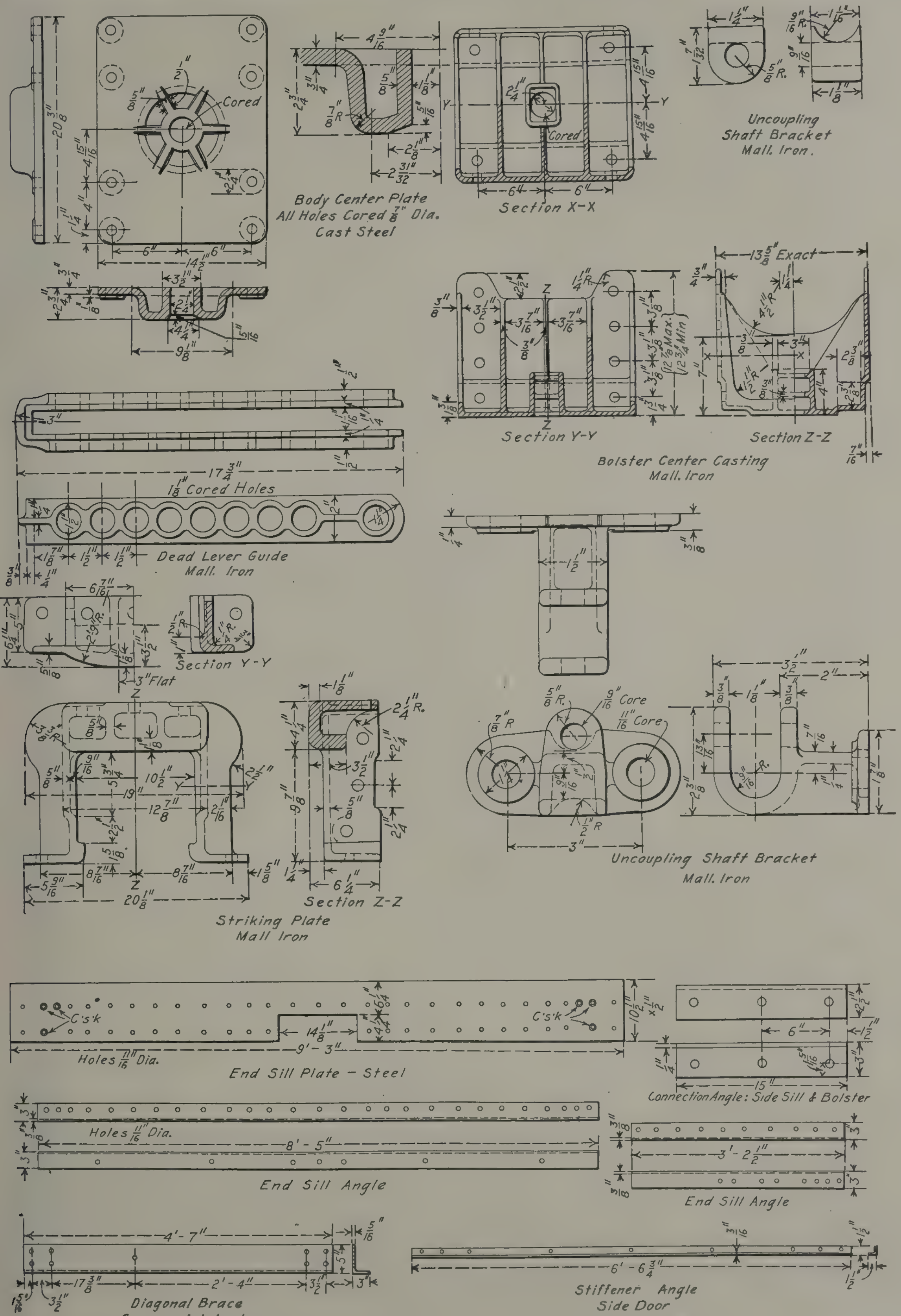


Fig. 969—Details Used on New York Central Steel Underframe Box Car.

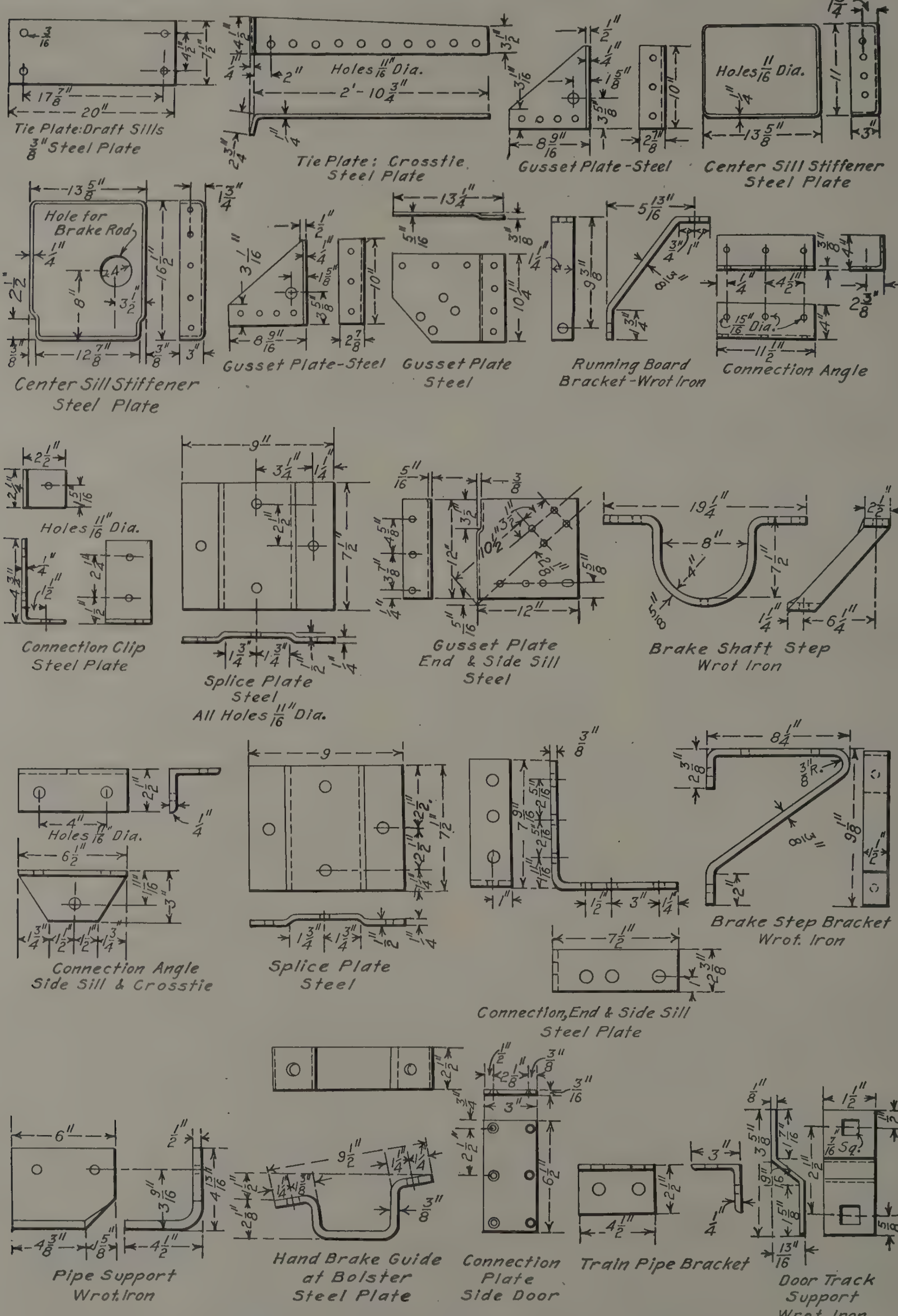


Fig. 970—Details Used on New York Central Steel Underframe Box Car.

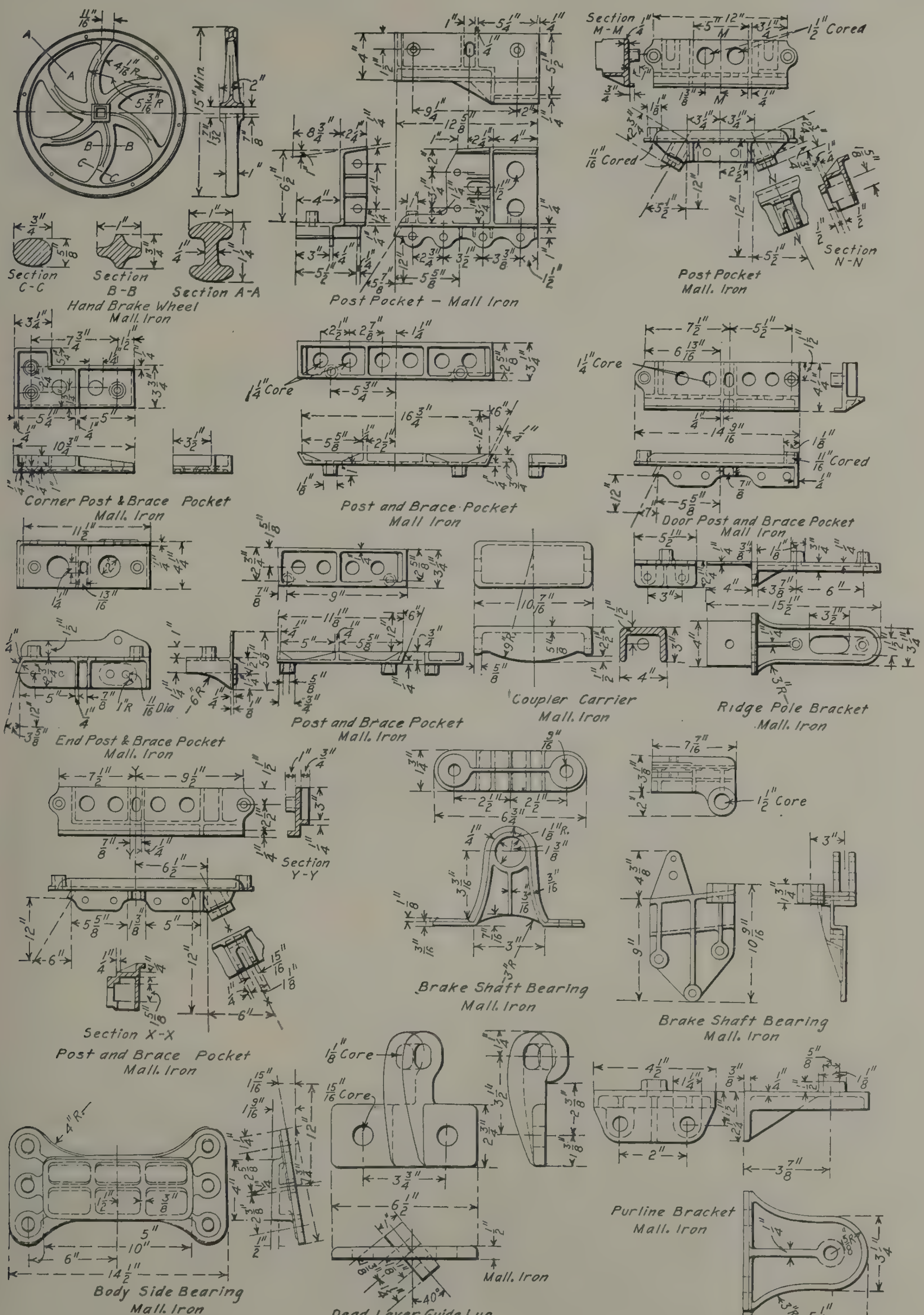


Fig. 971—Details Used on New York Central Steel Underframe Box Car.

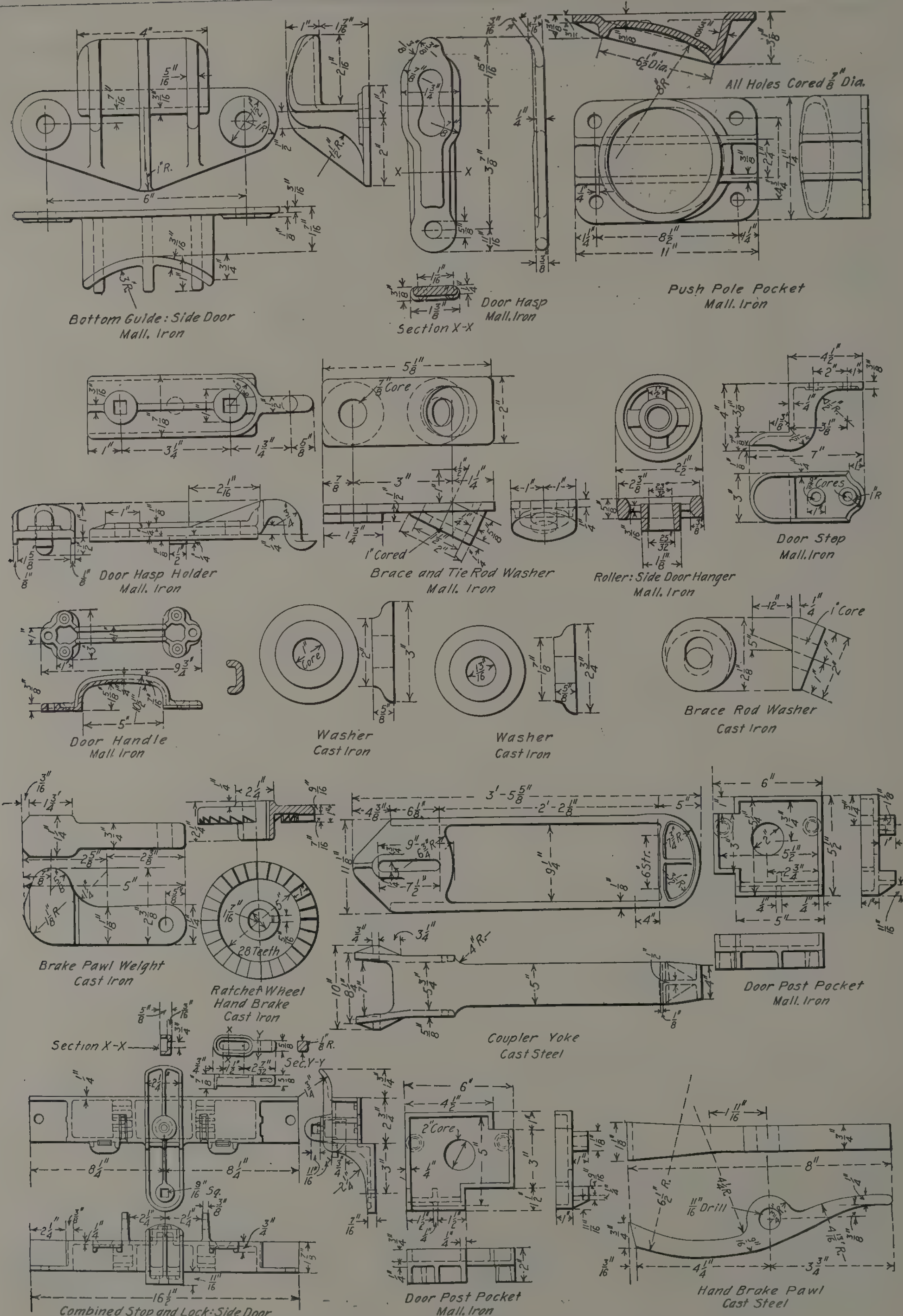


Fig. 972—Details Used on New York Central Steel Underframe Box Car. Door Bottom Guide, Stop and Lock, Roller, etc. Furnished by the Camel Company.

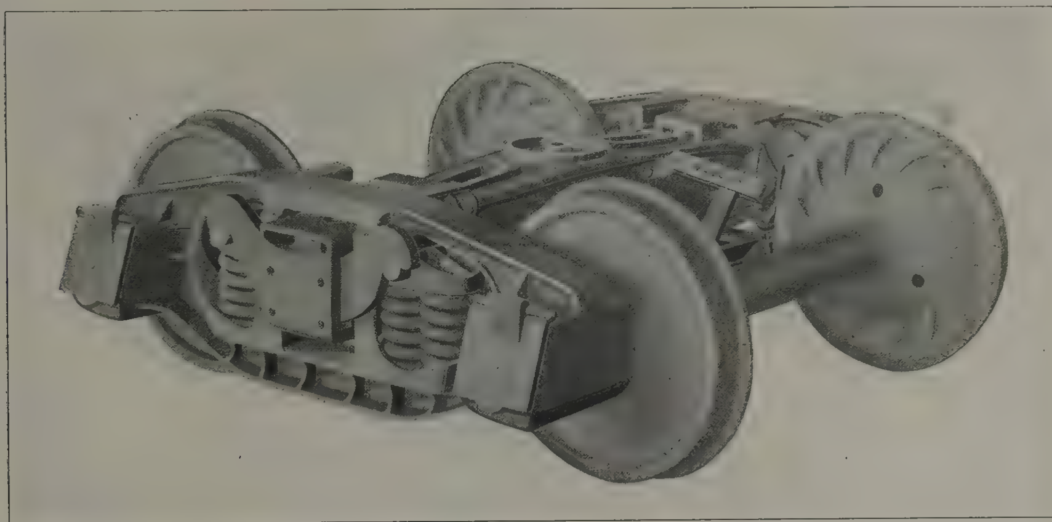


Fig. 793—Bettendorf 70-Ton Capacity Equalized Truck.

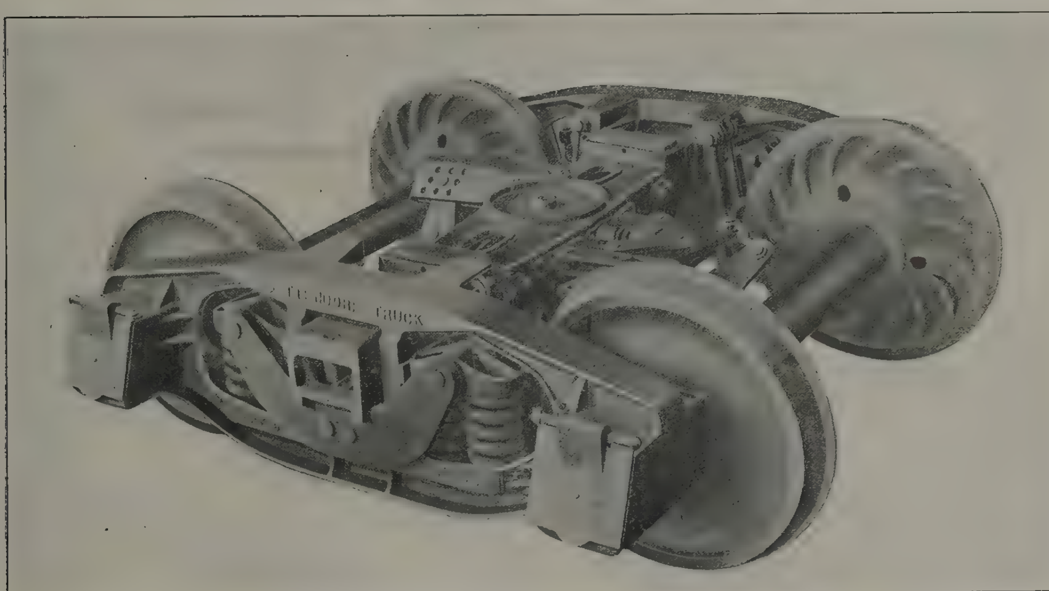


Fig. 974—Variable Load Brake Truck with Semi-Equalized Frame.

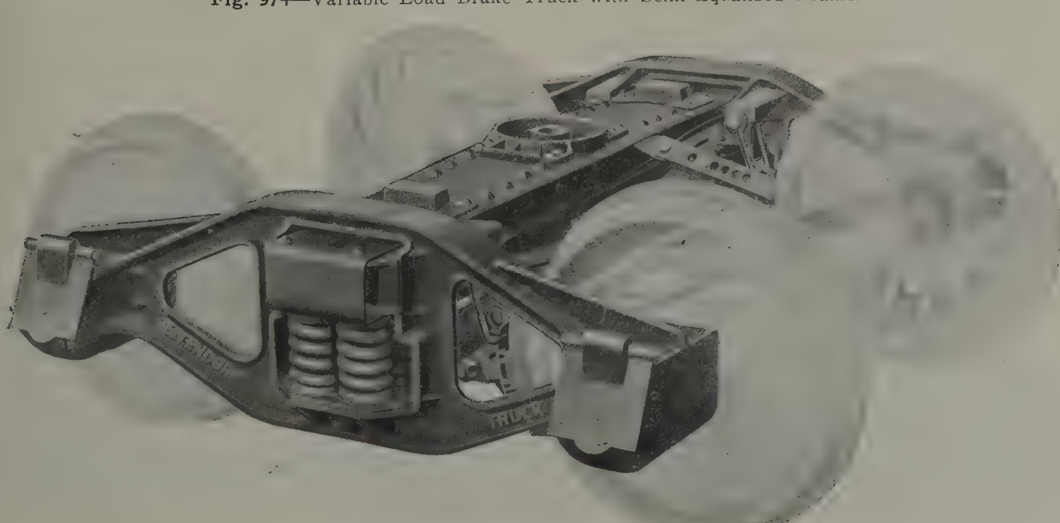


Fig. 975.—Bettendorf Truck for 40, 50 and 70-Ton Capacity Cars.

The Bettendorf Company.

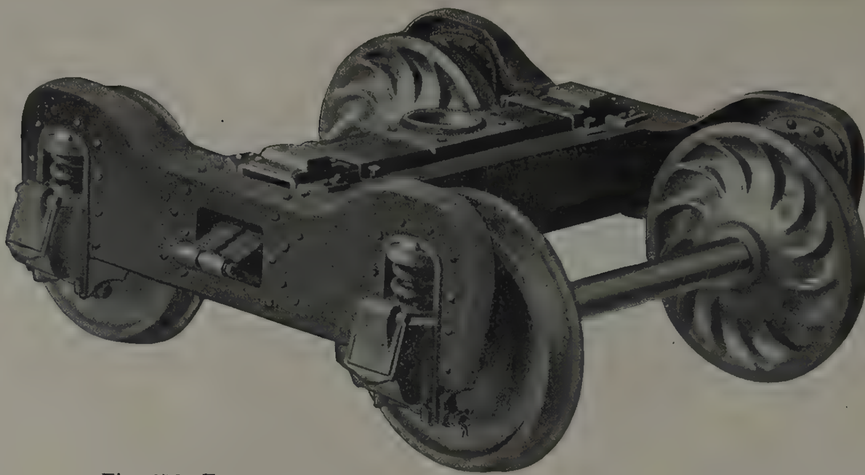


Fig. 976—Fox Pressed Steel Truck. Pressed Steel Car Company.

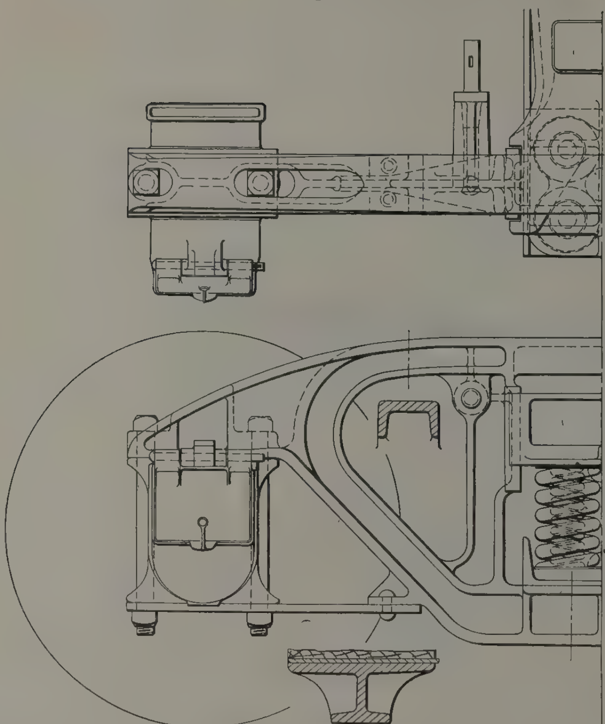


Fig. 977.—Gould Truck Frame, Z-Type Bolster and Journal Boxes for 50-Ton Capacity Cars. Gould Coupler Company.

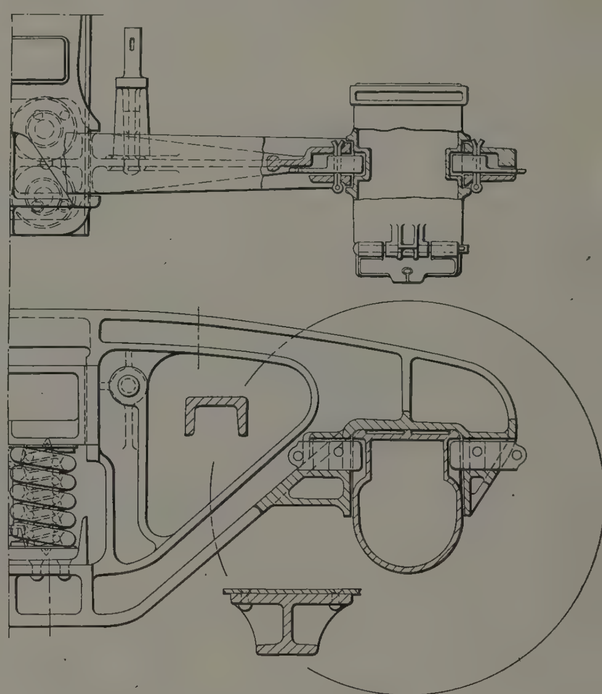


Fig. 978.—Gould Improved Cast Steel Truck. Gould Coupler Company.

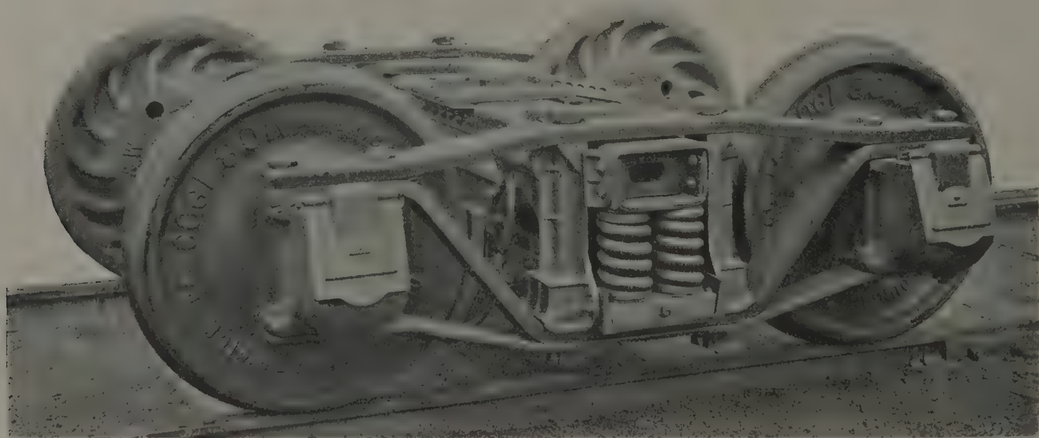


Fig. 979—Standard 50-Ton Freight Car Truck, Type 3-A. American Car & Foundry Company.

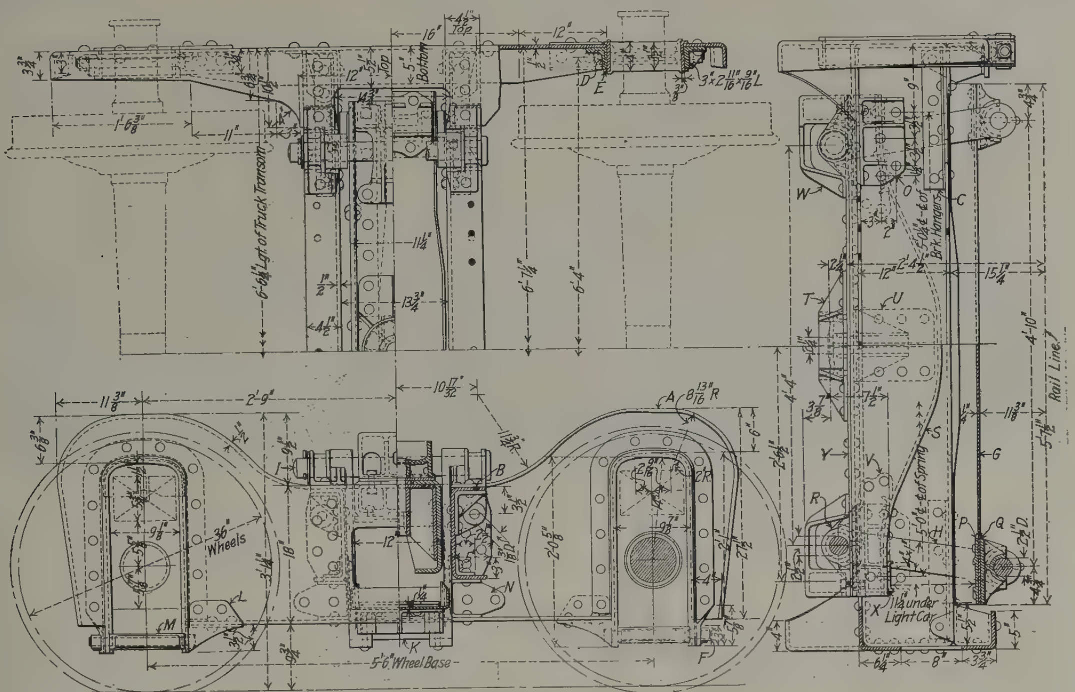


Fig. 980—Fox Truck with Swing Motion Bolster for 40-Ton Capacity Car.

Parts of Fox Trucks, Figs. 980 and 981.

A *Side*
B *Transom*
C *Transom Reinforcing Angle*
D *Pedestal Angle*
E *Pedestal Wearing Piece*
F *Pedestal Bolt*
G *Spring Plank*
H *Spring Plank Hanger*
I *Spring Plank Hanger Pin*
K *Lower Spring Plank Hanger Pin*
L *Pedestal Bracket*
M *Pedestal Spreader*
N *Side and Transom Connection*
O *Brake Beam End Hanger Bracket*
P *Spring Seat*
Q *Combined Spring Plank Seat and Hanger Arm Bearing*
R *Spring Plank Hanger Bearing*
S *Bolster Channel*
T *Center Plate*
U *Center Plate Support*
V *Reinforcing End Casting*
W *Side Bearing*
X *Spring Cap*
Y *Top Tie Plate*

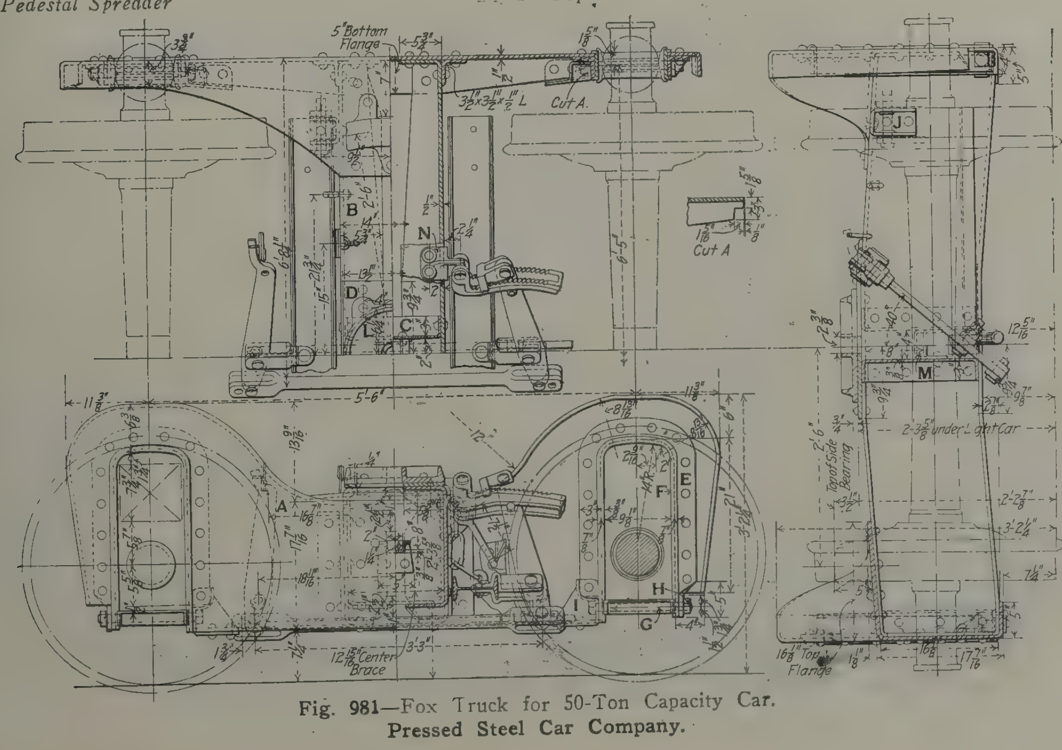


Fig. 981—Fox Truck for 50-Ton Capacity Car.
Pressed Steel Car Company.

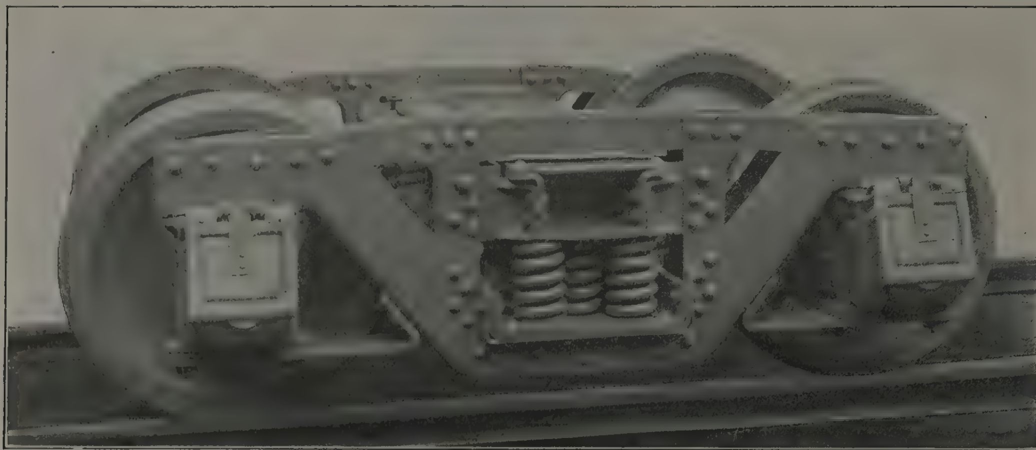


Fig. 982—Slick Side Frame Truck for 50-Ton Cars. Cambria Steel Company.

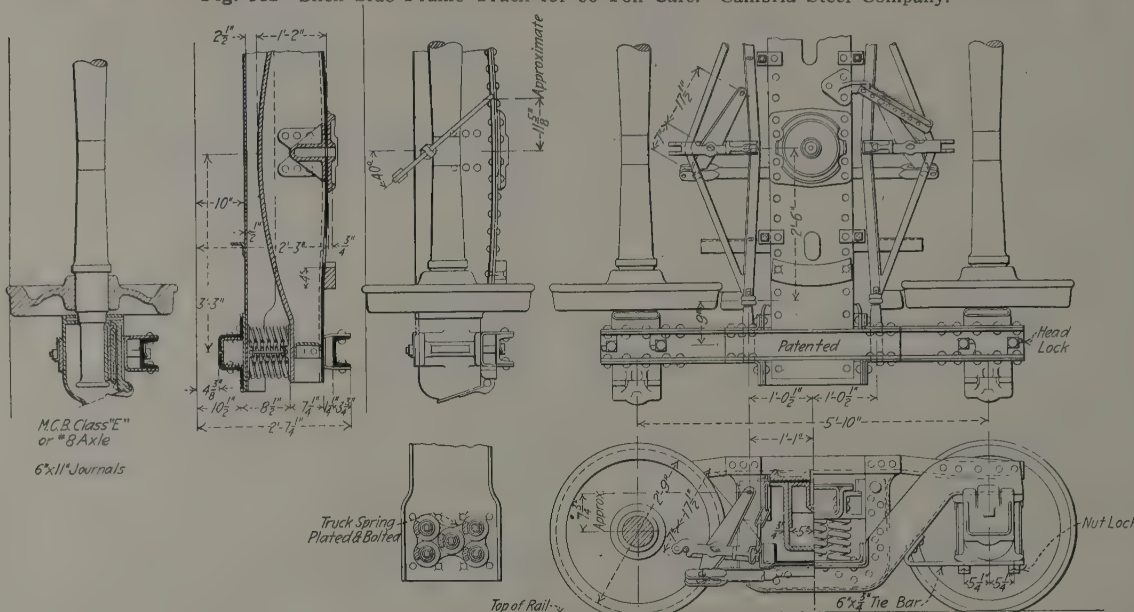


Fig. 983—General Drawing of Slick Side Frame Truck. Cambria Steel Company.

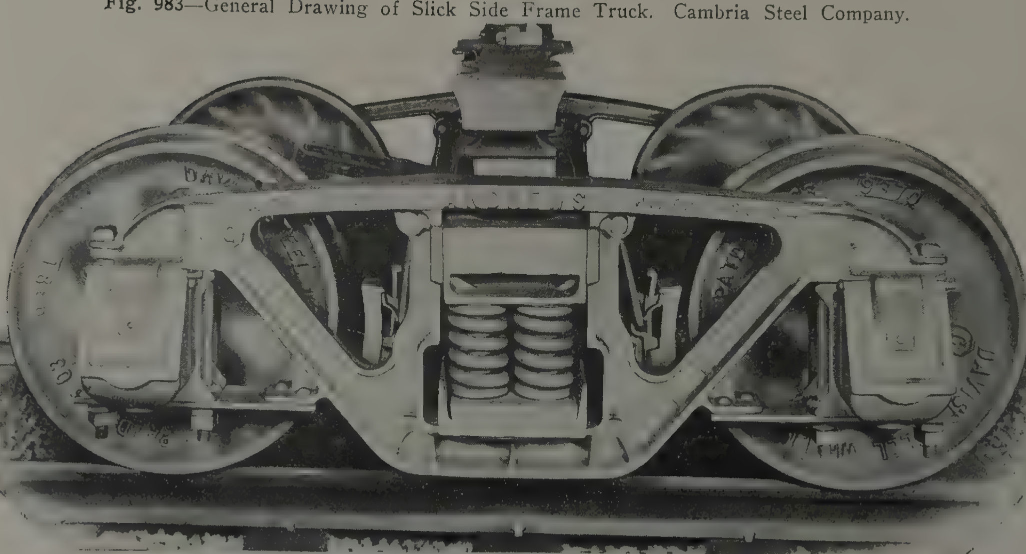


Fig. 984—Andrews Side Frame Truck. American Steel Foundries.

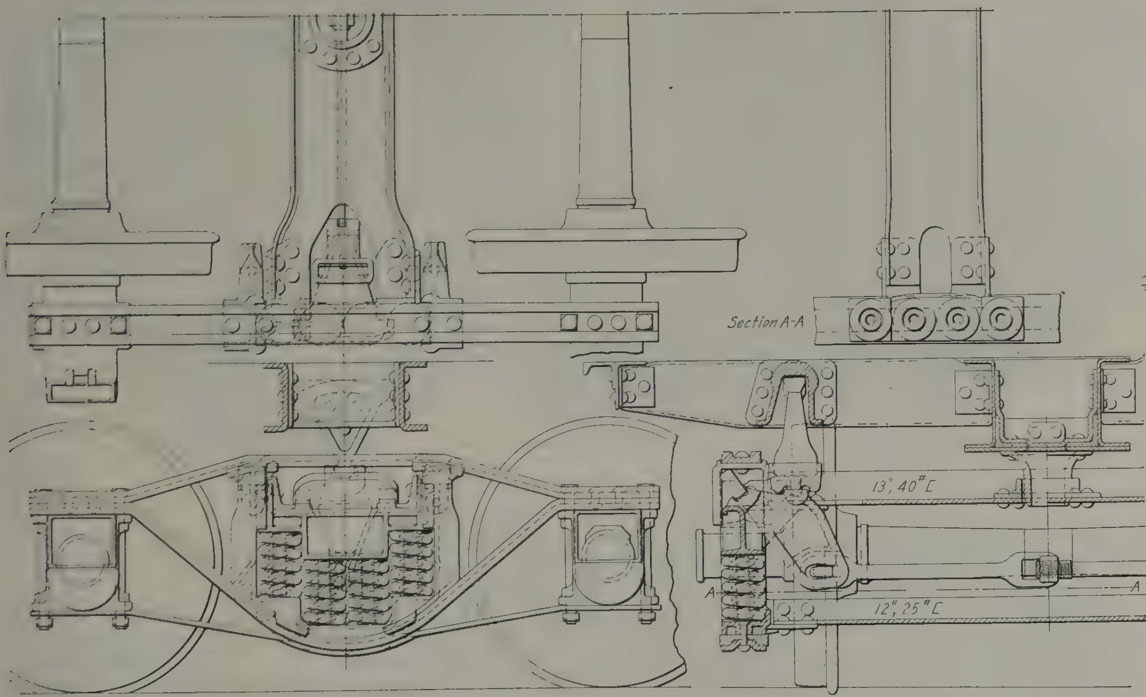


Fig. 985—Summers Balanced Side-Bearing Truck. Summers Steel Car Company.

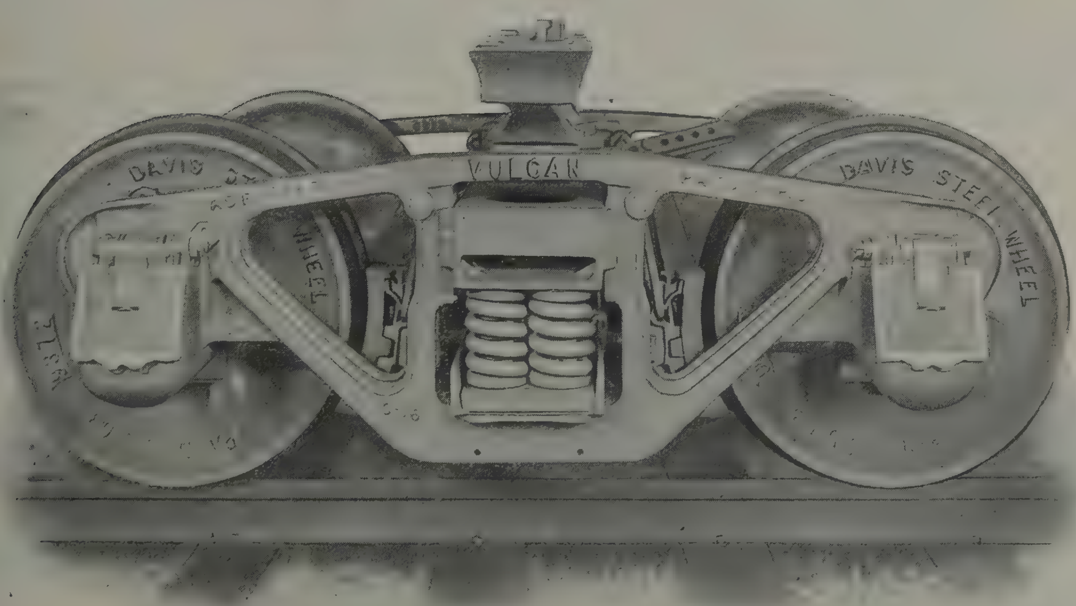


Fig. 986—Vulcan Side Frame Truck. American Steel Foundries.

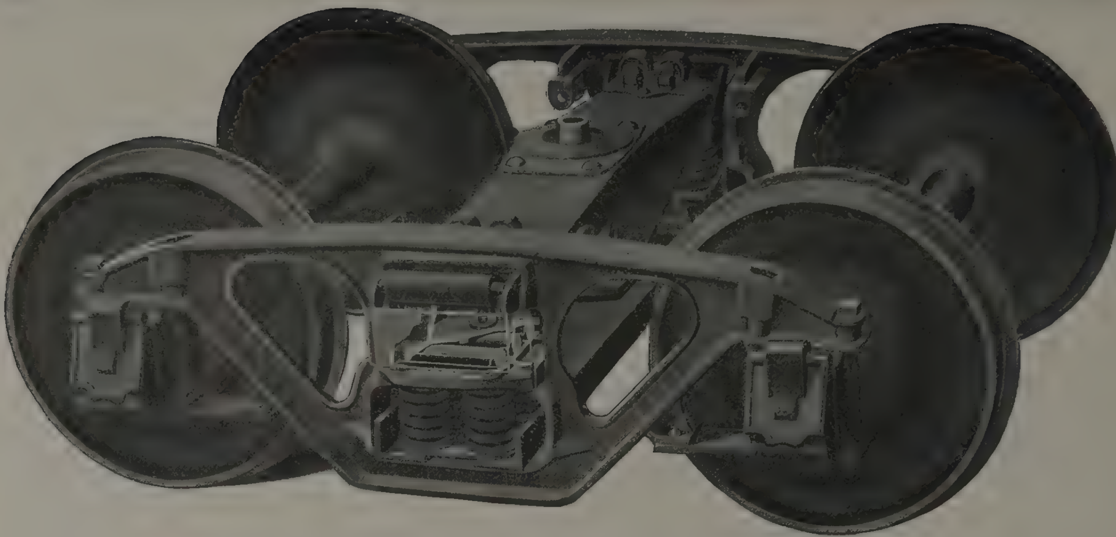


Fig. 987—Barber Lateral Motion Roller Bearing Freight Car Truck.

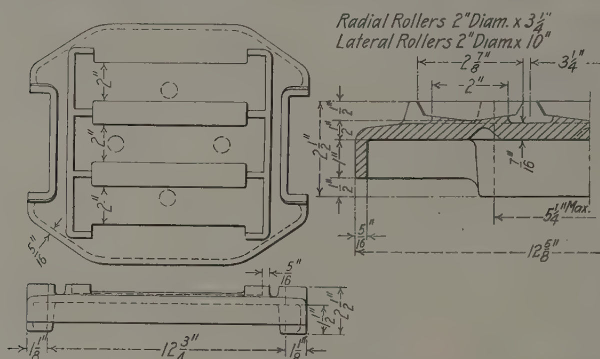


Fig. 988—Barber 50-Ton Lateral Motion Roller Bearing Seat for Freight Car Trucks.

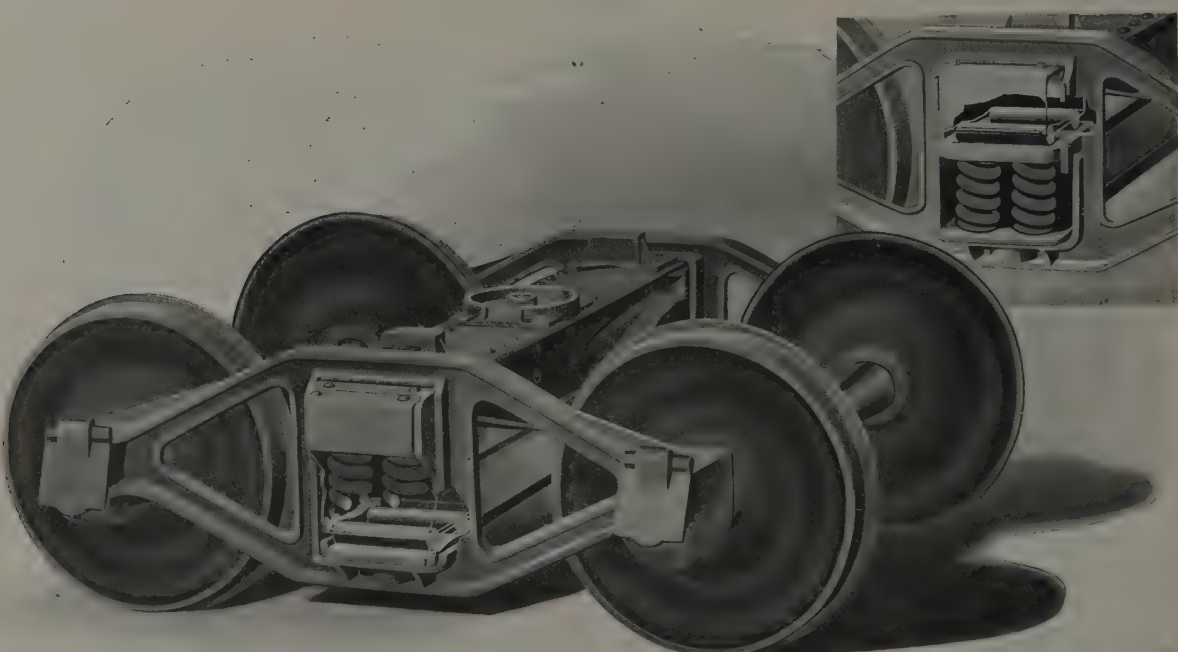


Fig. 989—Barber Lateral Motion Roller Bearing Freight Car Truck with Bettendorf Type of Side Frame and Bolster.
Standard Car Truck Company.

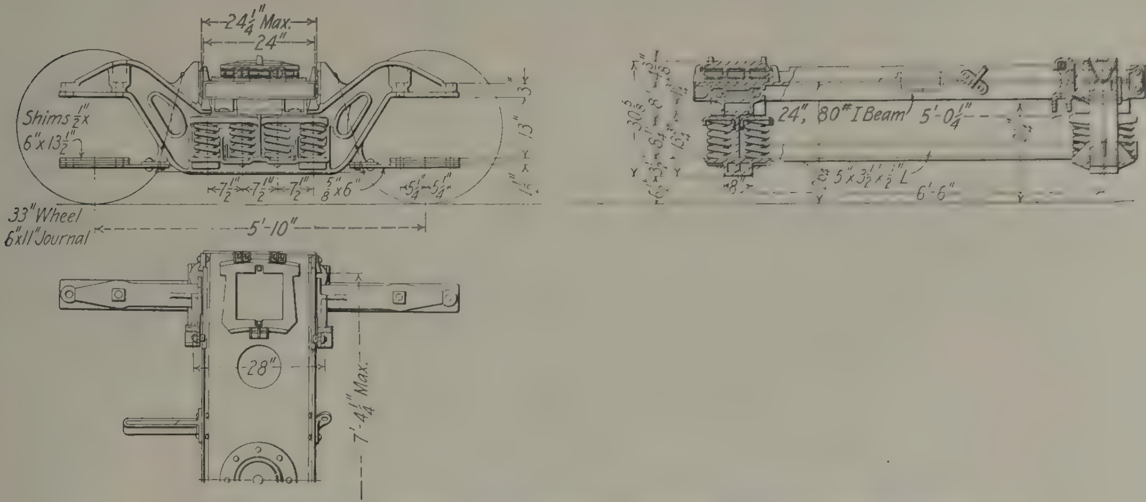


Fig. 990—Barber Double Action Freight Truck for 70-Ton Capacity Cars

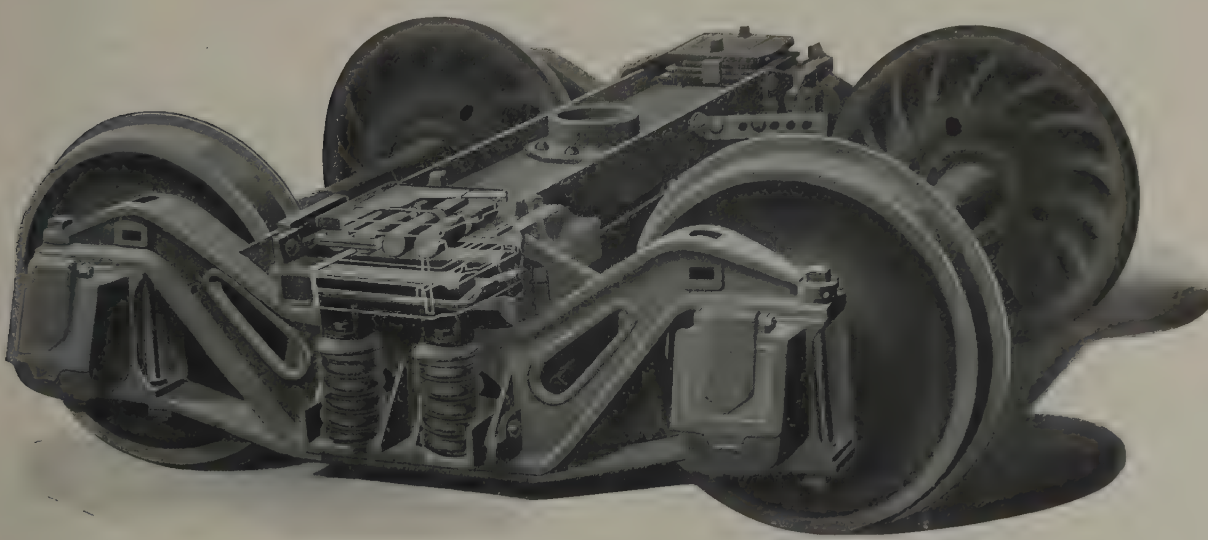


Fig. 991—Barber Double Action 50-Ton Truck.

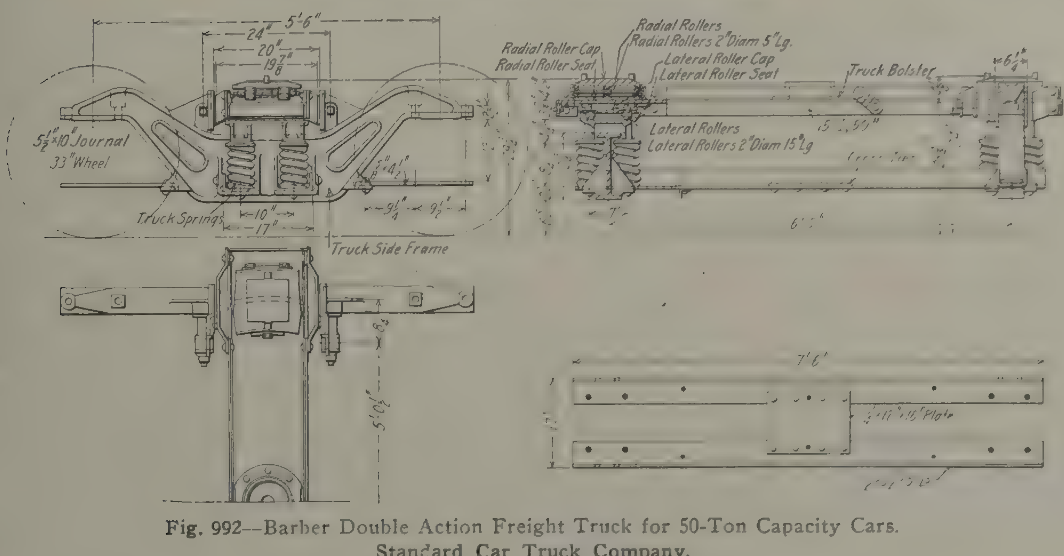


Fig. 992--Barber Double Action Freight Truck for 50-Ton Capacity Cars.
Standard Car Truck Company.

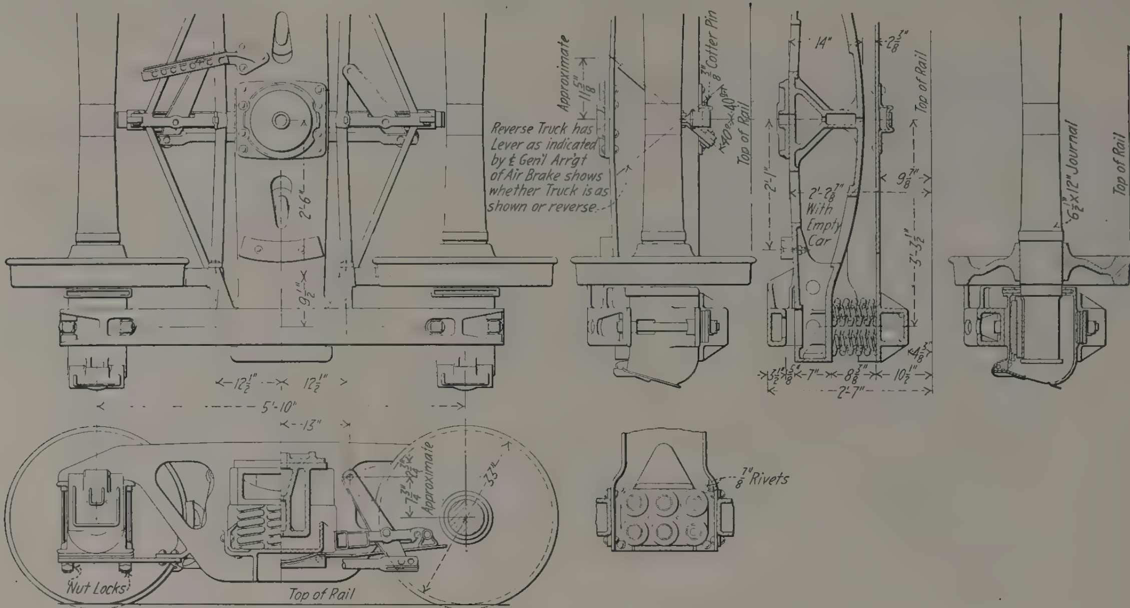


Fig. 993—General Arrangement of Pennsylvania Railroad Truck with Crown Cast Steel Side Frame.

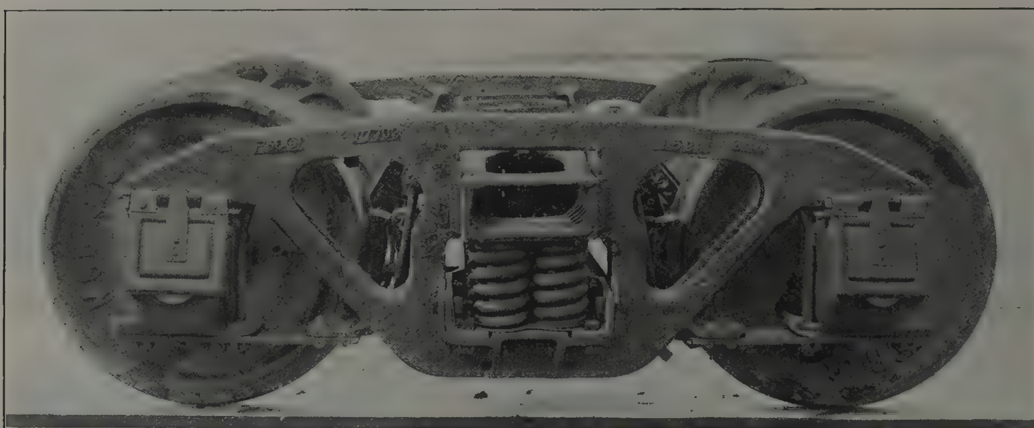


Fig. 994—Pennsylvania Railroad 70-Ton Capacity Truck with Crown Cast Steel Side Frame.

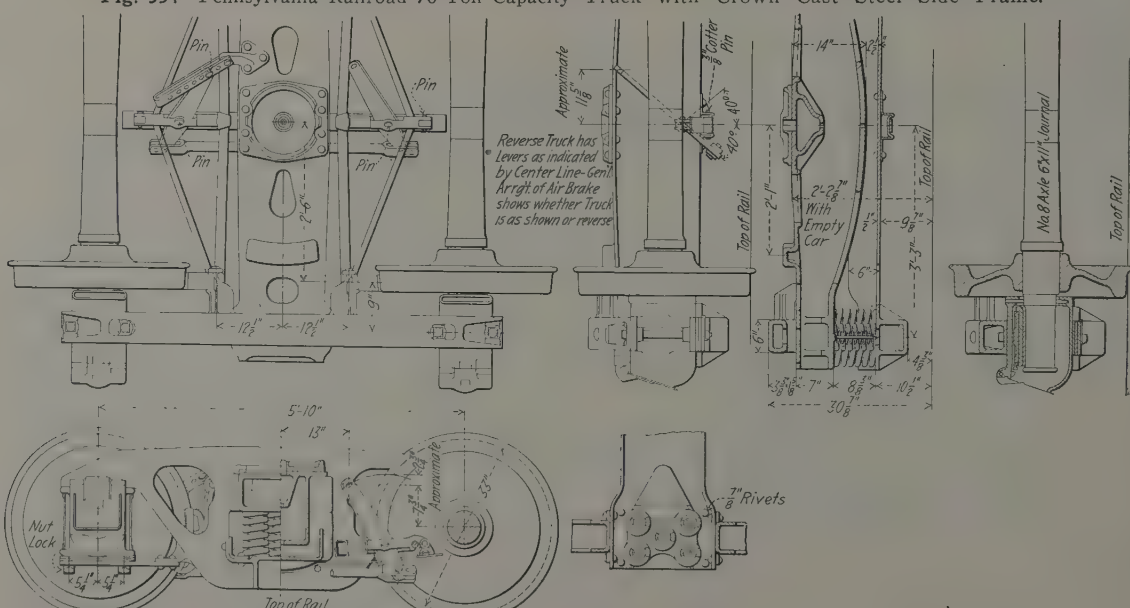


Fig. 994A—Pennsylvania Railroad 70-Ton Capacity Truck with Crown Cast Steel Side Frame.

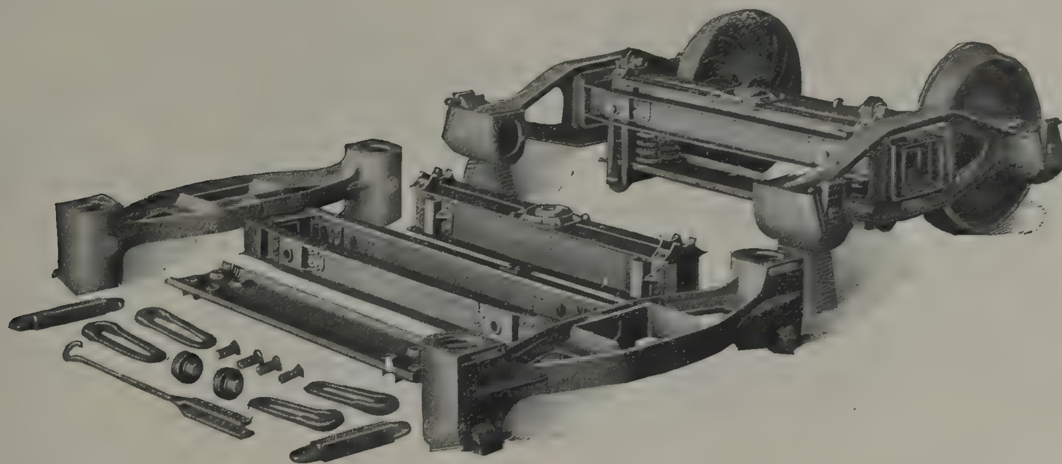


Fig. 995—Parts of Bettendorf Swing Motion Truck. The Bettendorf Company.

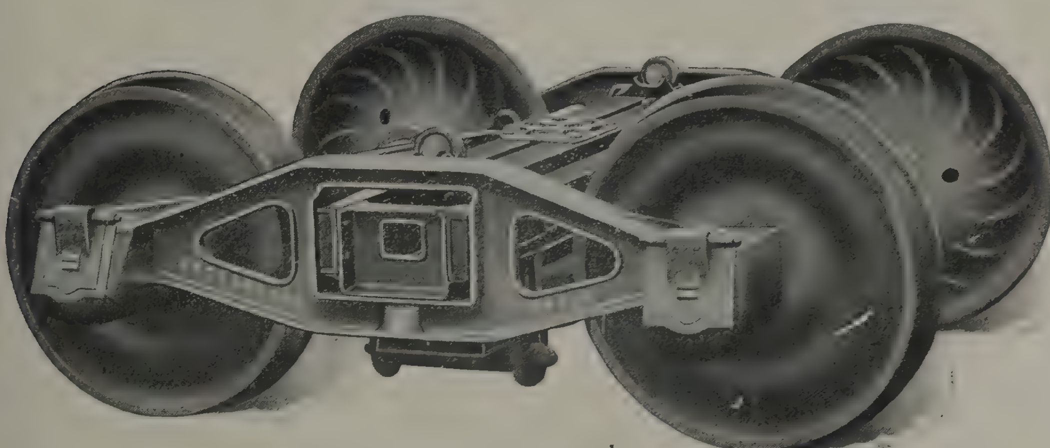


Fig. 996—Bettendorf Swing Motion Truck for 30-Ton Capacity Car. The Bettendorf Company.

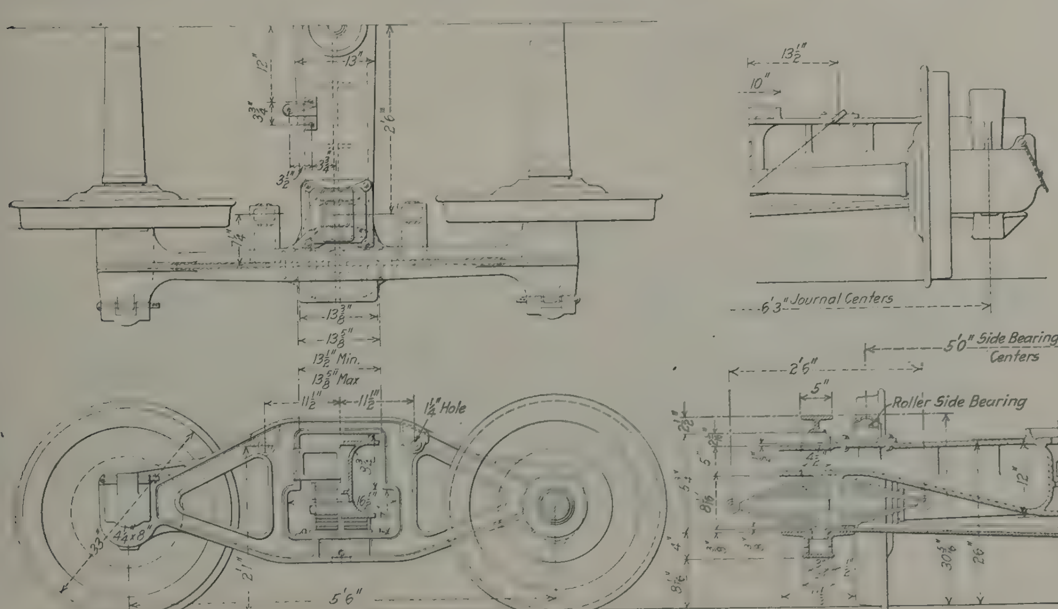


Fig. 997—Bettendorf Cast Steel Truck for Caboose Cars. The Bettendorf Company.

Fig. 998—Top View of Six-Wheel Truck Shown in Figs. 999 and 1000.

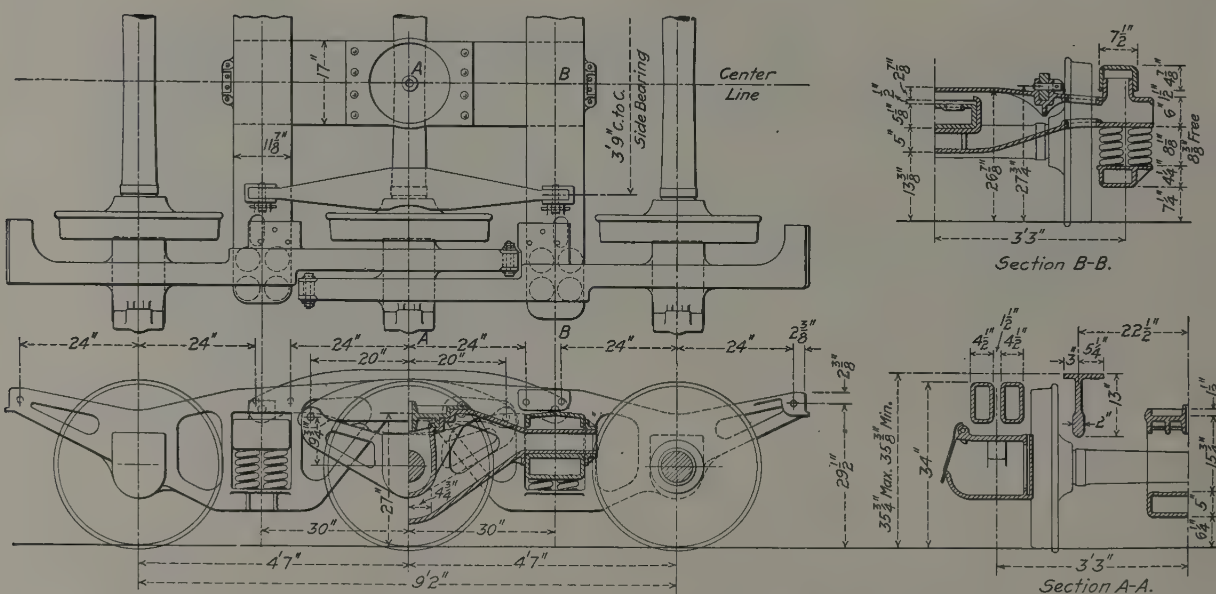


Fig. 999—General Drawing of Six-Wheel Truck Shown in Figs. 998 and 1000.

Fig. 1000—Articulated Six-Wheel Truck for Freight Service. See Figs. 998 and 999.
Buckeye Steel Castings Company.

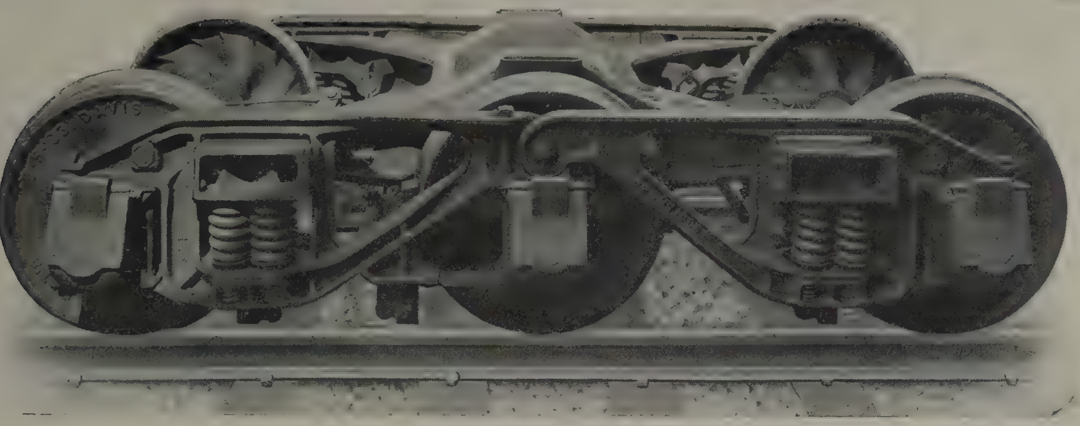


Fig. 1001—Six-Wheel Truck for 90-Ton Capacity Norfolk & Western Gondola Car. American Steel Foundries.

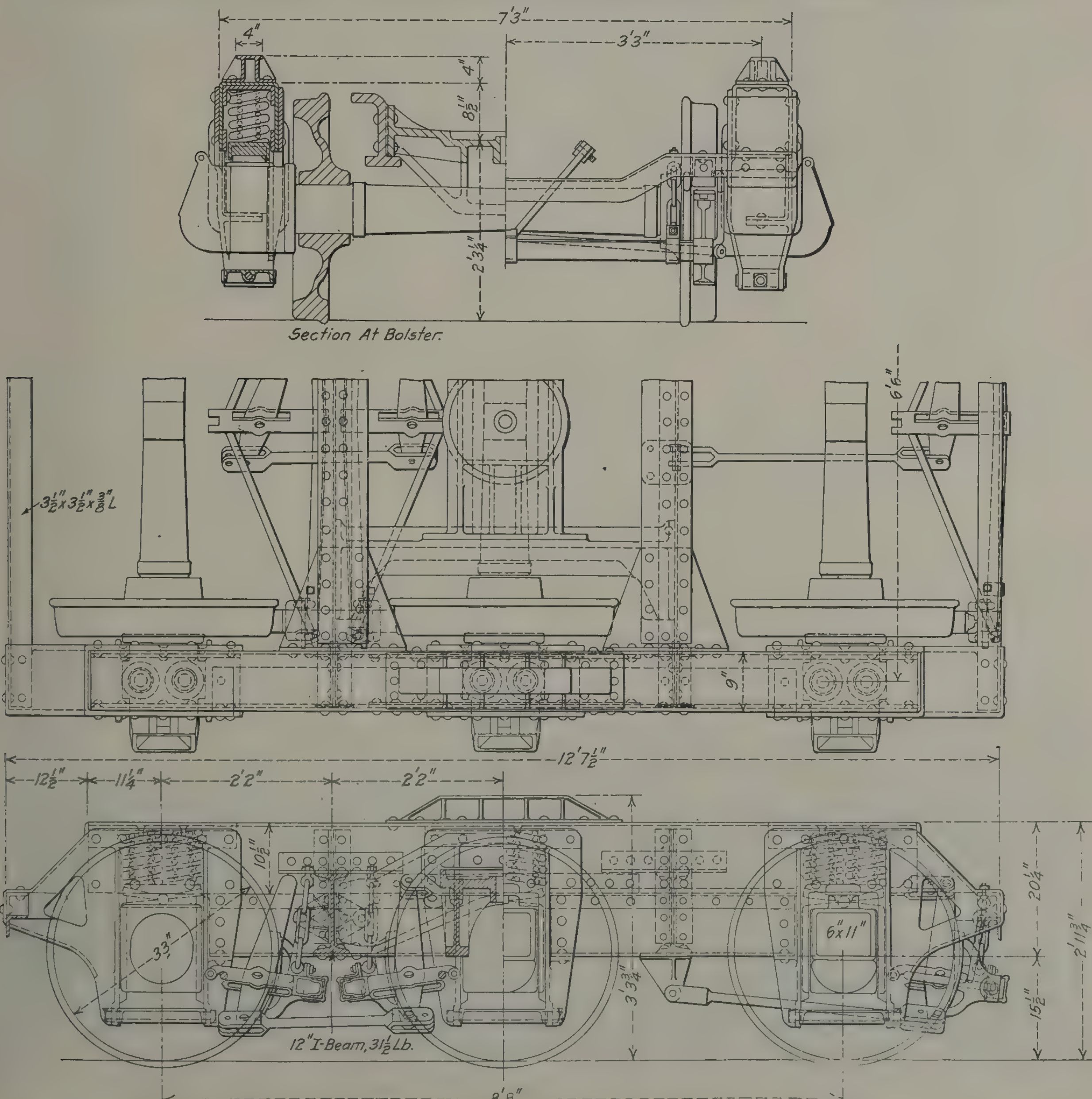


Fig 1002—Built-Up Six-Wheel Truck for Woodward Iron Company's 100-Ton Hopper Car. Pressed Steel Car Company.

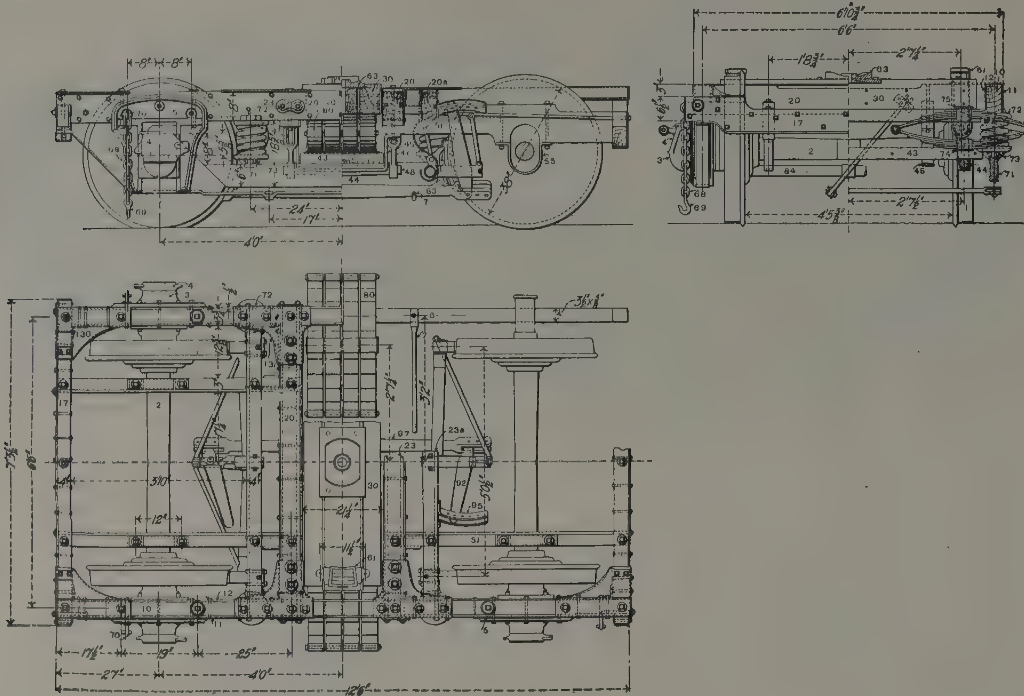


Fig. 1003—Four-Wheel Passenger Truck with Wooden Frame.

Parts of Trucks. See Fig. 1003.

1 *Wheel*
2 *Axle*
3 *Journal Box*
4 *Journal Box Lid*
5 *Pedestal*
6 *Pedestal Tie Bar*
7 *Pedestal Stay Rod*
10 *Wheel Piece*
11 *Outside Wheel Piece Plate*
12 *Inside Wheel Piece Plate*
17 *Truck Frame End Piece*
20 *Transom*
20a *Extra Transom*
23 *Transom Tie Rod*
23a *Extra Transom Tie Rod*
26 *Transom Tie Rod Washer*
30 *Truck Bolster*
43 *Spring Plank*
44 *Spring Plank Bearing*
45 *Spring Plank Safety Hanger*
46 *Swing or Spring Hanger*
48 *Lower Swing or Spring Hanger*
51 *End Axle Guard*
55 *Axle Safety Hanger*
61 *Truck Side Bearing*
63 *Truck Center Plate*
68 *Safety Chain*
69 *Safety Chain Hook*
70 *Safety Chain Eye Bolt*
71 *Equalizing Bar*
72 *Equalizing Bar Spring Cap*
73 *Equalizing Bar Spring Seat*
74 *Bolster Spring Seat*
75 *Bolster Spring Cap*
79 *Equalizing Bar Spring*
80 *Bolster Spring*
83 *Brake Head*
84 *Brake Beam*
92 *Brake Lever*
95 *Dead Lever Guide*
97 *Bottom Brake Rod*
130 *End Piece Corner Plate*
31 *Transom Corner Plate*

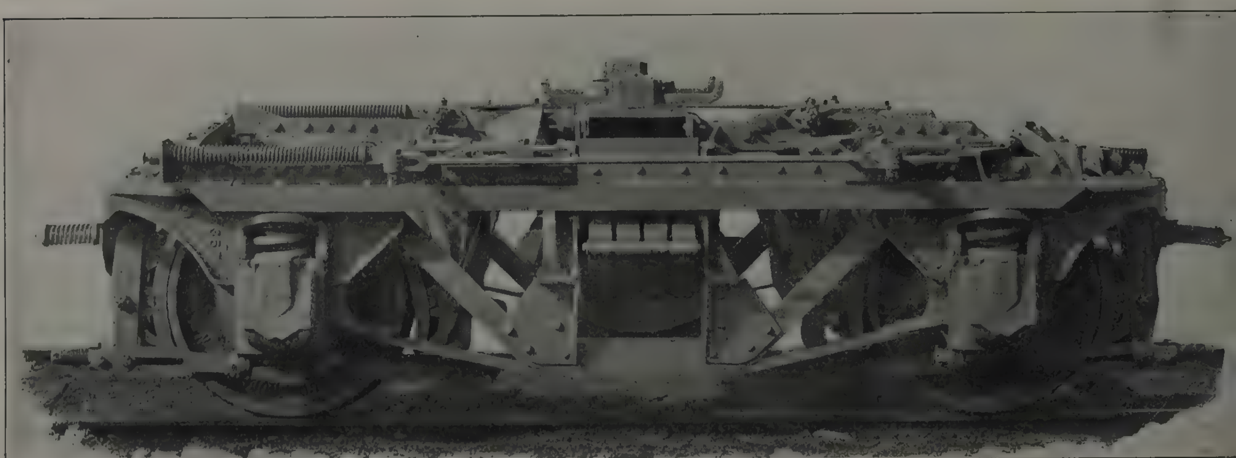


Fig. 1004—Truck for Erie Steel Suburban Car. Pressed Steel Car Company.

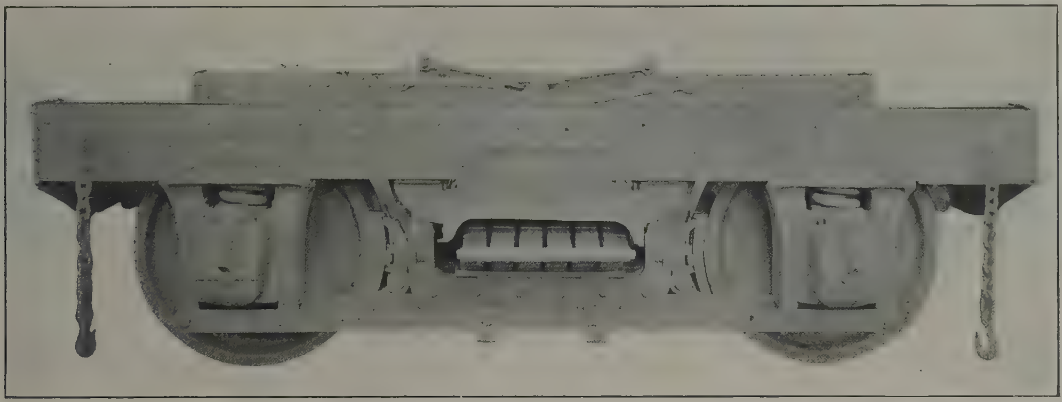


Fig. 1005—Four-Wheel Truck for Pennsylvania Railroad Steel Cars.

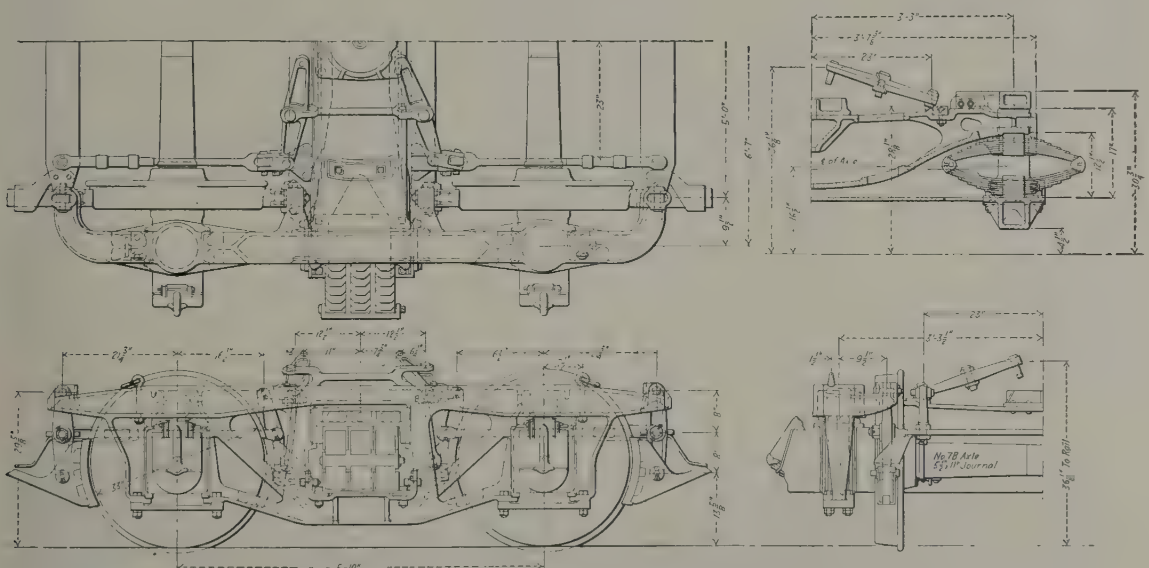


Fig. 1006—General Arrangement of Four-Wheel Steel Truck Class No. 9 for Passenger Cars. Pennsylvania Railroad.

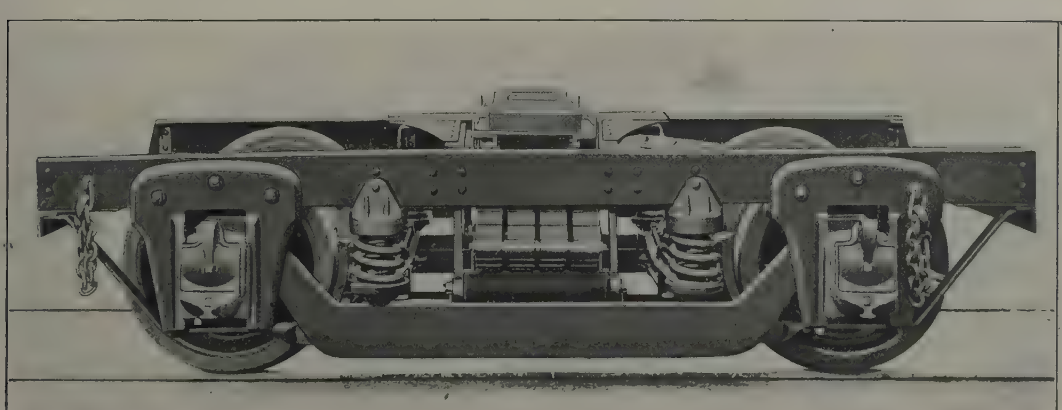


Fig. 1007—Four-Wheel Truck with Rolled Steel Frame. American Car & Foundry Company.

Fig. 1008—Four-Wheel Trailer Truck for New York, Westchester & Boston Steel Suburban Car.

Fig. 1009—Commonwealth Steel Company's Four-Wheel Cast Steel Truck.

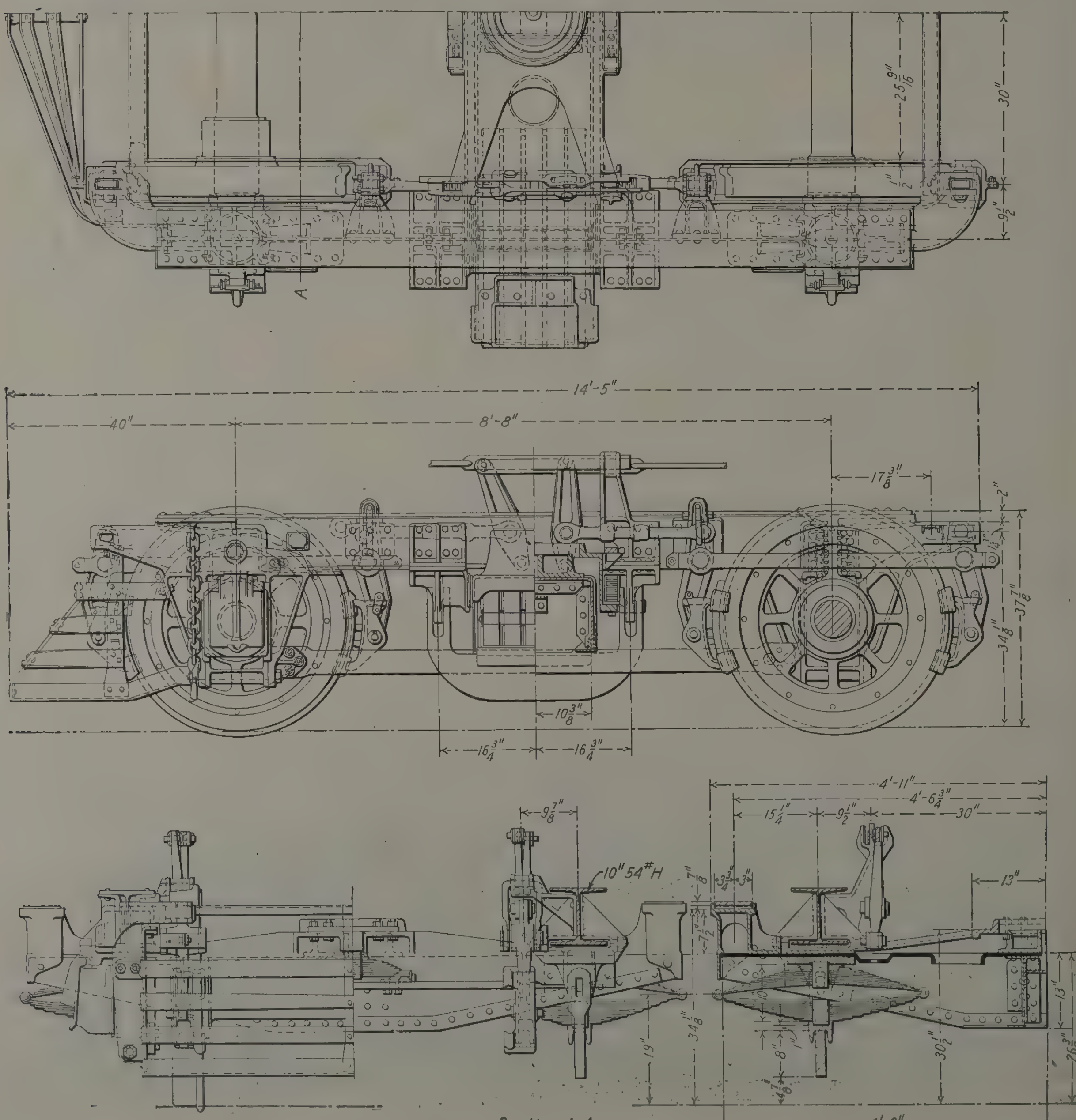


Fig. 1010—Standard Four-Wheel Steel Passenger Car Truck Modified for Use Under Motor Cars on Electrified District of the Pennsylvania Railroad at Philadelphia.

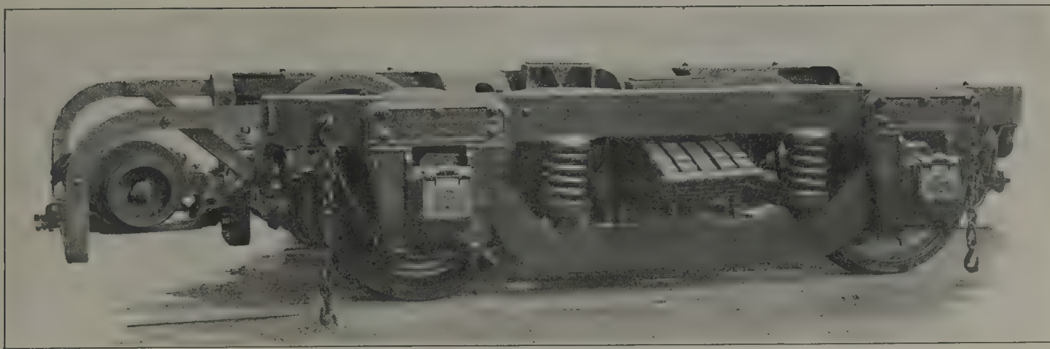


Fig. 1011—Four-Wheel Steel Frame Truck.

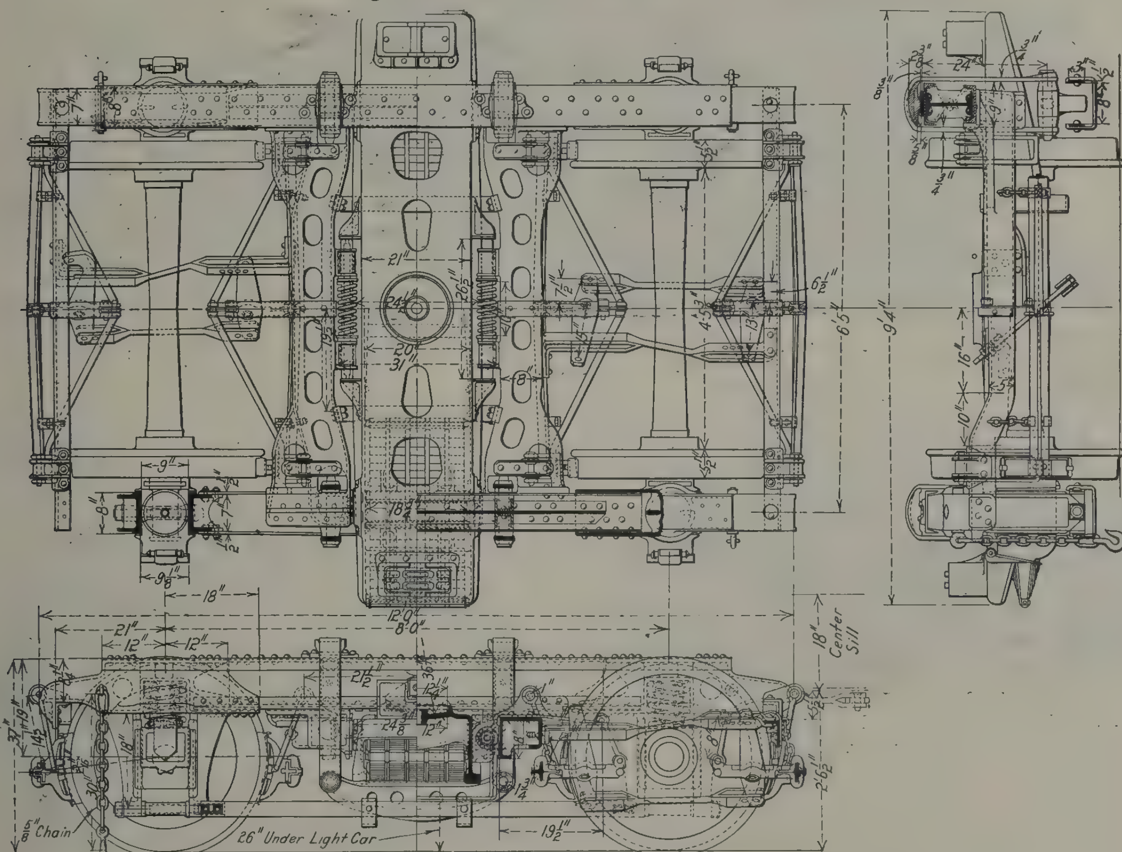


Fig. 1012—General Arrangement of Four-Wheel Steel Truck Shown in Fig. 1011.

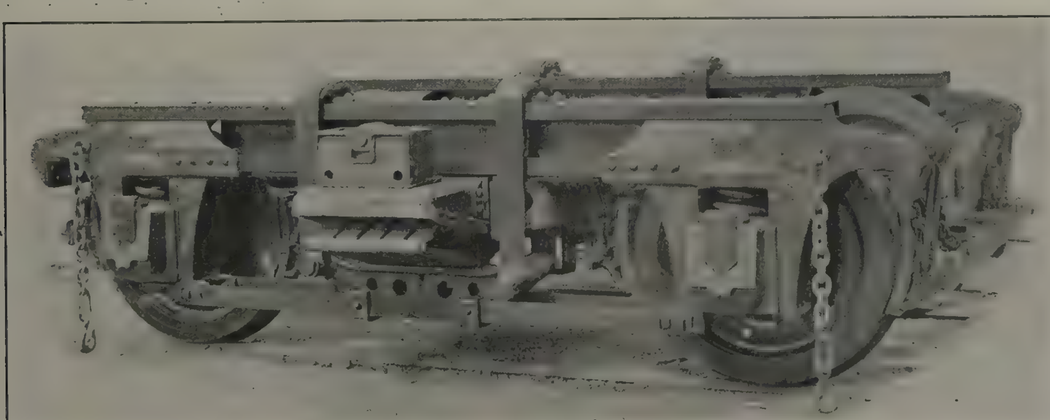


Fig. 1013—Philadelphia & Reading Four-Wheel Steel Truck with Clasp Brake Arrangement.
The Harlan Works of the Bethlehem Ship Building Corporation.

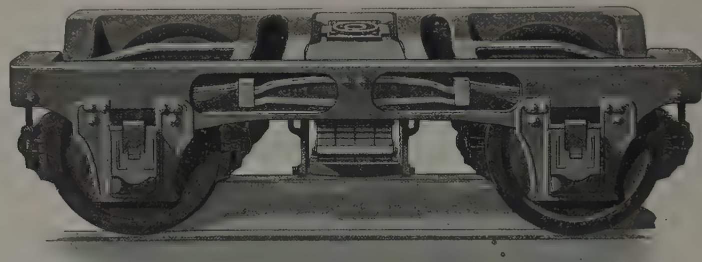


Fig. 1014—Four-Wheel Top Equalizer Truck. Commonwealth Steel Company.

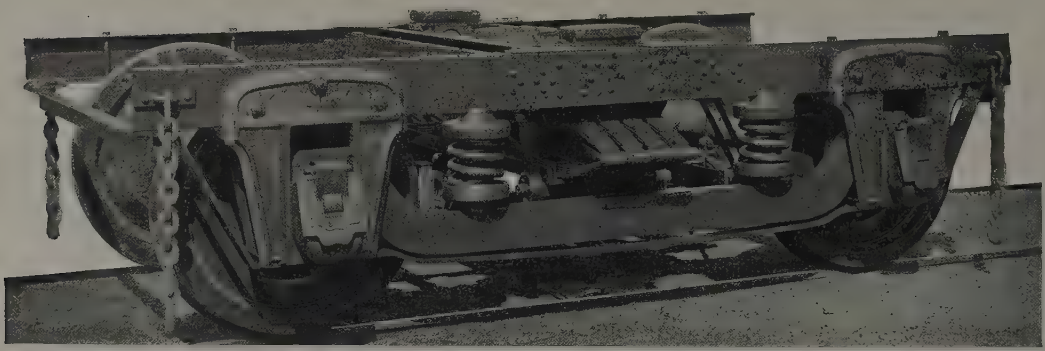


Fig. 1015—Four-Wheel Steel Truck for Passenger Train Cars. The Harlan Works of Bethlehem Ship Building Corporation.

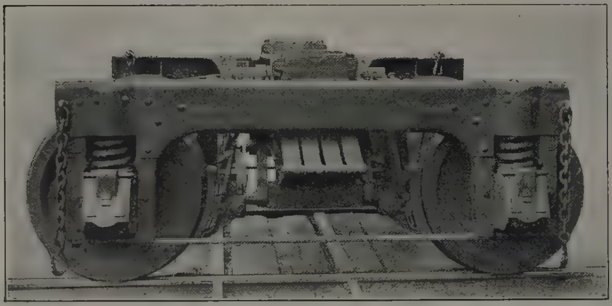


Fig. 1016—Truck for Long Island Railroad Steel Trailer Car.

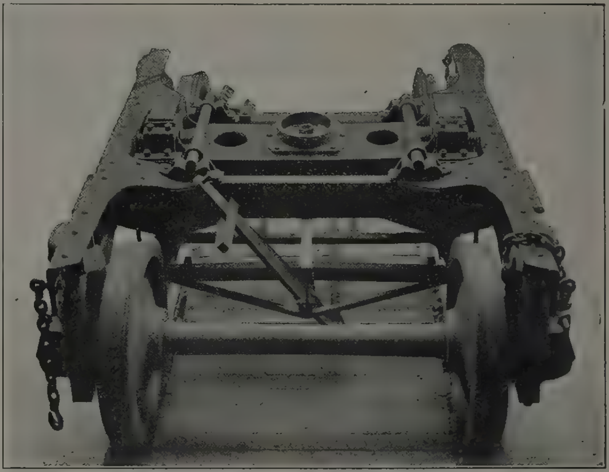
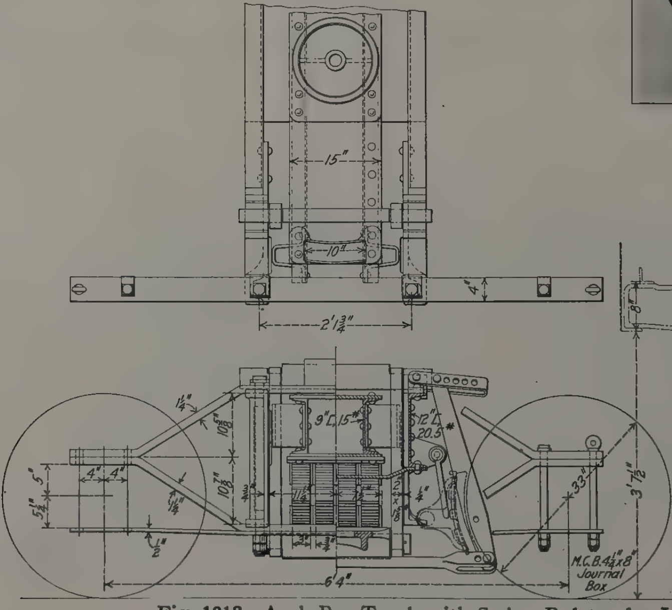


Fig. 1017—Truck for Long Island Railroad Steel Trailer Car.



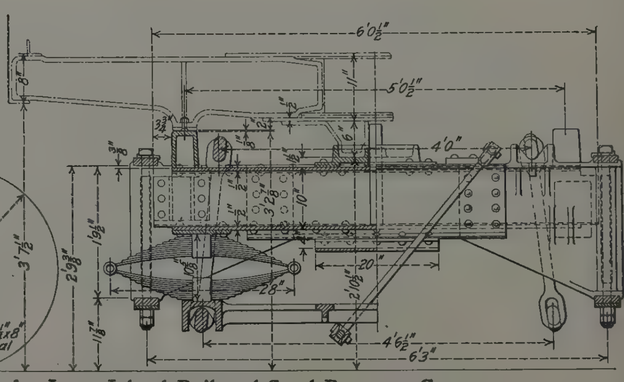


Fig. 1018—Arch Bar Truck with Swing Bolster for Long Island Railroad Steel Baggage Car.

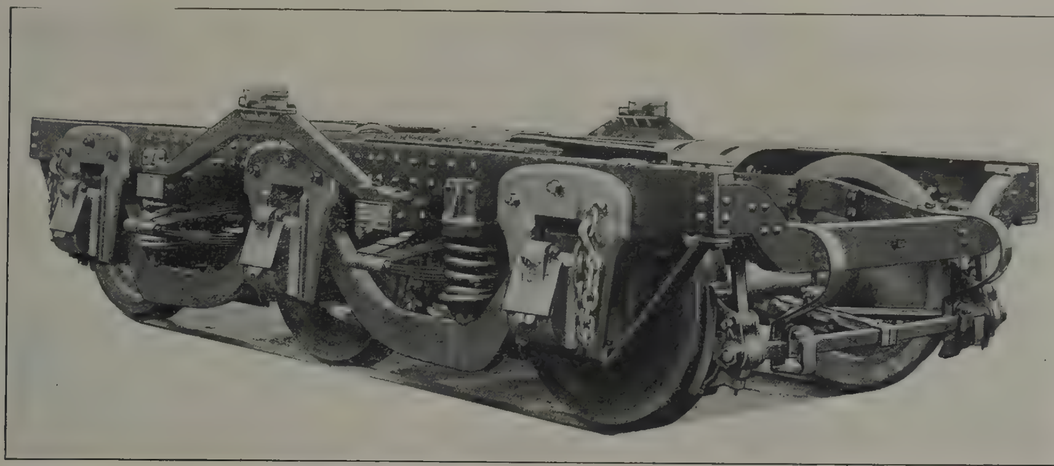


Fig. 1019—Six-Wheel Truck with Rolled Steel Frame. American Car & Foundry Company.

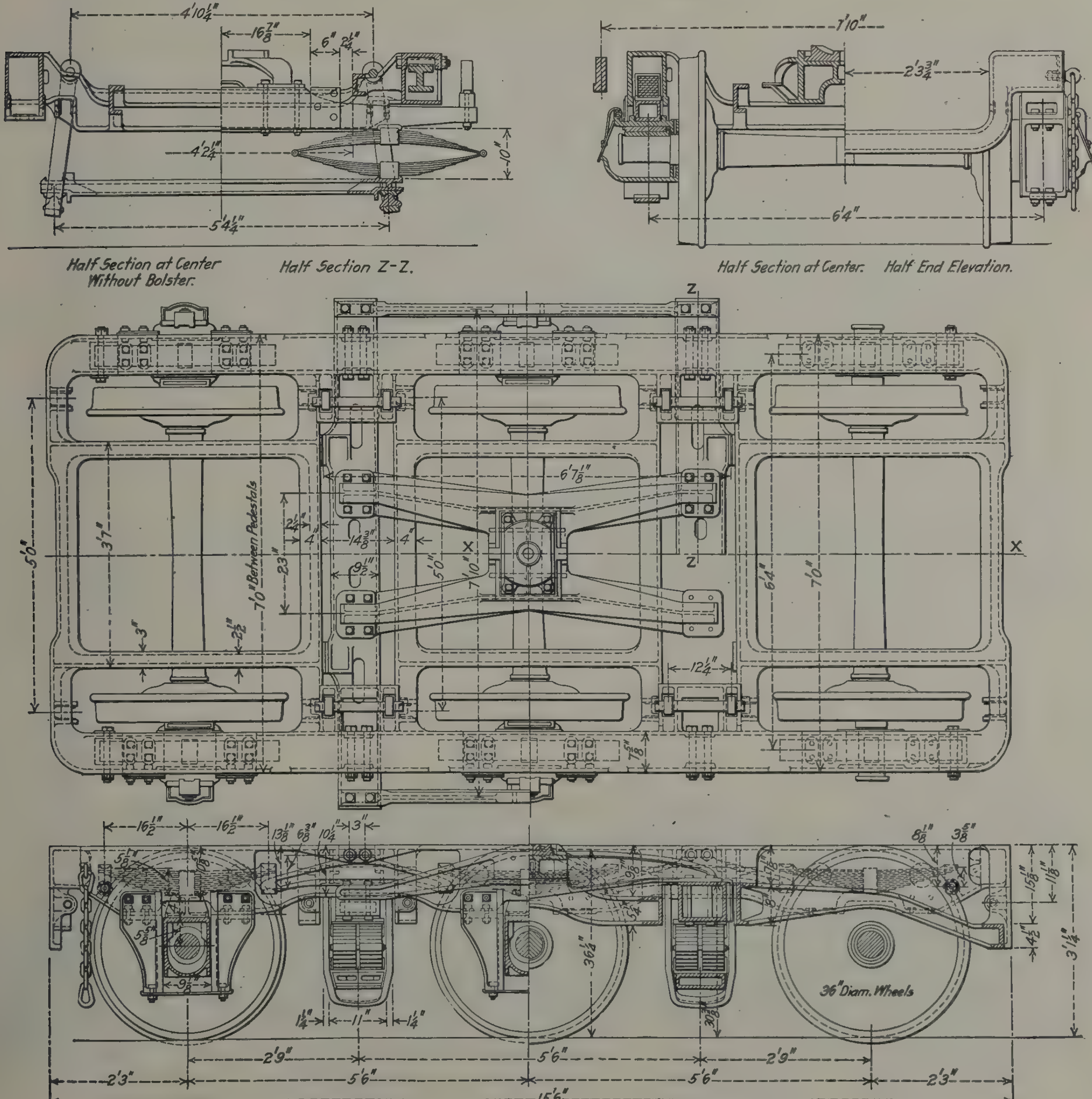


Fig. 1020—New York Central Six-Wheel Truck with Top Equalizer Clasp Brake Arrangement.

Fig. 1021—Six-Wheel Passenger Car Truck for Atlantic Coast Line. American Car & Foundry Company.

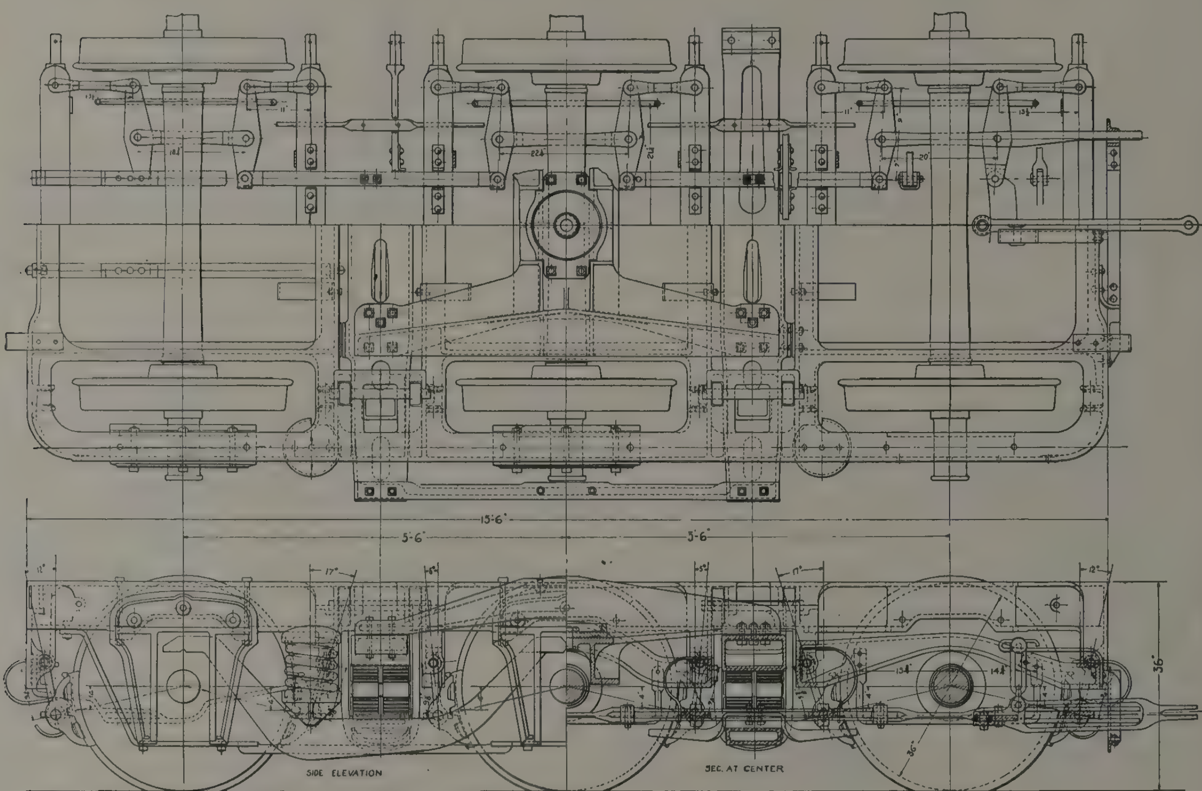


Fig. 1022—Philadelphia & Reading Six-Wheel Truck with Clasp Brake Arrangement. The Harlan Works of the Bethlehem Ship Building Corporation.

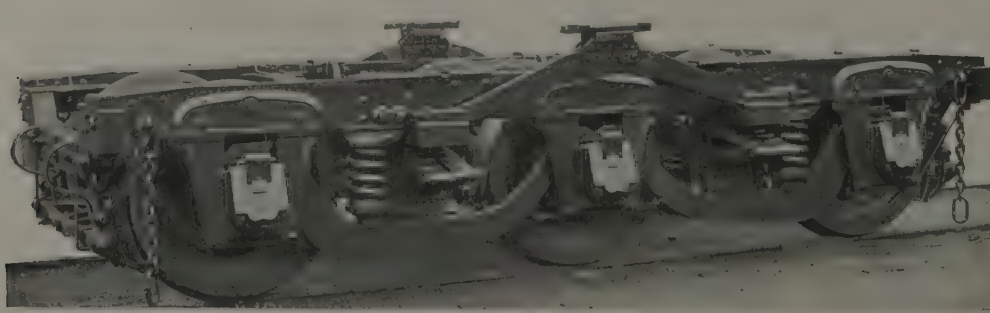


Fig. 1023—Six-Wheel Steel Truck. The Harlan Works of the Bethlehem Ship Building Corporation.

Fig. 1024—Brill—27—M. C. B.—3 Truck for Boston Elevated Subway Service Railway. The J. G. Brill Company.

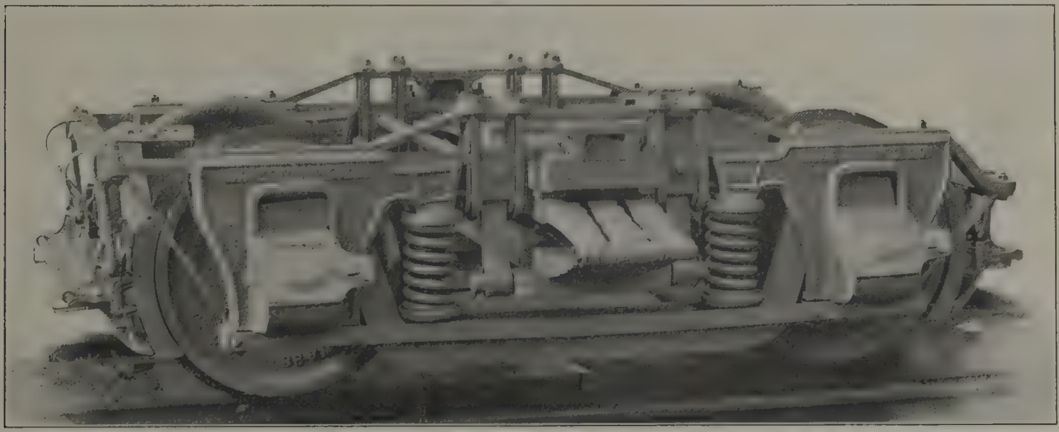


Fig. 1025—Four-Wheel Truck for Narrow Gage Cars. The Wason Manufacturing Company.

Fig. 1026—Six-Wheel Truck with Commonwealth Cast Steel Frame. The Harlan Works of the Bethlehem Ship Building Corporation.

Fig. 1027—Commonwealth Steel Company's Six-Wheel Cast-Steel Truck. Commonwealth Steel Company.

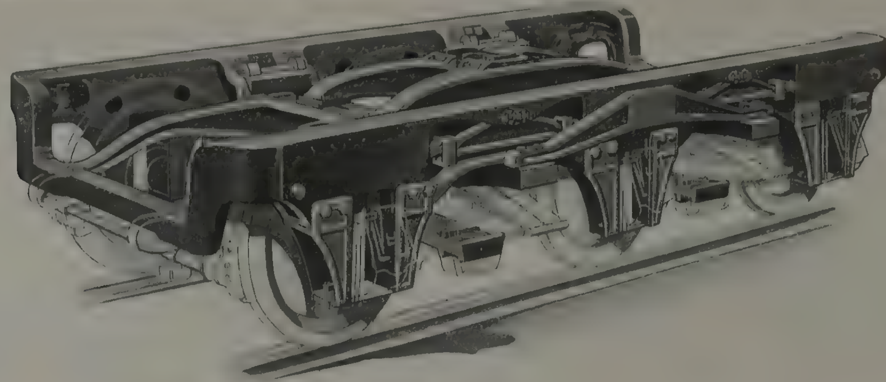


Fig. 1028—Six-Wheel Top Equalizer Truck. Commonwealth Steel Company.

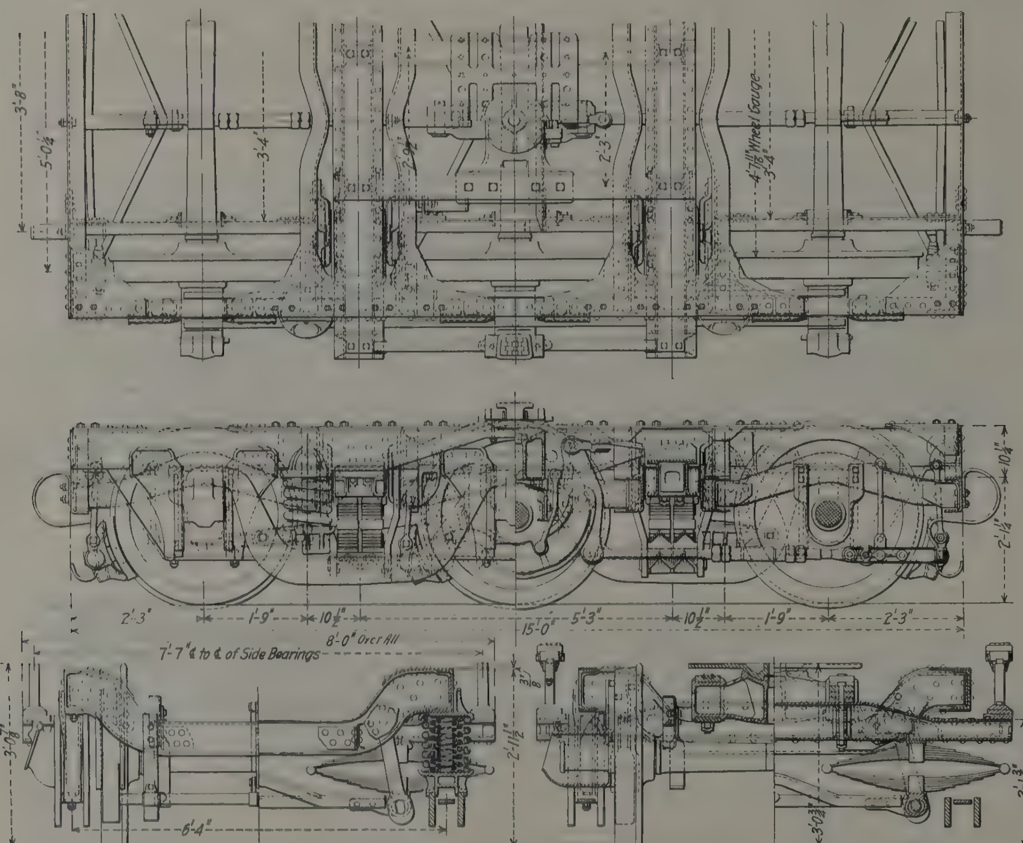


Fig. 1029—Six-Wheel Steel Truck. Standard Steel Car Company.

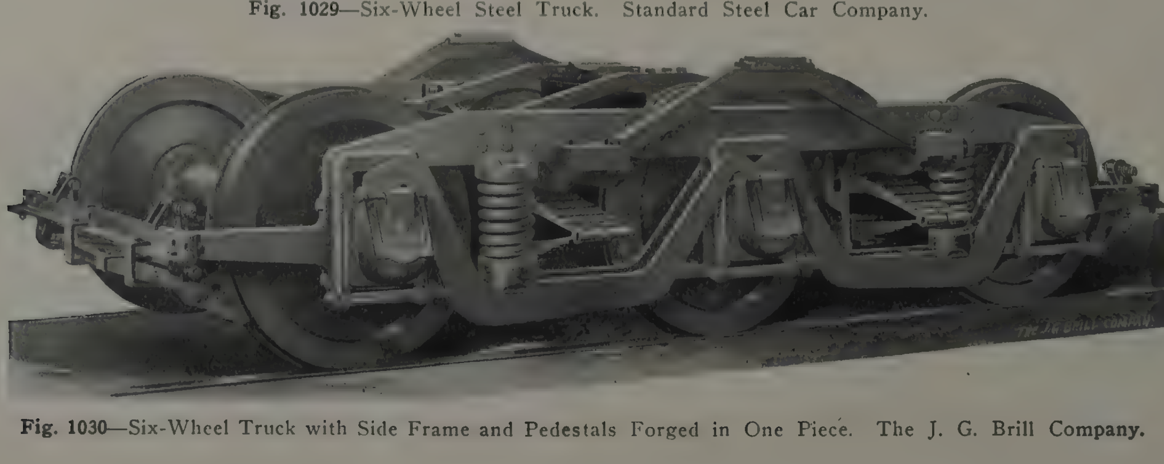


Fig. 1030—Six-Wheel Truck with Side Frame and Pedestals Forged in One Piece. The J. G. Brill Company.

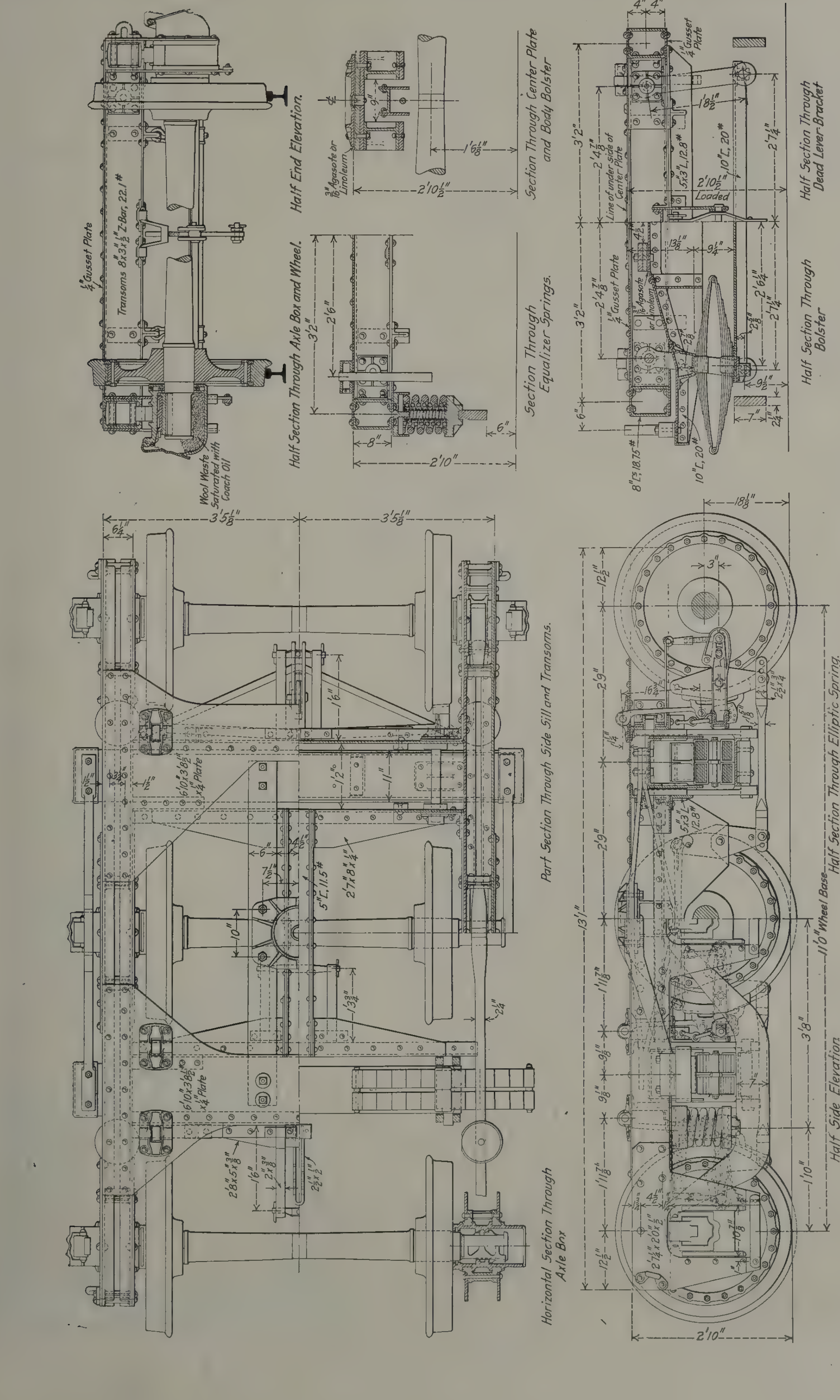


Fig. 1031—Canadian Pacific Steel Truck for Passenger Service.

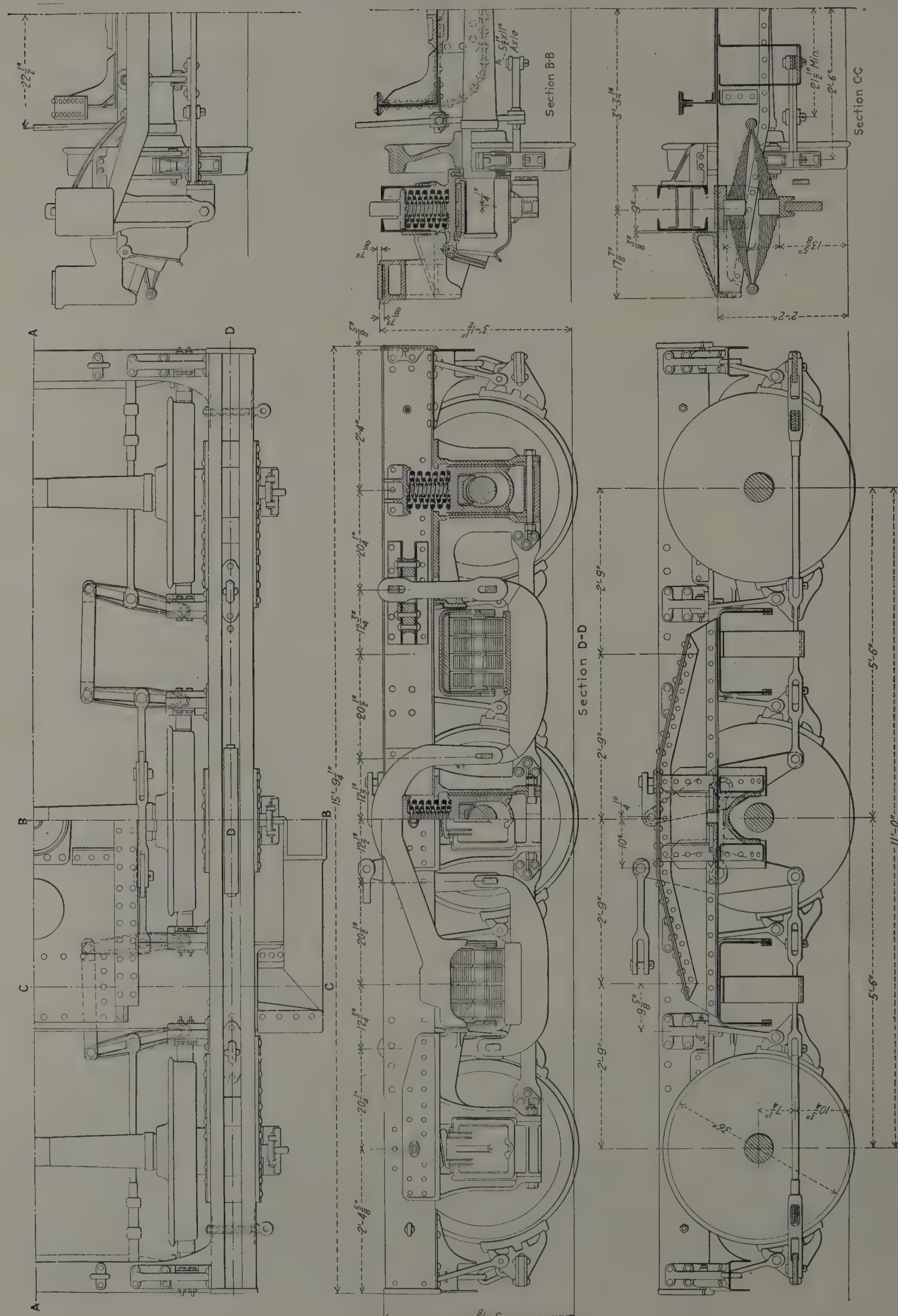


Fig. 1032—Six-Wheel Class C Passenger Car Truck. Pennsylvania Railroad

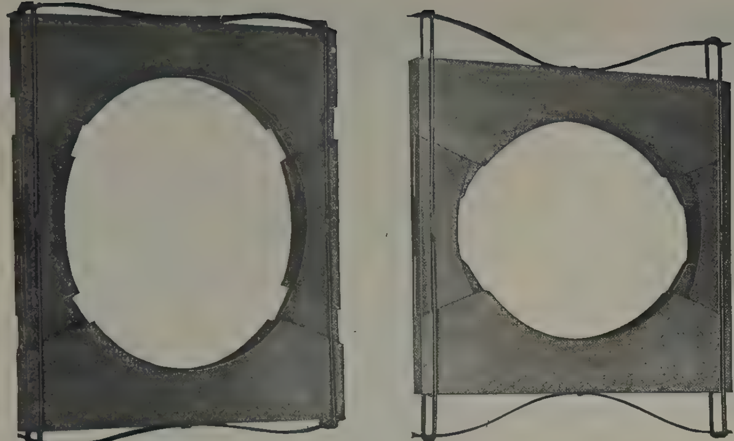


Fig. 1033—Security Dust Guard. Western Railway Equipment Company.
Extended. Closed.

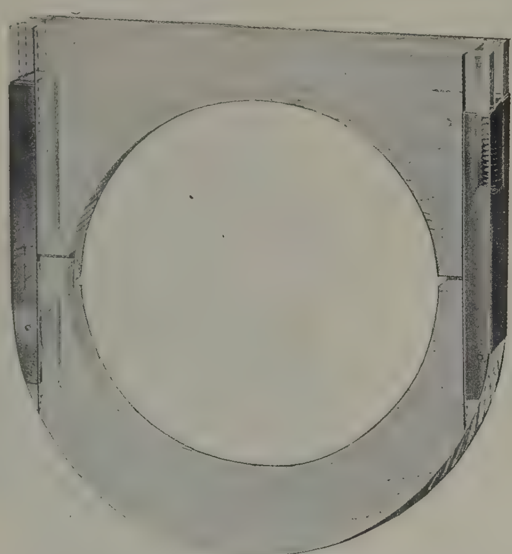


Fig. 1034—National H-4 Combination Wood and Steel Dust Guard.
The Wm. N. Thornburgh Company.
(*See Fig.* 1035.)

DIMENSIONS—FIG. 1035.

Size of Journal.	A.	B.	C.	D.	E.	F.	G.	H.	I.	J.	K.	L.	M.	N.
3¾x7	4 13/16	⅝	6	7¾	6 7/16	6 13/16	13/16	10/16	11/16	..	..	..	..	..
4¼x8	5 5/16	⅝	7¼	8	7⅝	7⅜	13/16	10/16	11/16	..	..	..	..	..
5 x9	6 3/16	⅝	8	9¼	9	8¾	13/16	10/16	11/16	4	..	⅜	4⅜	4⅞
5½x10	6 11/16	⅝	8¾	9⅞	9⅞	9⅝	13/16	10/16	11/16	4⅜	..	⅜	4¾	5⅛
6 x10	7 3/16	⅝	8¾	11	9	8¾	13/16	10/16	11/16	..	..	..	..	..
6½x10	7 11/16	⅝	10	11½	10½	10¼	13/16	10/16	11/16	..	..	..	..	..
6 x11	7 5/16	⅝	10½	10⅝	11⅝	11⅜	13/16	10/16	11/16	5	¼	..	5	5⅜
6 x11 So. Pac. Stand'd	7¼	⅝	11⅛	11	....	....	13/16	10/16	11/16	..	..	..	..	..

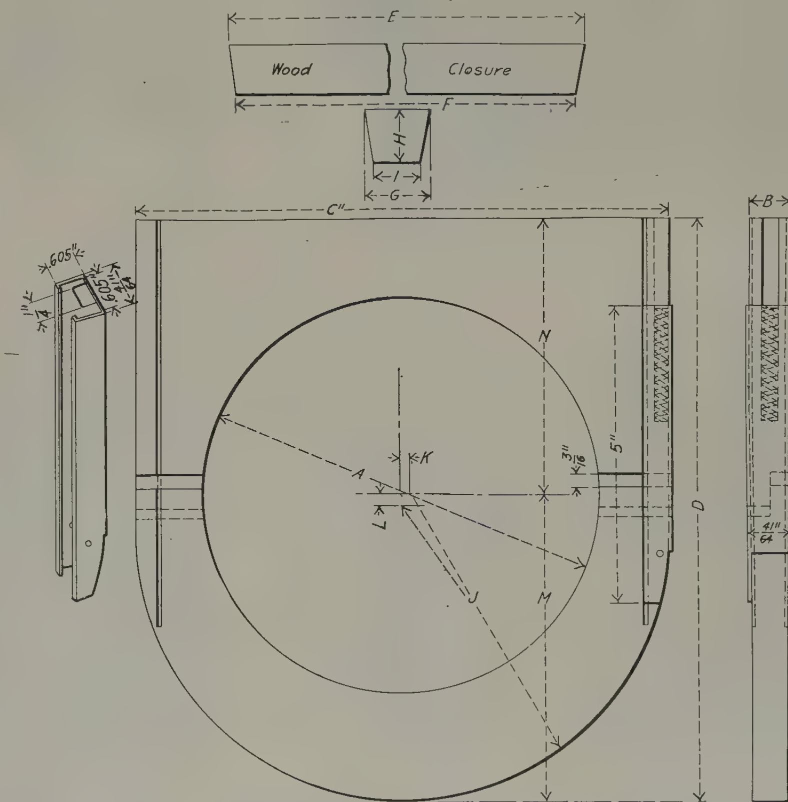


Fig. 1035—Master Drawing of National H-4 Dust Guard Shown in Fig. 1034.
The Wm N. Thornburgh Company.

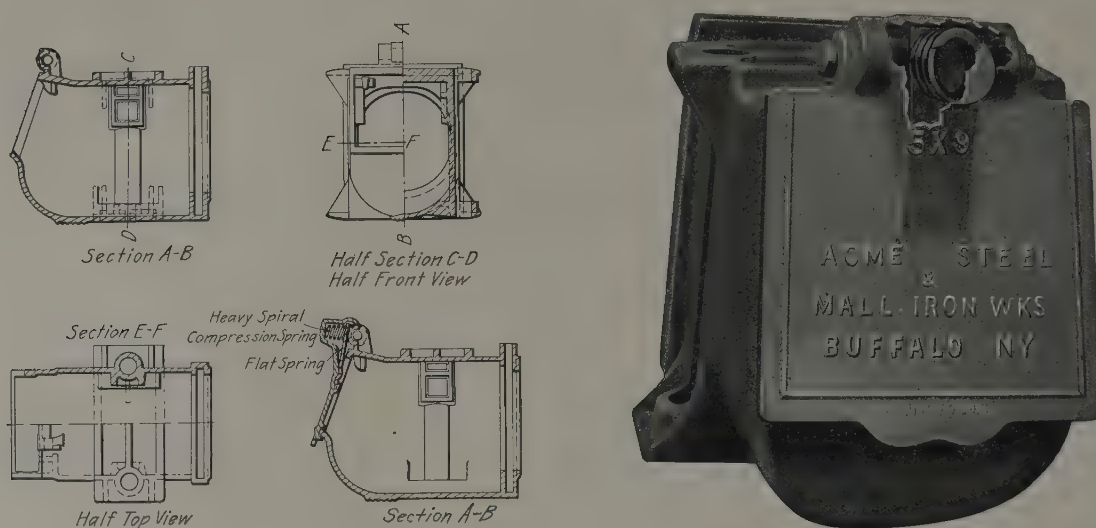


Fig. 1036—Acme Journal Box. Acme Steel & Malleable Iron Works.

Fig. 1037—M. C. B. Arch Bar Journal Box with Improved Coil Spring Lid. (Closed.) Gould Coupler Company.

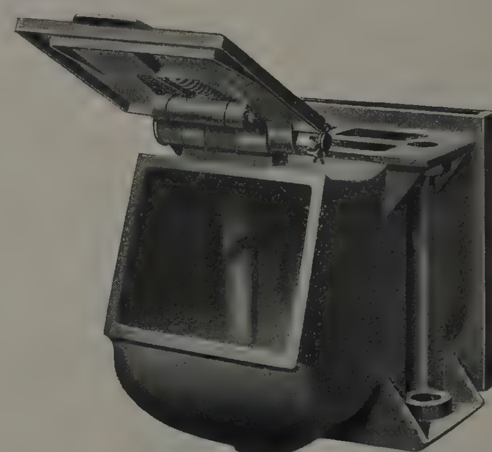


Fig. 1038—M. C. B. Arch Bar Journal Box with Improved Coil Spring Lid. (Open.) Gould Coupler Company.

Fig. 1039—Improved Journal Box for Freight Pedestal Trucks. Gould Coupler Company.

Fig. 1040—Improved Journal Box for Passenger Pedestal Trucks. Gould Coupler Company.

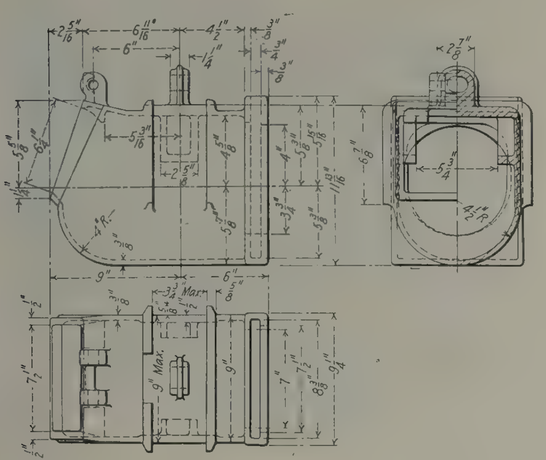


Fig. 1041—Scullin Journal Box. Scullin Steel Company.

Fig. 1042—Davis Pressed Steel M. C. B. Journal Box Lid. Davis Brake Beam Company.

Fig. 1043—Davis Pressed Steel Side Hung Journal Box Lid. Davis Brake Beam Company.

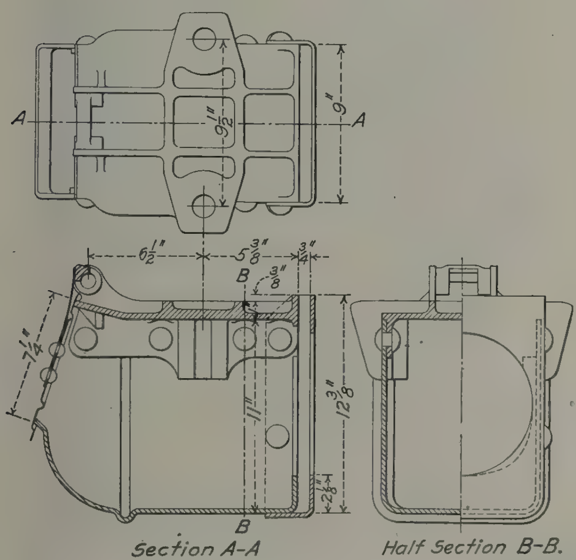


Fig. 1044—Kensington Steel Journal Box with Outside Lid Spring. Union Spring & Manufacturing Company.

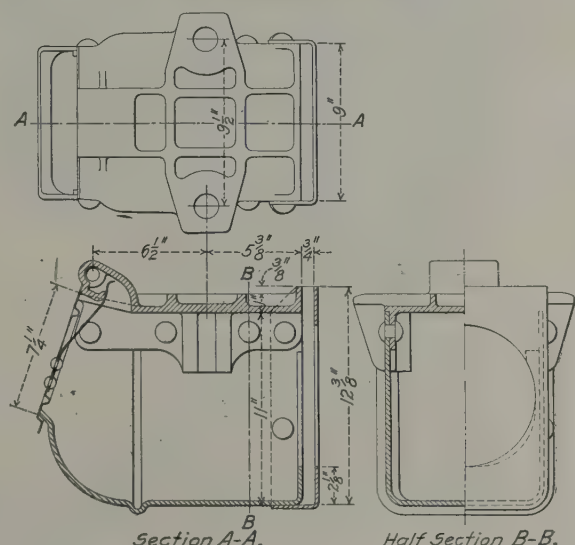


Fig. 1045—Kensington Steel Journal Box with Inside Lid Spring. Union Spring & Manufacturing Company.

Fig. 1046—Kensington Steel Journal Box with Outside Lid Spring. Union Spring & Manufacturing Company.

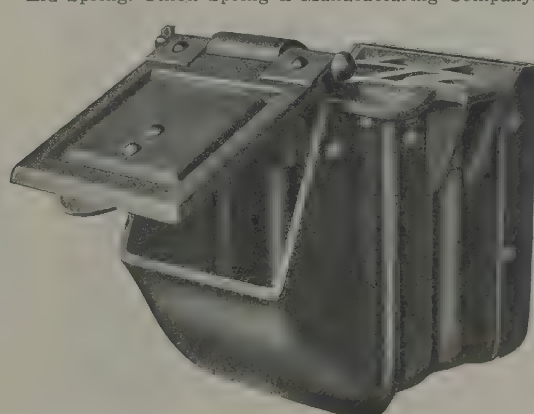


Fig. 1047—Kensington Steel Journal Box with Inside Lid Spring. Union Spring & Manufacturing Company.

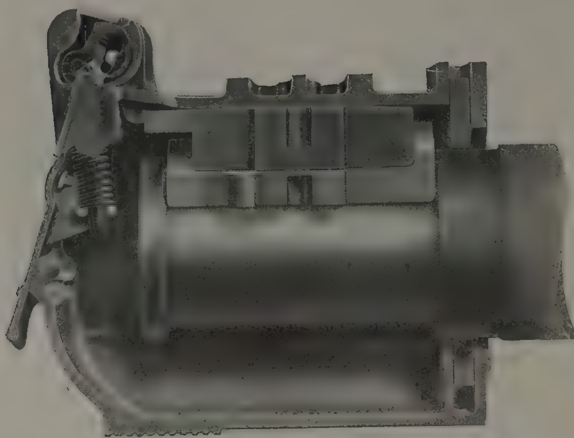


Fig. 1048—McCord 5 in. by 9 in. Journal Box with M. C. B. Dust Guard and Wedge; Lid in Closed Position, Showing Locking Lips.

Fig. 1049—Finished Box After Pouring. McCord & Company.

Fig. 1050—McCord Steel Journal Box with Coil Spring Malleable Iron Lid, for Freight Pedestal Trucks.

Fig. 1051—McCord Steel Journal Box with Coil Spring Pinless Lid, for Arch Bar Trucks.

Fig. 1052—McCord Malleable Iron Pedestal Truck Journal Box with Continuous Steel Inserts for Protection of Pedestal Channels.

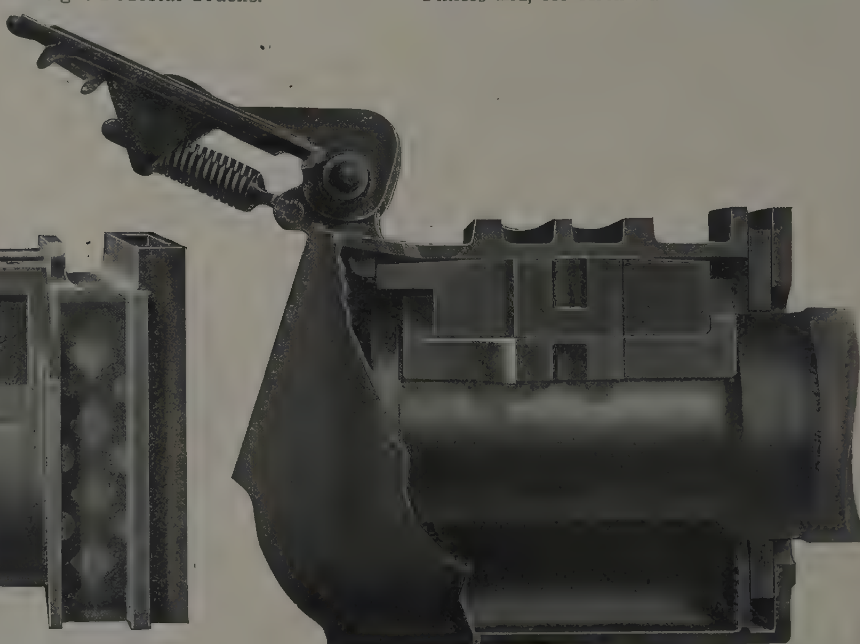


Fig. 1053—McCord Malleable Iron Journal Box for Arch Bar Trucks, with Coil Spring Lid in Open Position.

McCord & Company.

Fig. 1054—National Coiled Spring Journal Box and Parts.

Fig. 1055—National Coiled Spring Journal Box, Open and Closed.

Fig. 1056—National Coiled Spring Journal Box for Scullin Truck.

Fig. 1057—National Coiled Spring Journal Box for Vulcan Truck.

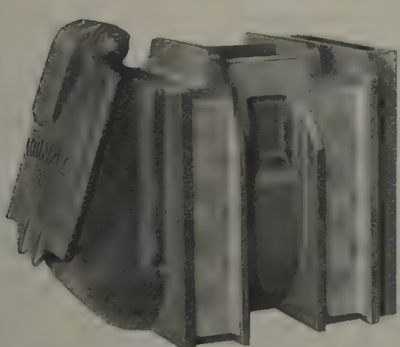


Fig. 1058—National Coiled Spring Journal Box with Steel Inserts for Passenger Trucks.

Fig. 1059—National Equalizing Wedge and Coiled Spring Journal Box.

National Malleable Castings Company.

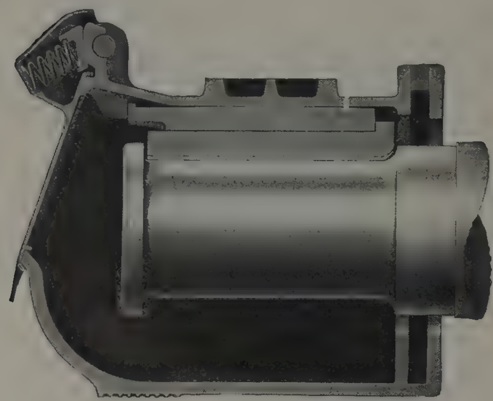


Fig. 1060—Joliet Journal Box and Lid. Joliet Railway Supply Company.

Fig. 1061—Barber Roller Bearing Lateral Motion Journal Box. Standard Car Truck Company.

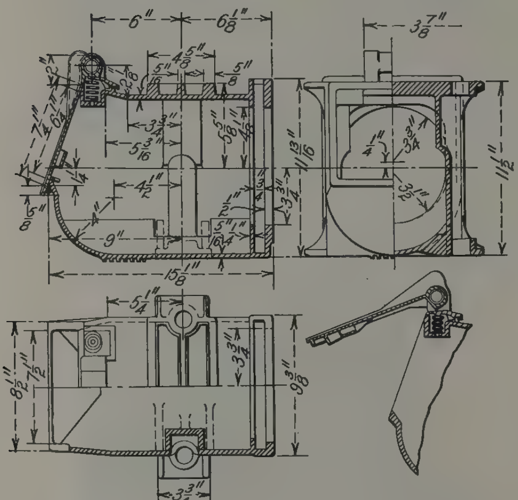


Fig. 1062—Buffalo Journal Box for 5 in. by 9 in. Journals. The Pratt & Letchworth Company.

Fig. 1062-A—Buffalo Journal Box. The Pratt & Letchworth Company.

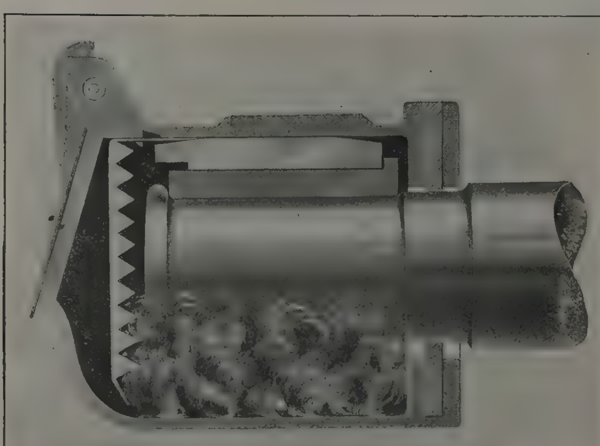


Fig. 1063—Packing Guard in Position in Journal Box. Nuway Packing Guard Company.

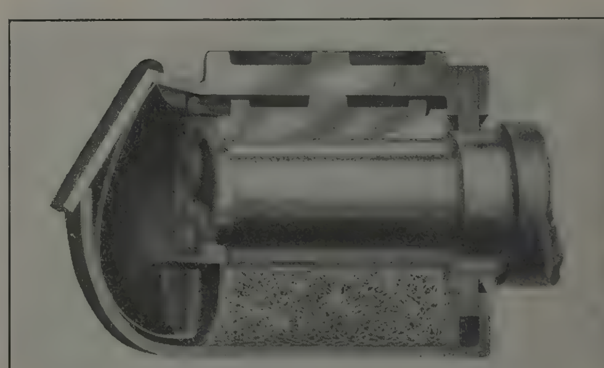


Fig. 1064—Journal Box Waste Check. Ideal Waste Check Company.

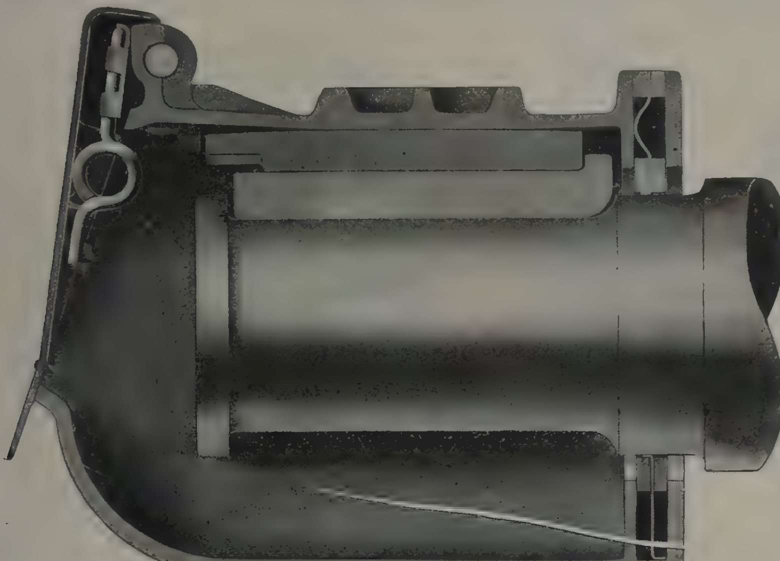


Fig. 1065—Symington Journal Box Equipped with Symington Flexible Dust Guard.

Fig. 1068—Symington Pivot Spring Lid, Spring and Bolt.

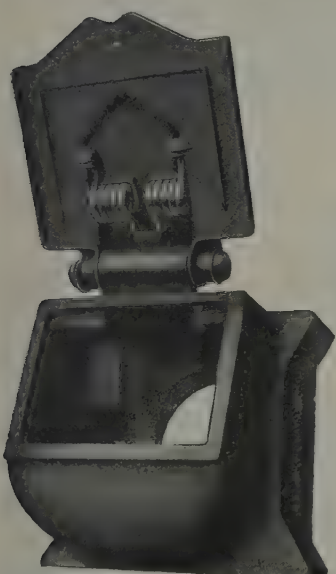


Fig. 1066—Symington M. C. B. Freight Car Journal Box with Torsion Spring Lid.

Fig. 1067 — Symington Malleable Iron Torsion Spring Lid, Spring and Bolt.

Fig. 1069—Symington Flexible Journal Box Dust Guard.

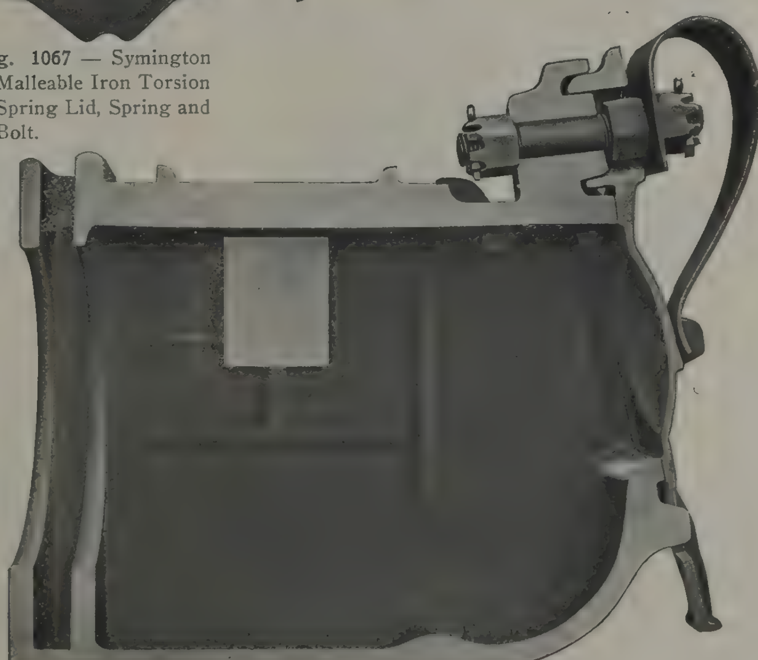


Fig. 1070—Sectional View of Symington Pedestal Truck Journal Box for Passenger and Electric Car Service, with Pivot Lid and Central Spring Pressure.

T. H. Symington Company.

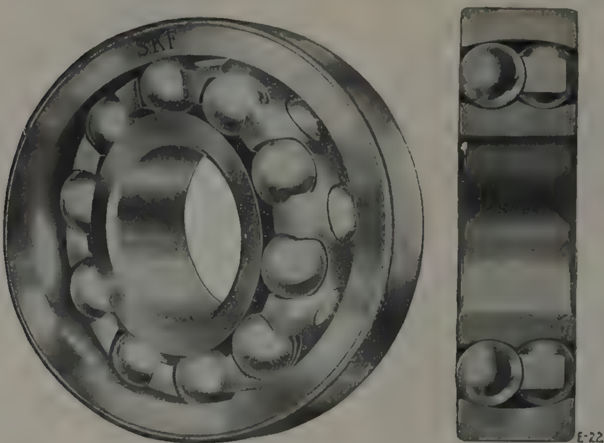


Fig. 1071—S. K. F. Ball Bearings. S. K. F. Ball Bearing Company.

Fig. 1072—Fafnir Roller Bearing. The Fafnir Bearing Company.

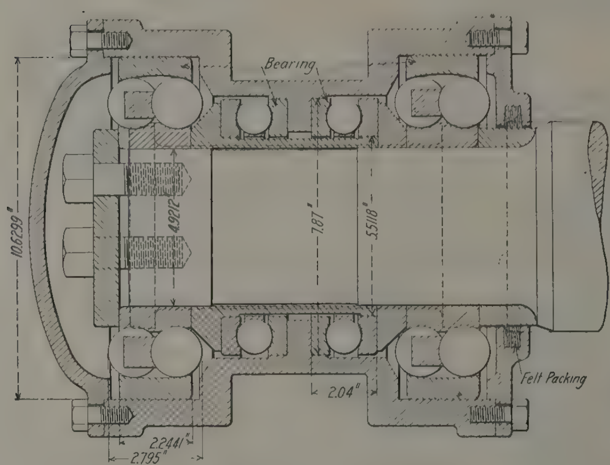


Fig. 1073—Ball Bearing for New York, New Haven & Hartford 5 in. by 9 in. Journal. S. K. F. Ball Bearing Company.

Fig. 1074—Journal Bearing. More-Jones Brass & Metal Company.

Fig. 1075—National Equalizing Wedge. National Malleable Castings Company.

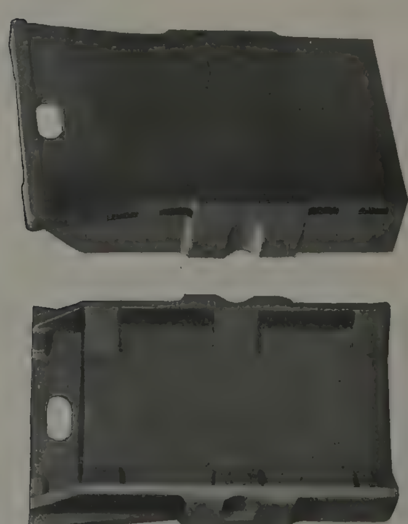


Fig. 1076—Journal Bearing Wedge. National Malleable Castings Company.

Fig. 1077—Perfecto Type Bronze Bearing. Ajax Metal Company.

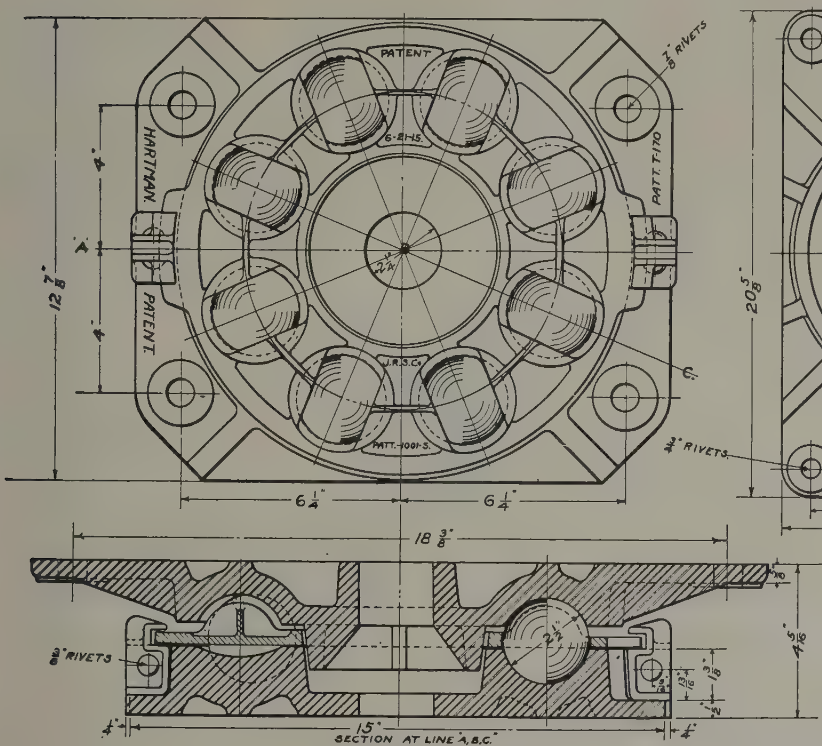


Fig. 1078—Hartman Ball-Bearing Center Plate. Joliet Railway Supply Company.

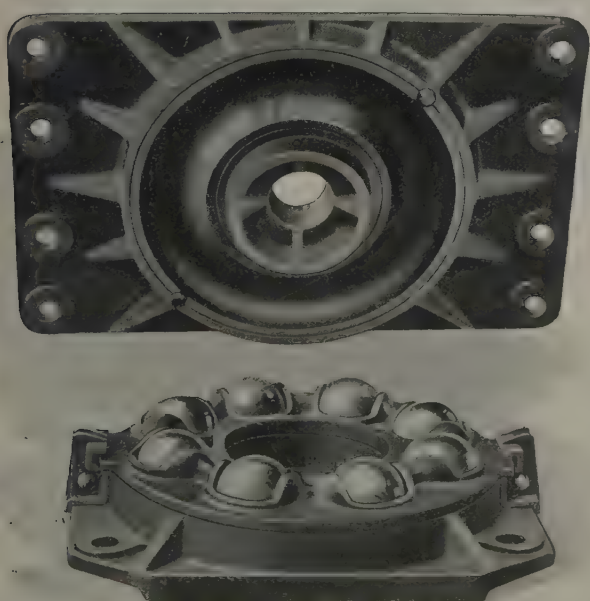


Fig. 1079—Hartman Ball Bearing Center Plate
Joliet Railway Supply Company.

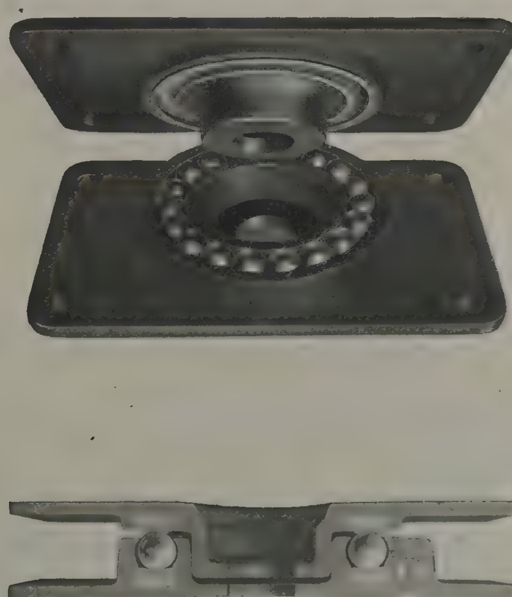


Fig. 1080 Baltimore Ball-Bearing Center Bearing.
T. H. Symington Company.

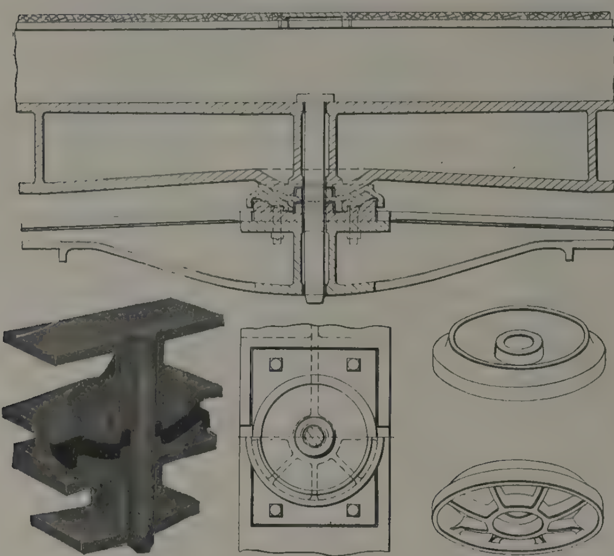


Fig. 1081—Miner Center Plate Shim as Applied to Passenger Equipment with Six-Wheel Trucks. W. H. Miner.

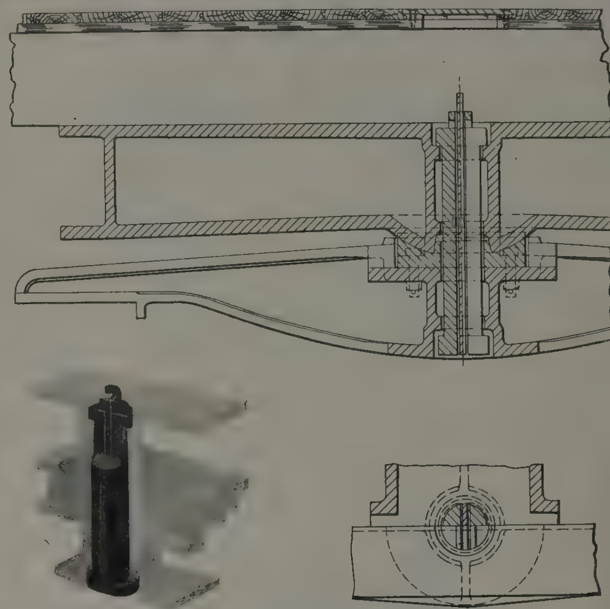


Fig. 1082—Coleman Bolster-Locking Center Pin. W. H. Miner.

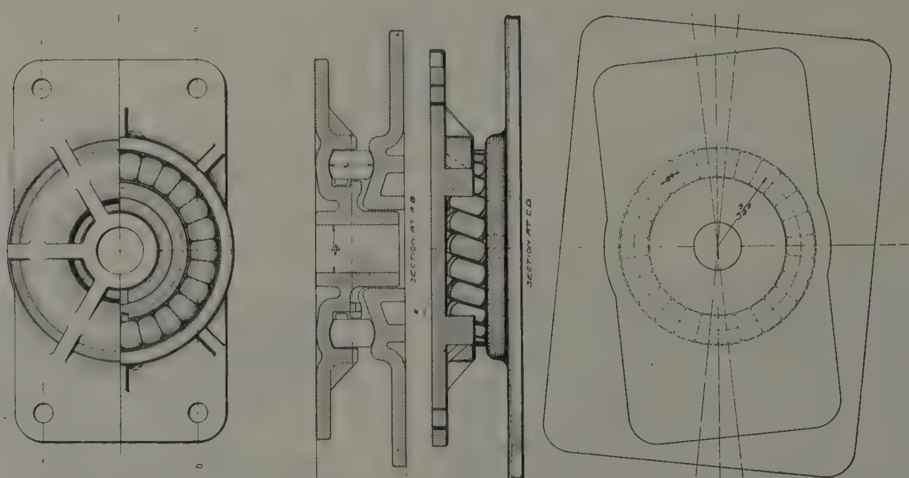


Fig. 1083—General Arrangement of 12 in. Roller Center Plate. Edwin S. Woods & Company.

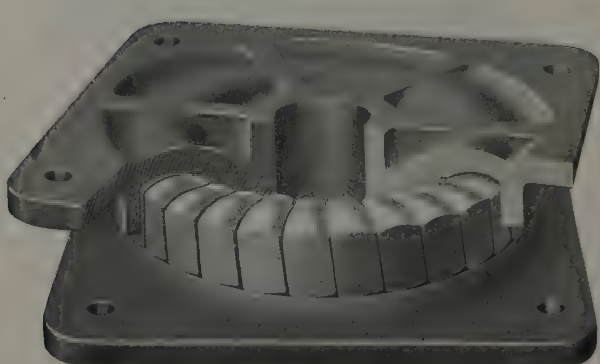


Fig. 1084—Roller Center Plate. Diameter of Roller Circle, 12 in.; Number of Rollers, 40; Diameter, 2¼ in.; Length, 3¼ in. Edwin S. Woods & Company.

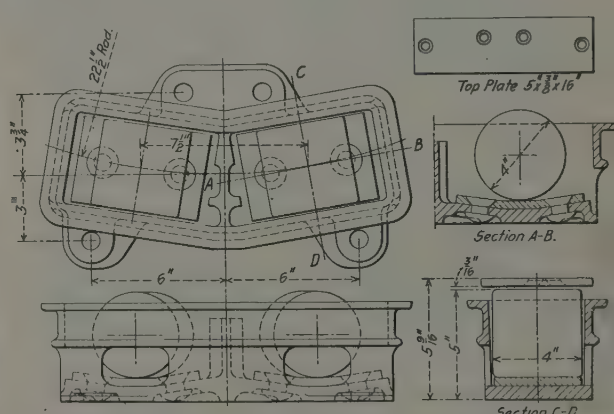


Fig. 1085—Stucki Two-Roller Type Side Bearing. A. Stucki Company.

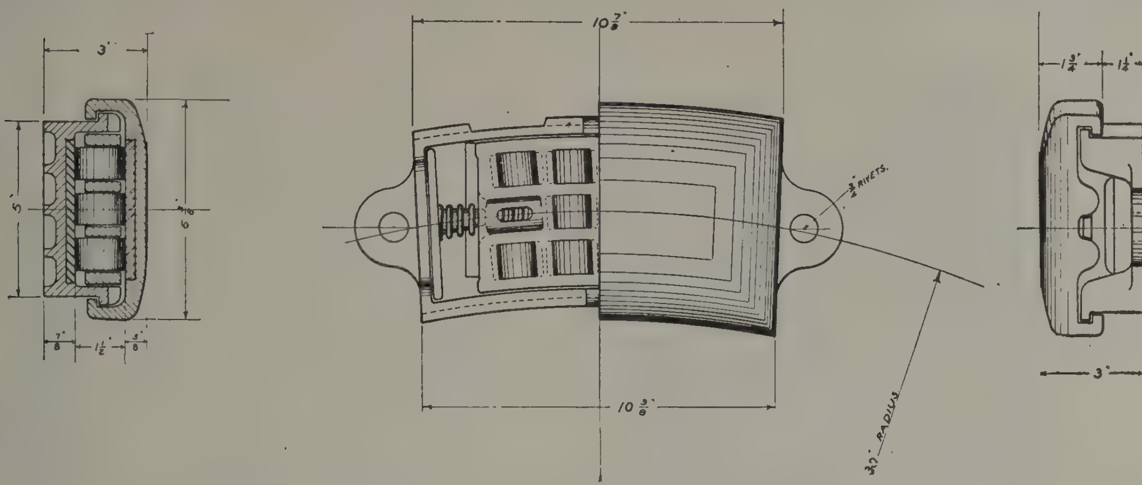


Fig. 1086—Perry Side Bearing No. 20 for 50-Ton Cars. Joliet Railway Supply Company.

Fig. 1087—Perry Roller Side Bearing for 50-Ton Capacity Freight Cars. Joliet Railway Supply Company.

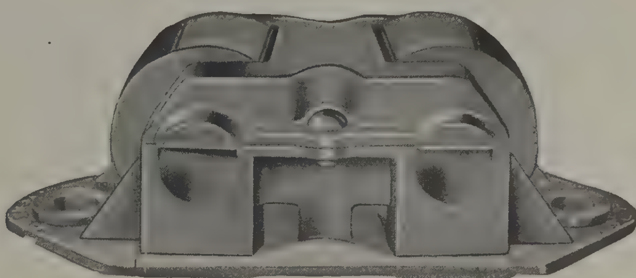


Fig. 1088—Barber Roller Side-Bearing for Freight Cars. Standard Car Truck Company.

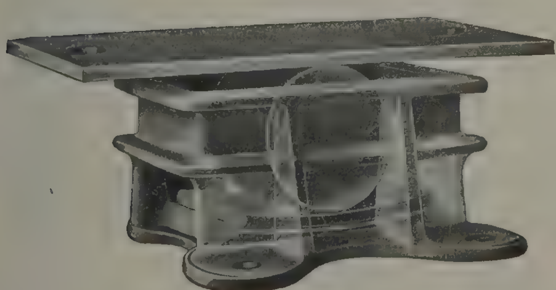


Fig. 1089—Stucki Side Bearing. A. Stucki Company.

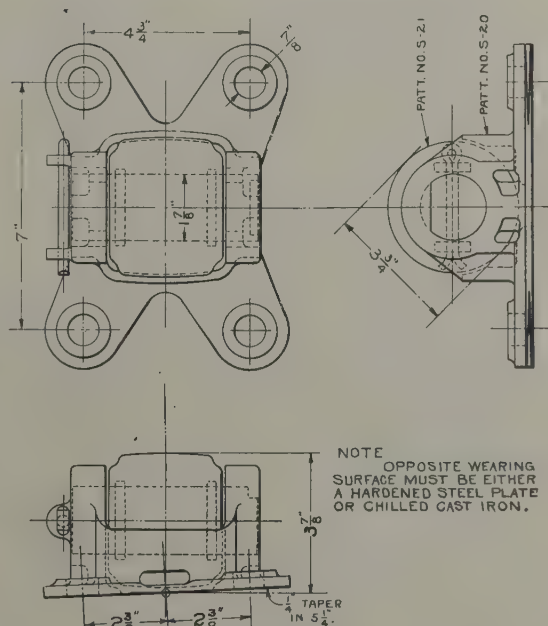


Fig. 1090—Economy Single Roller Side Bearing. Chicago Railway Equipment Company.

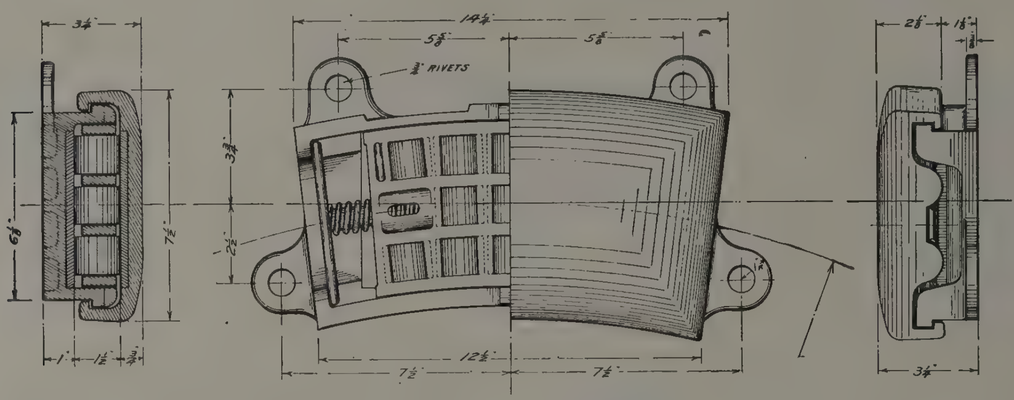


Fig. 1091—Perry Side Bearing No. 12 E for 100-Ton Capacity Cars.

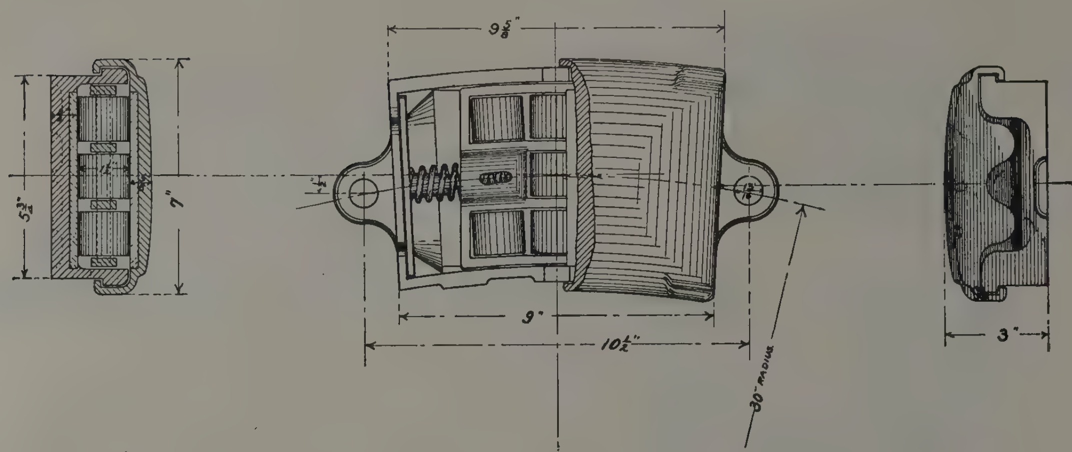


Fig. 1092—Perry Freight Side Bearing No. 8-s.

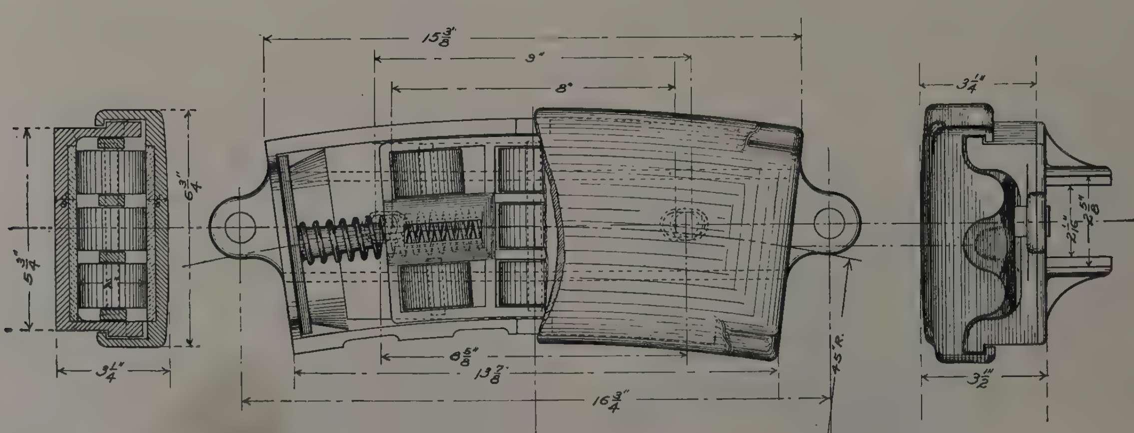


Fig. 1093—Perry No. 10 Passenger Car Side Bearing. For Six-Wheel Trucks.

Joliet Railway Supply Company.

Fig. 1094—Perry Roller Side Bearing for 70 and 100-Ton Capacity Freight Cars.

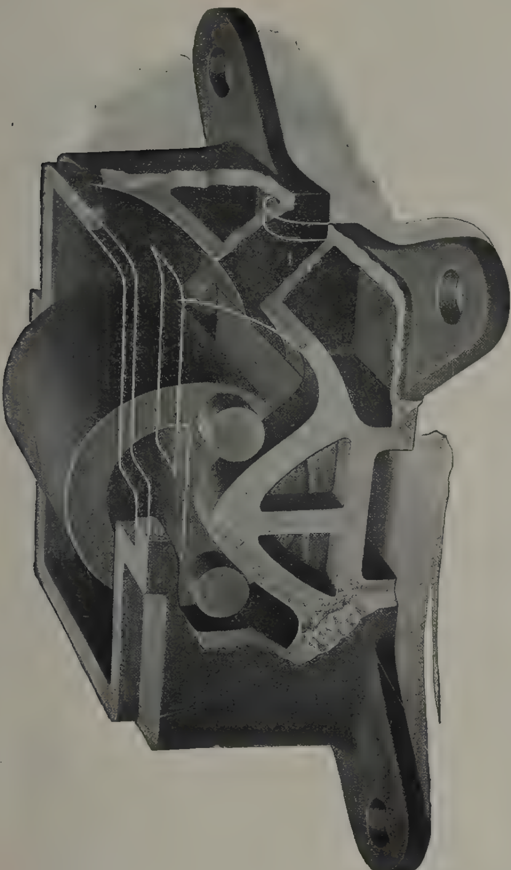


Fig. 1095—Peerless Roller Side Bearing.

Fig. 1096—Burry Double Rocker Side Bearing.

Fig. 1097—Perry Roller Side Bearing No. 10 for Six-Wheel Passenger Trucks.

Joliet Railway Supply Co.

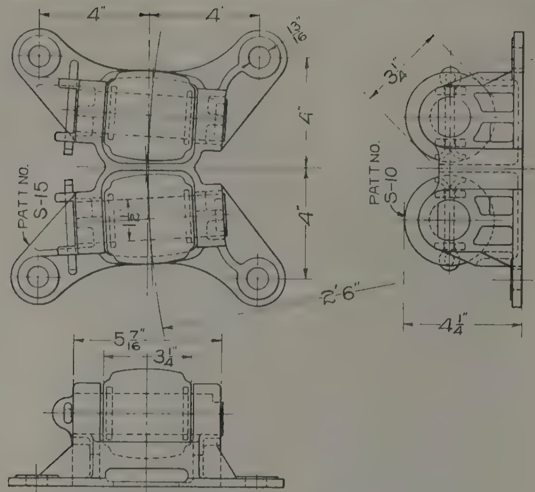


Fig. 1098—Economy Roller Side Bearing for New York Central Lines.

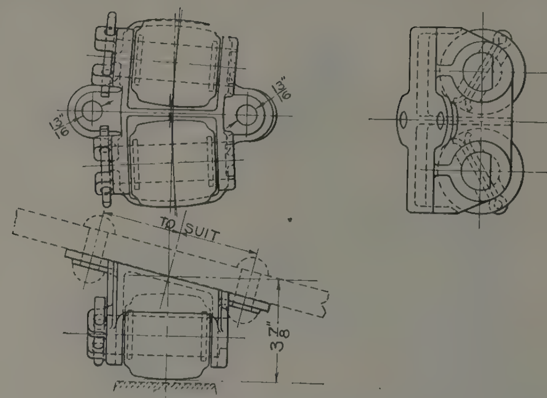


Fig. 1099—Economy Inverted Style Roller Side Bearing for Freight Service.

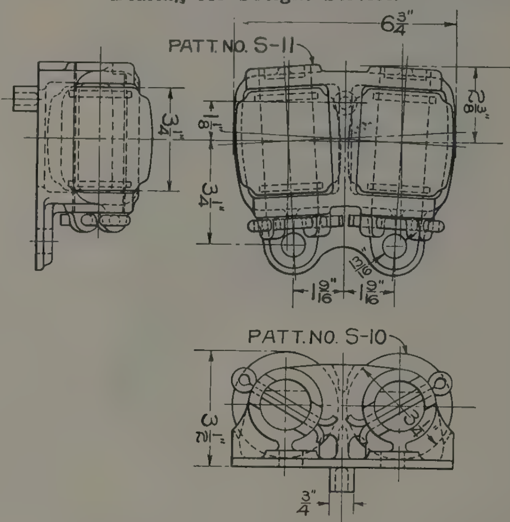


Fig. 1101—Economy Double Roller Side Bearing for Freight Service.

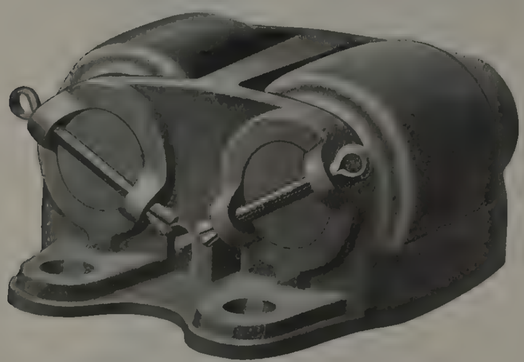


Fig. 1100—Economy Roller Side Bearing.

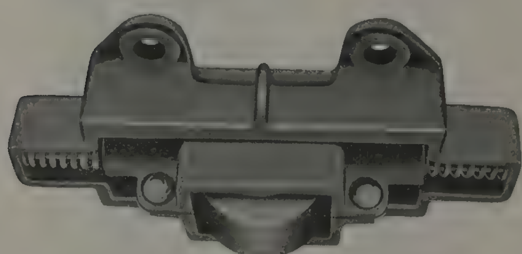


Fig. 1102—Drexel Roller Side Bearing.

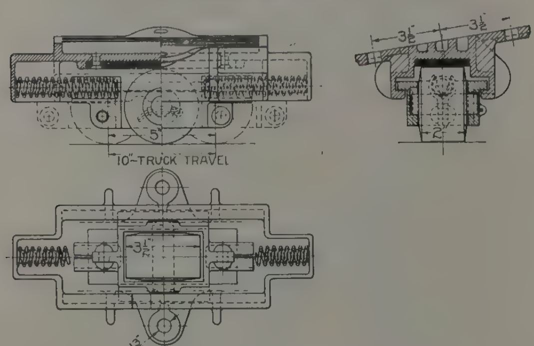


Fig. 1103—Drexel Single Roller Side Bearing for Freight Service.

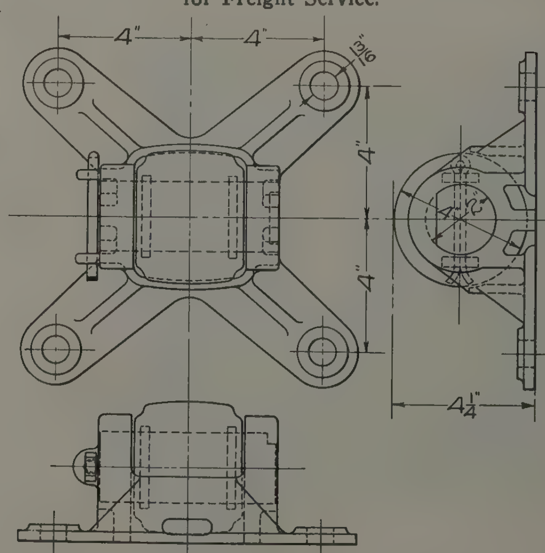


Fig. 1104—Economy Single Roller Side Bearing for Freight Service.

Chicago Railway Equipment Company.

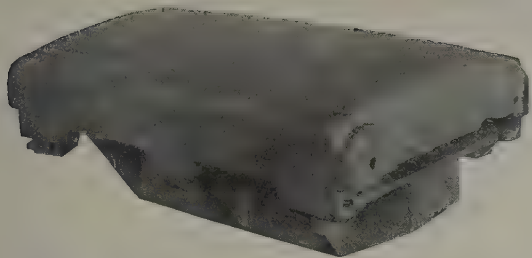


Fig. 1105—Creco Covered Roller Side Bearing.

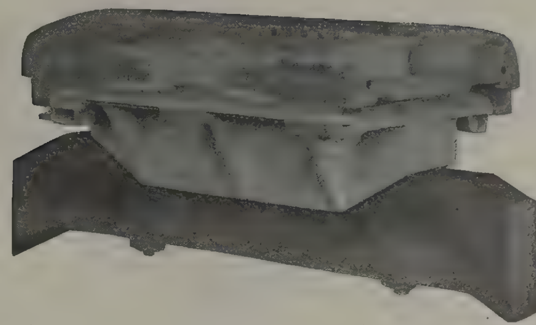


Fig. 1106—Creco Covered Roller Side Bearing Applied to Bearing Bridge of Six-Wheel Truck.

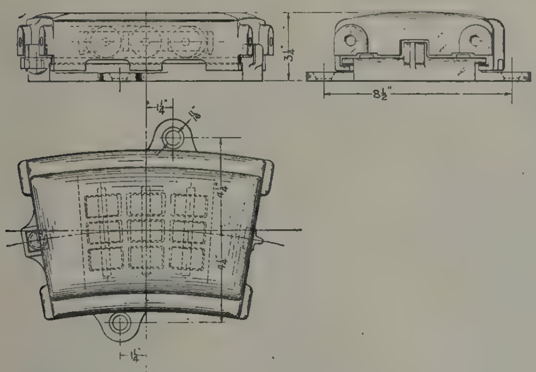


Fig. 1107—Creco Covered Roller Side Bearing for Freight Car Trucks.

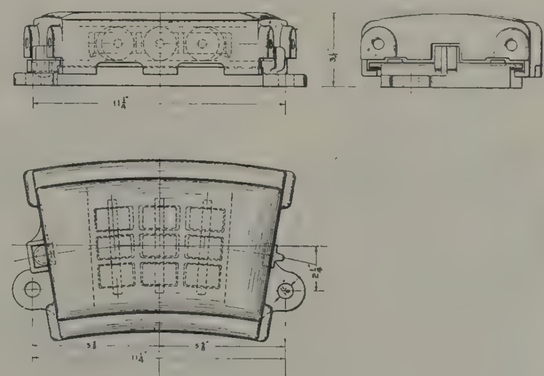


Fig. 1108—Creco Covered Roller Side Bearing for Four-Wheel Passenger Train Car Trucks.

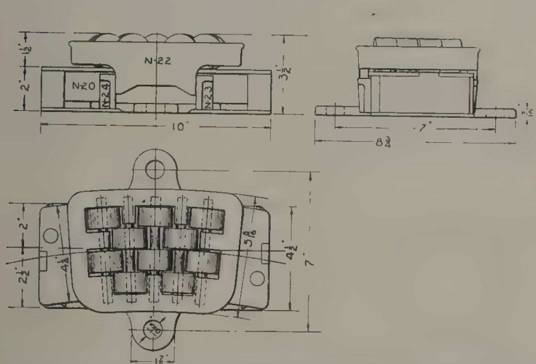


Fig. 1109—Creco Roller Side Bearing for Freight Cars.

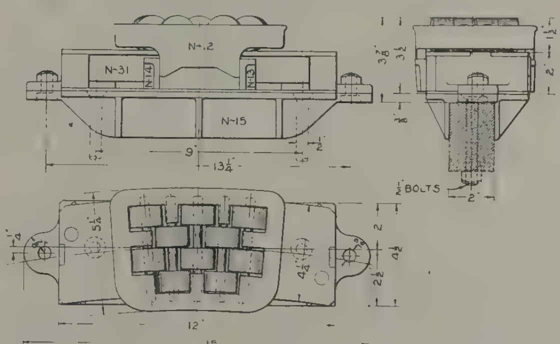


Fig. 1110—Creco Roller Side Bearing No. 7-A for Six-Wheel Passenger Train Car Trucks.

Fig. 1111—Creco Roller Side Bearing No. 4-A for Four-Wheel Passenger Train Car Trucks.

Chicago Railway Equipment Company.

Fig. 1112—Universal Rocker Side Bearing.
Universal Draft Gear Attachment Company.

Fig. 1113—Side Plate of Carrier for Universal Rocker Side Bearing.
Universal Draft Gear Attachment Company.

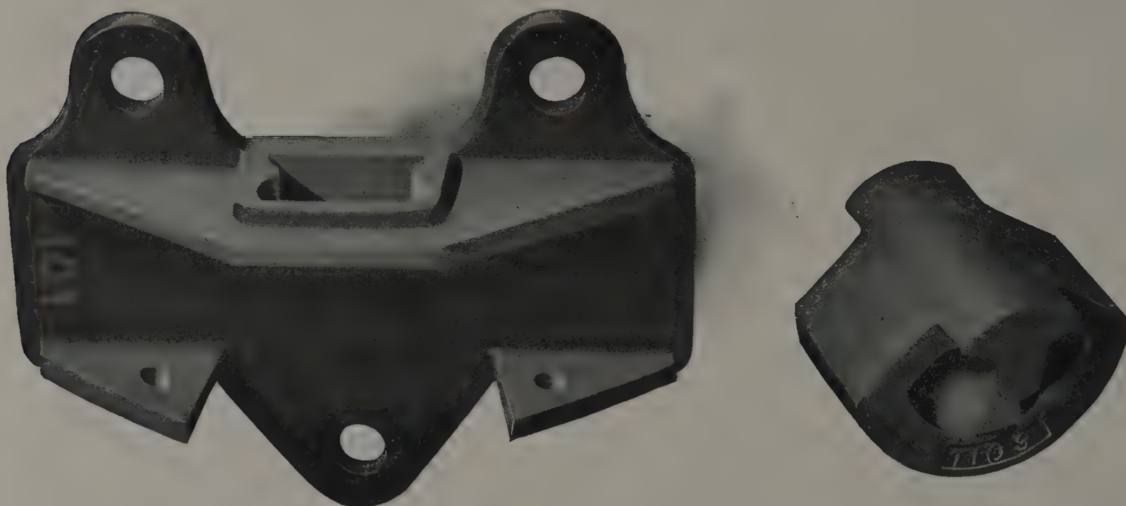


Fig. 1114—Rocker Carrier and Rocker for Universal Rocker Side Bearing.
Universal Draft Gear Attachment Company.

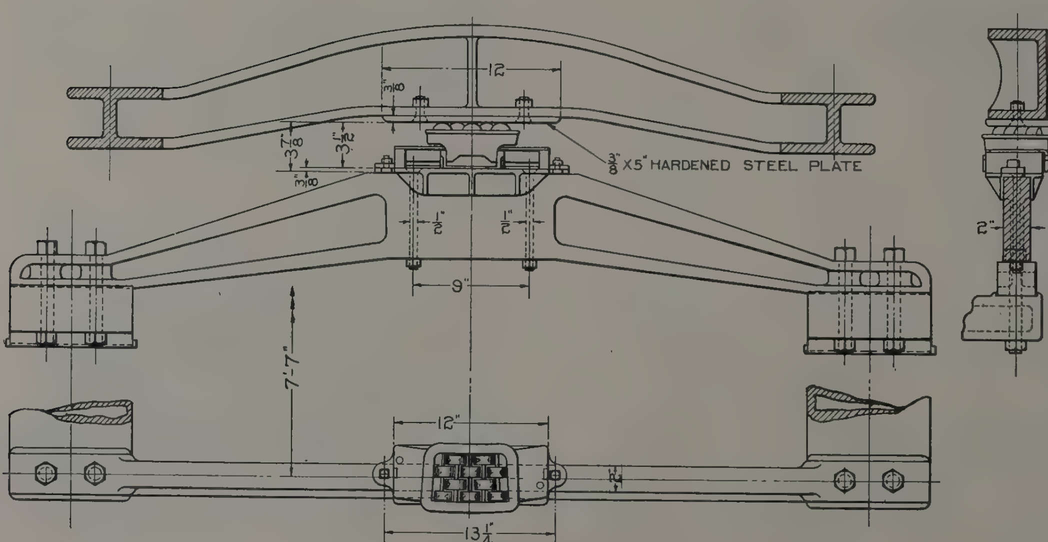


Fig. 1115—Creco Roller Side Bearing Applied to Bearing Bridge of Six-Wheel Truck.
Chicago Railway Equipment Company.

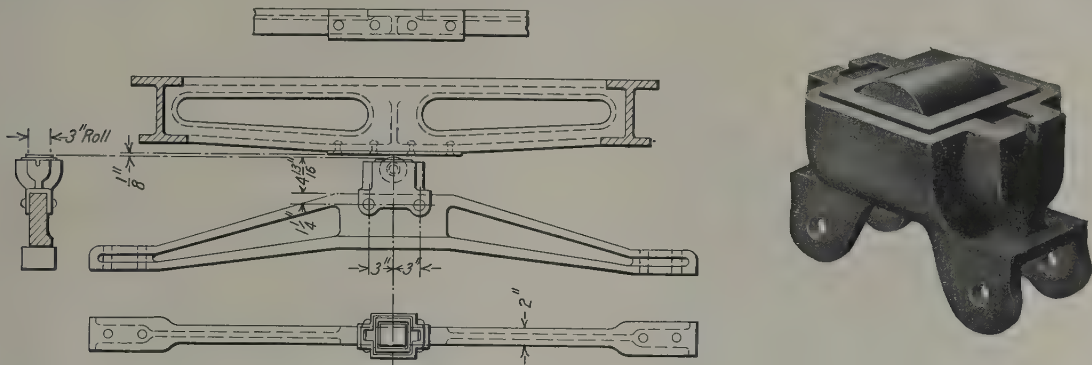


Fig. 1116—Miner Single Roller Side Bearing as Applied to Passenger Equipment Six-Wheel Trucks. W. H. Miner.

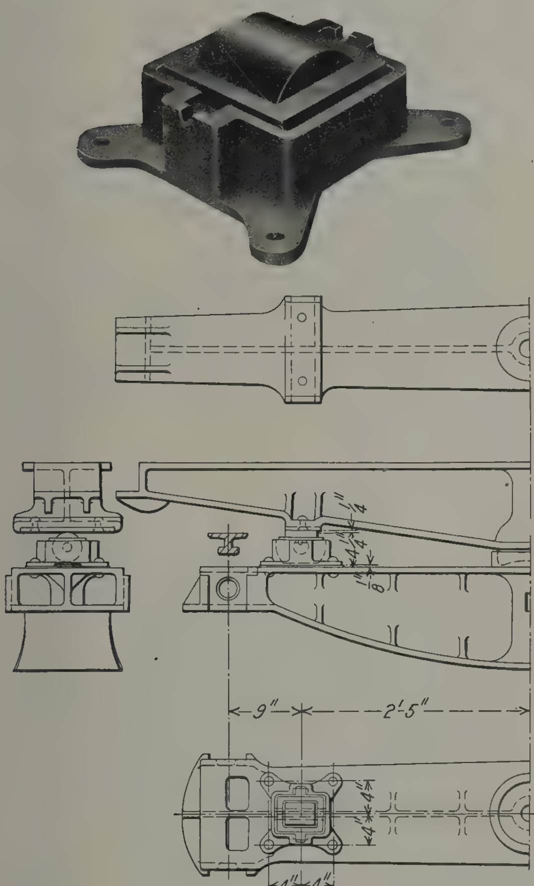


Fig. 1117—Miner Single Roller Side Bearing as Applied to Truck Bolsters for Freight Equipment. W. H. Miner.

Fig. 1121—Self-Centering Roller Side-Bearing. Wine Railway Appliance Company.

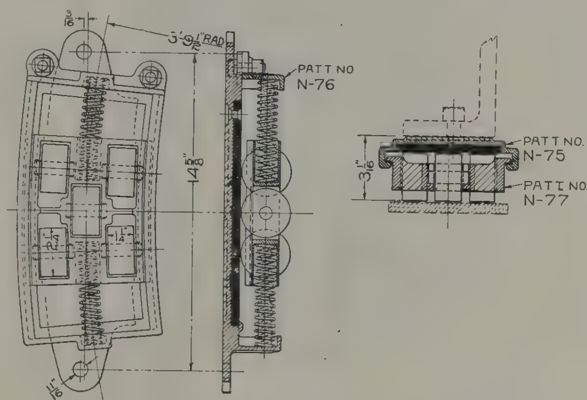


Fig. 1118—Drexel Five-Roller Side Bearing for Passenger Service. Chicago Railway Equipment Company.

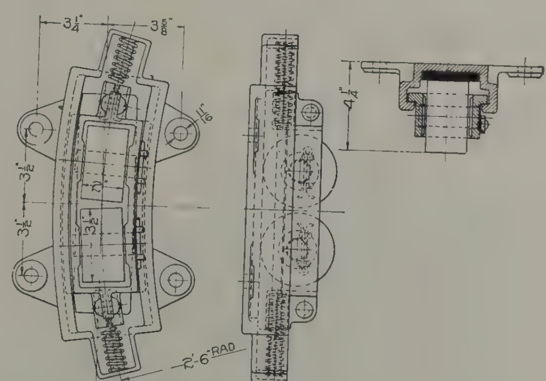


Fig. 1119—Drexel Double Roller Side Bearing for Freight and Passenger Service. Chicago Railway Equipment Company.

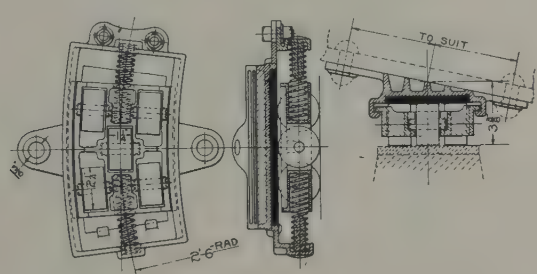


Fig. 1120—Drexel Five-Roller Side Bearing for Freight Service. Chicago Railway Equipment Company.

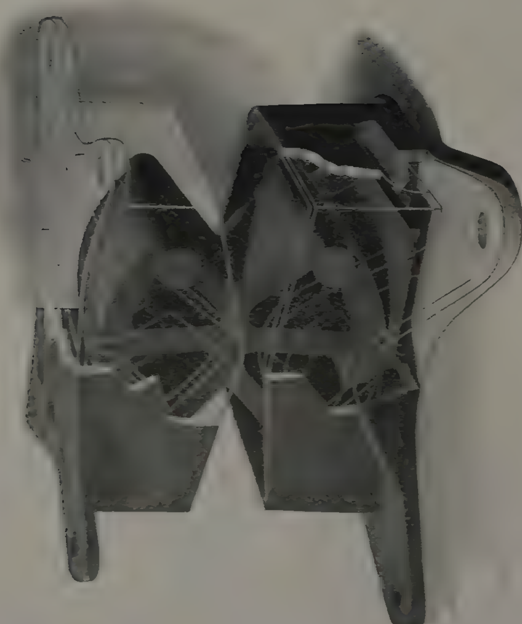


Fig. 1122—Burry Single Rocker Side Bearing.
Joliet Railway Supply Company.

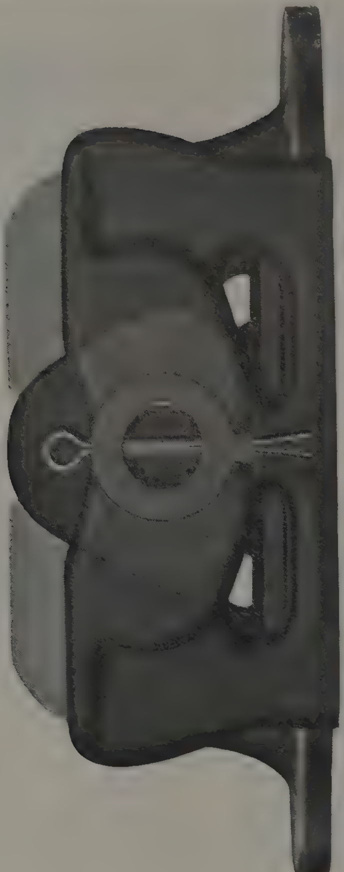


Fig. 1123—Wine Roller Bearing in Central Position and (in phantom) Extreme Positions.
The Wine Railway Appliance Company.

Fig. 1124—"XL" Roller Side Bearing for Application to Truck Bolster.
Edwin S. Woods & Company.

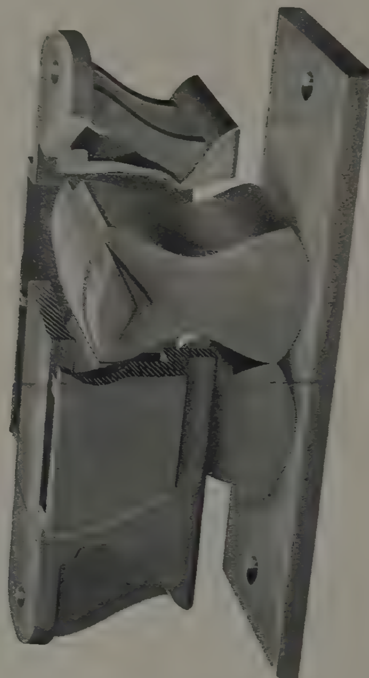


Fig. 1125—Tip-Roller Side Bearing for Application to Body Bolster.
Edwin S. Woods & Company.

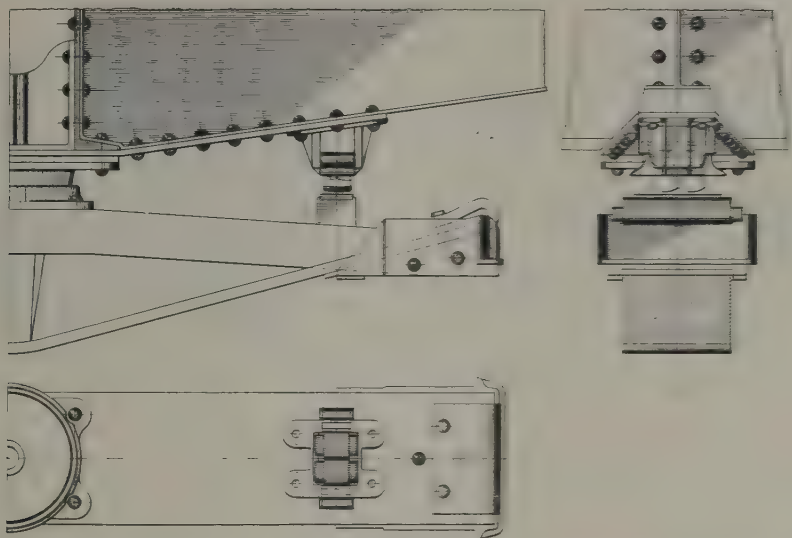


Fig. 1126—Tip Roller Side Bearing Applied to 50-Ton Capacity Freight Car. Edwin S. Woods & Company.

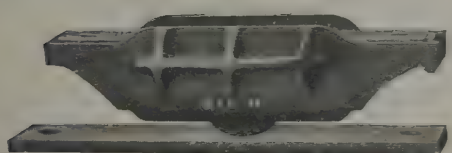


Fig. 1127—Passenger Train Car Side Bearing. Edwin S. Woods & Company.

Fig. 1128—Parts of Single Roller Side Bearing for Freight Cars. Edwin S. Woods & Company.

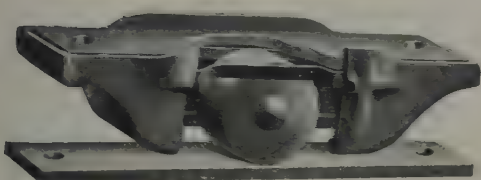


Fig. 1129—Passenger Train Car Side Bearing Showing Roller and Springs. Edwin S. Woods & Company.

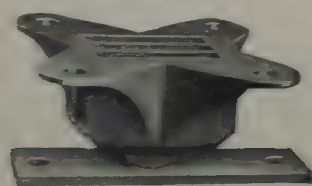


Fig 1130—Single Roller Side Bearing for Freight Cars. Edwin S. Woods & Company.

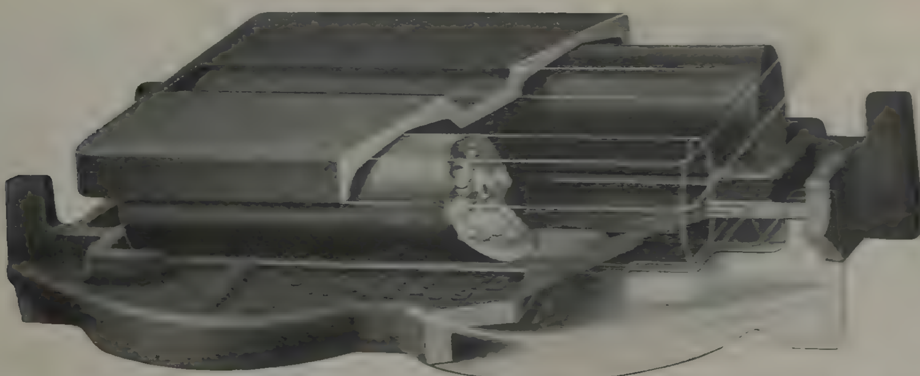


Fig. 1131—Lateral Motion Combined 40-Ton Roller Seat and Spring Cap. Standard Car Truck Company.

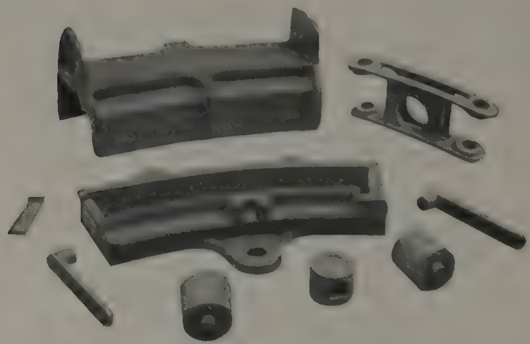


Fig. 1132—Parts of Susemihl Side Bearing.

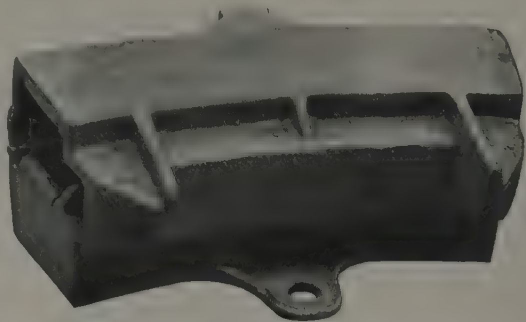


Fig. 1133—Susemihl Side Bearing for Four-Wheel Passenger Train Car Trucks.

Fig. 1134—Susemihl Side Bearing for Six-Wheel Passenger Train Car Trucks.

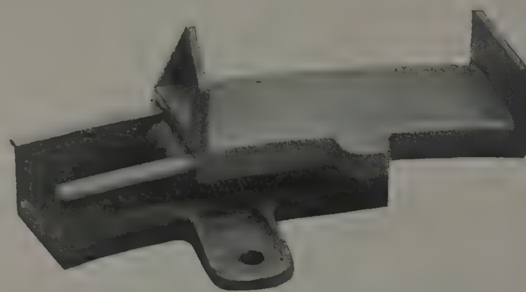


Fig. 1135—Susemihl Side Bearing for Freight Car Trucks.

Fig. 1136—Susemihl Side Bearing with Top Removed.

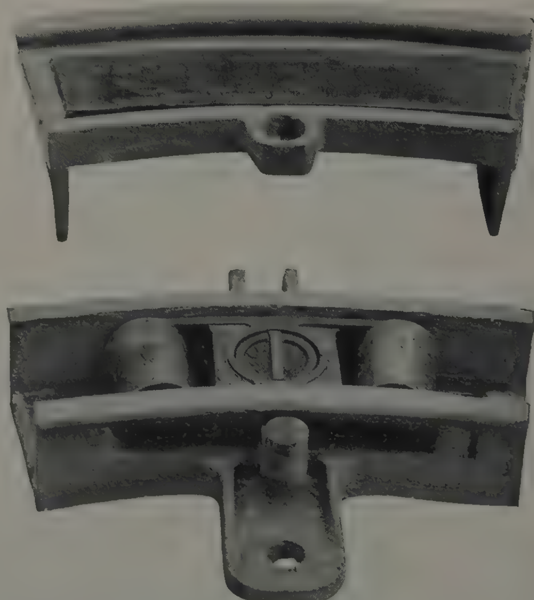


Fig. 1137—Susemihl Side Bearing for Freight Car Trucks, with Top Removed.

American Steel Foundries.

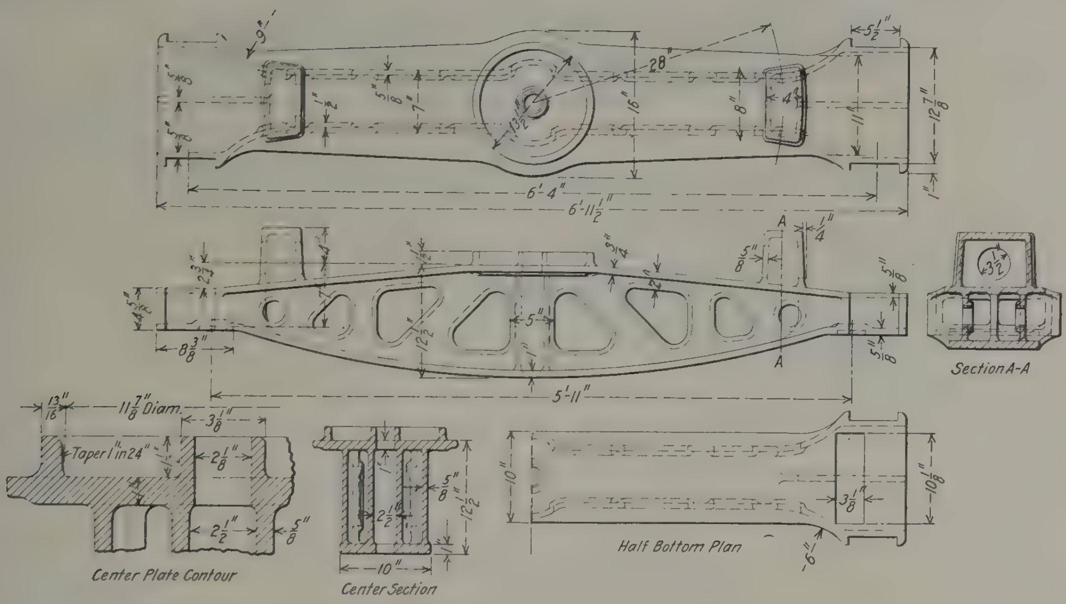


Fig. 1138—Cast Steel Truck Bolster. Pittsburgh Steel Foundry Company.

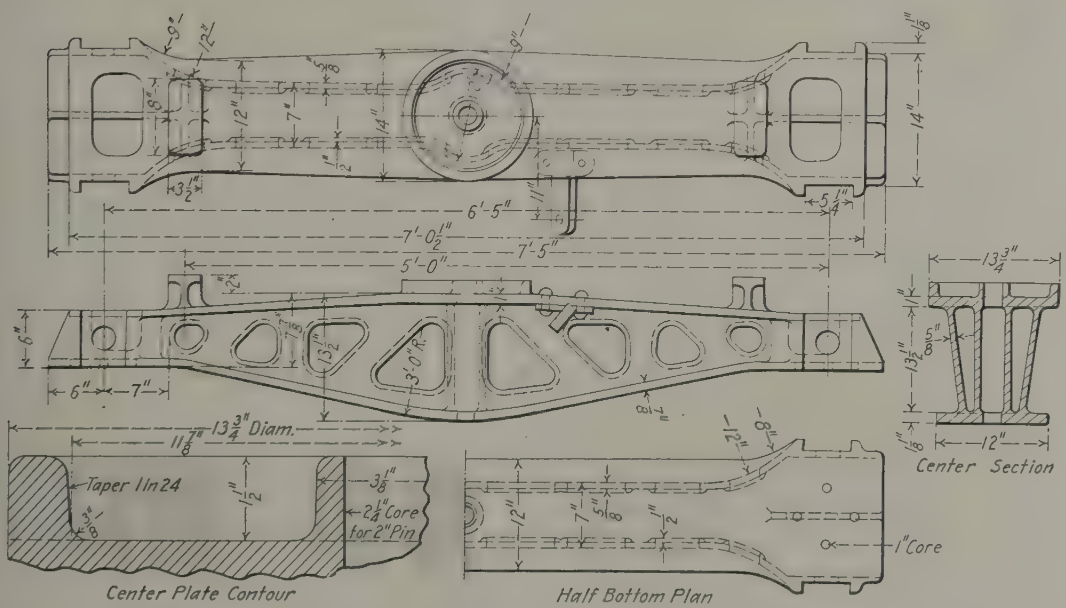


Fig. 1139—Cast Steel Truck Bolster. Pittsburgh Steel Foundry Company.

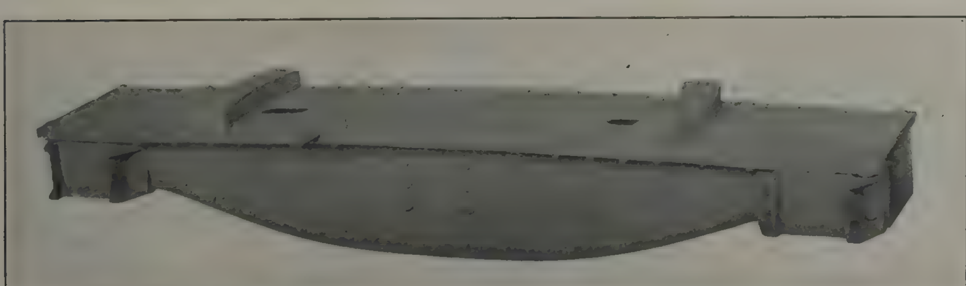


Fig. 1140—Truck Bolster for 70-Ton Capacity Car. Pressed Steel Car Company.

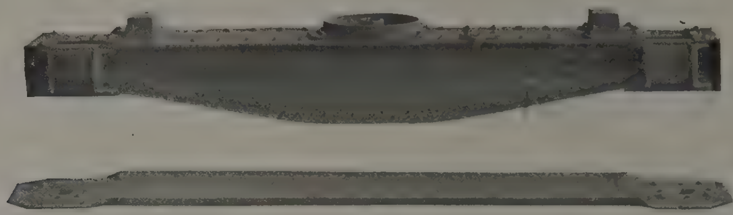


Fig. 1141—Bettendorf Truck Bolster and Spring Plank for Freight Cars. Bettendorf Axle Company.

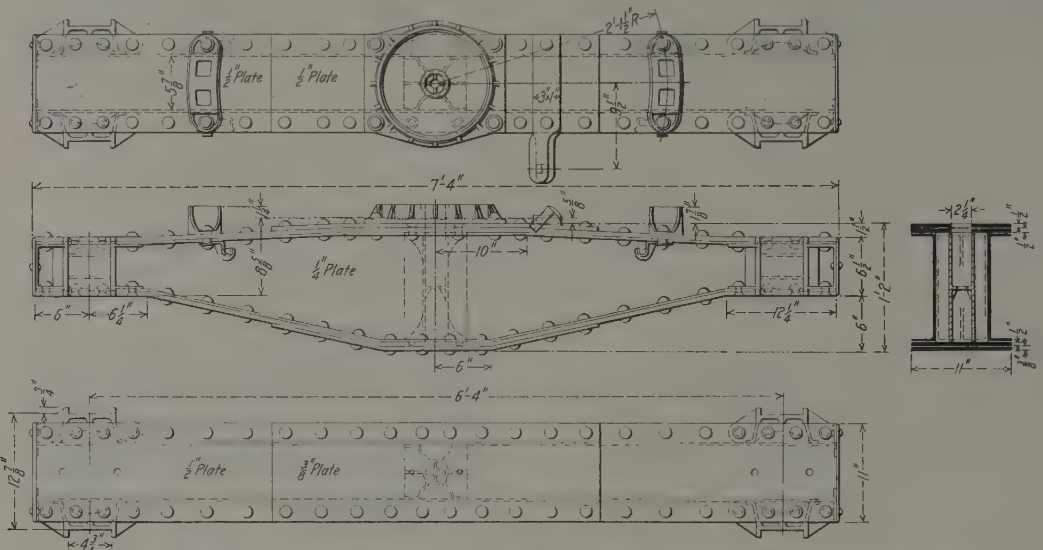


Fig. 1142—Standard Truck Bolster for 40-Ton Capacity Cars. American Car & Foundry Company.

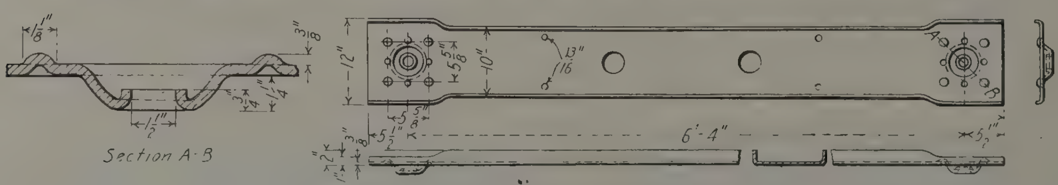


Fig. 1143—Scullin Equalized Spring Plank. Scullin Steel Company.

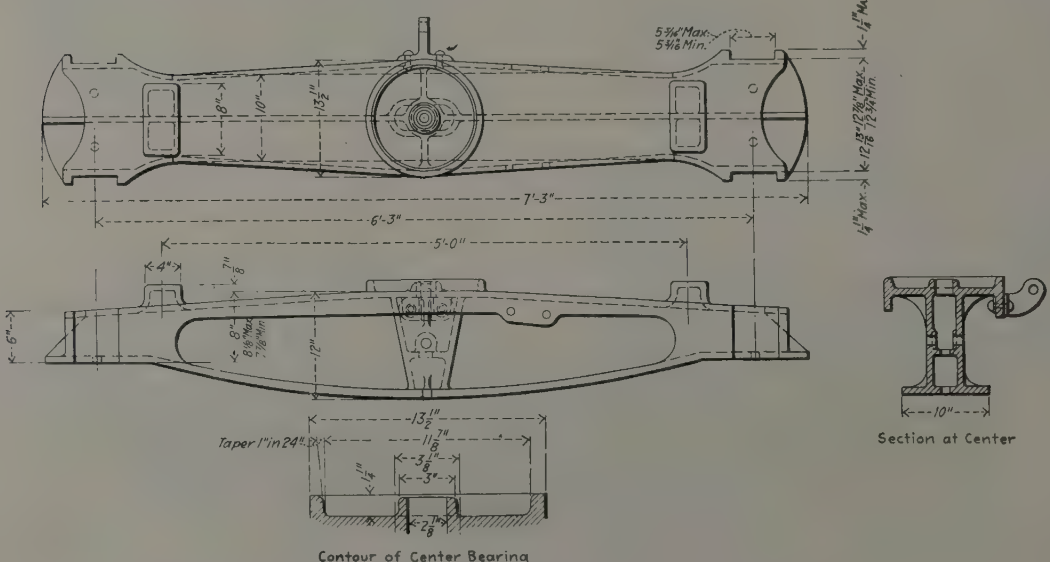


Fig. 1144—Cast Steel Truck Bolster. Scullin Steel Company.

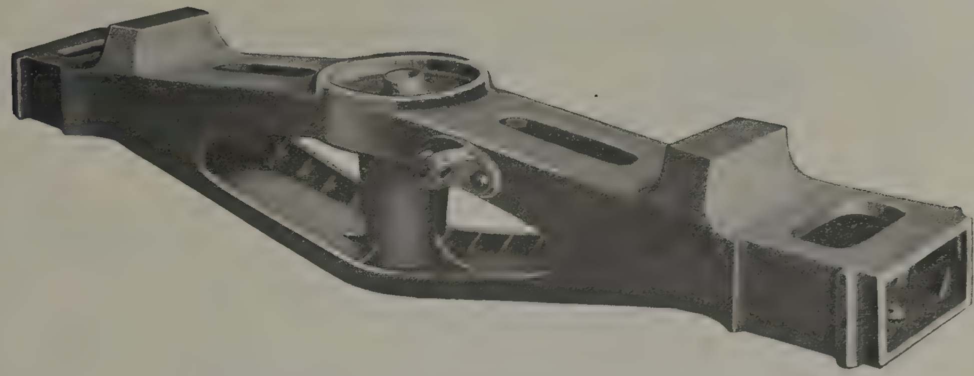


Fig. 1145—Buckeye Cast Steel Truck Bolster for Freight Cars. Buckeye Steel Castings Company.

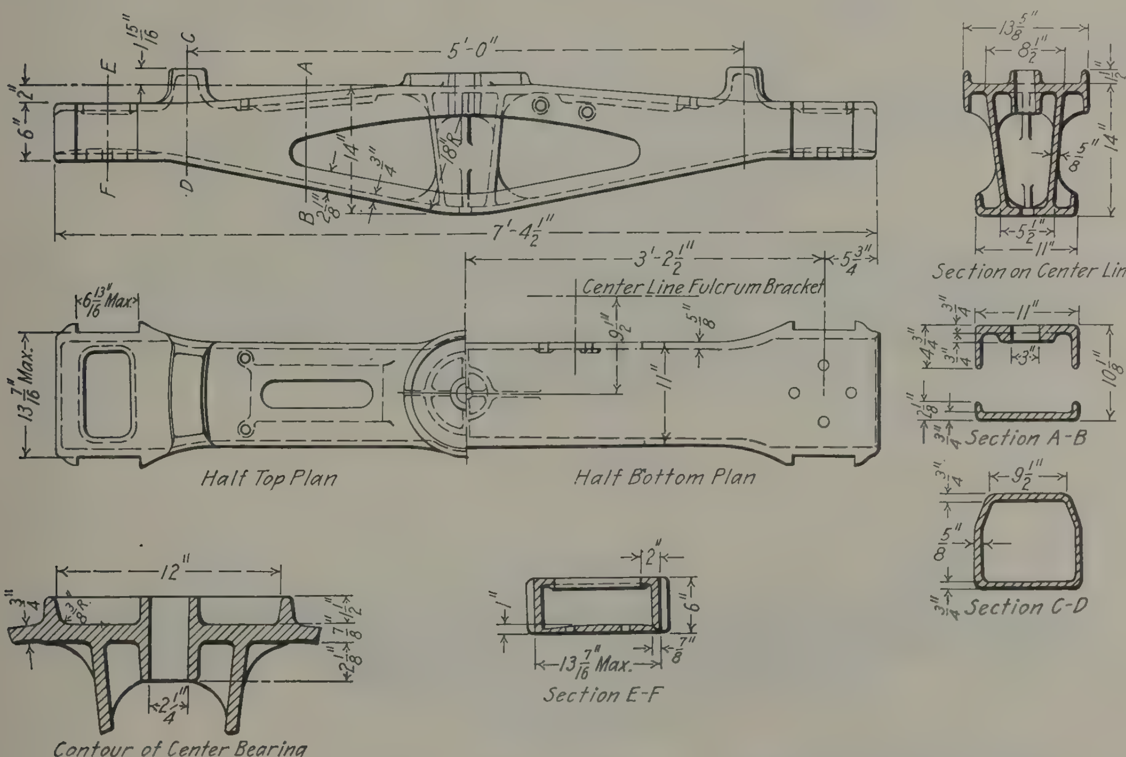


Fig. 1146—Truck Bolster for 50-Ton Capacity Freight Cars. Buckeye Steel Castings Company.

Fig 1147—Buckeye Cast Steel Truck Bolster for Freight Cars. Buckeye Steel Castings Company.

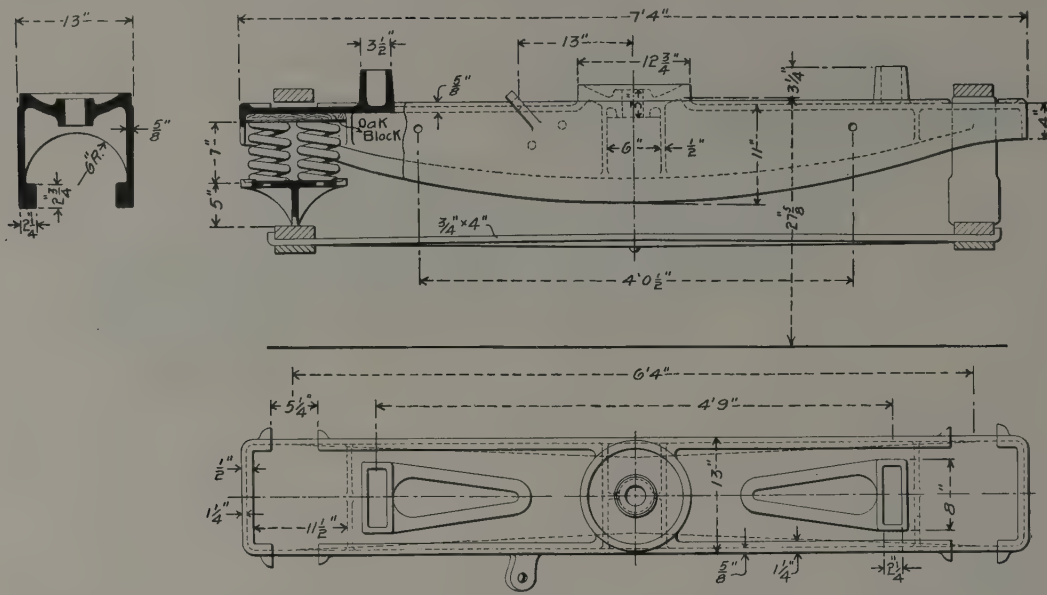


Fig. 1148—Cast Steel Truck Bolster for Freight Cars. American Steel Foundries.

Fig. 1149—Box Shape Cast Steel Truck Bolster for Freight Cars. American Steel Foundries.

Fig. 1150—T-Shape Cast Steel Truck Bolster for 30 to 50-Ton Capacity Freight Cars. American Steel Foundries.

Fig. 1151—I-Shape Cast Steel Truck Bolster for 30 to 40-Ton Capacity Freight Cars. American Steel Foundries.

Fig. 1152—Simplex Truck Bolster for 40-Ton Capacity Freight Cars. American Steel Foundries.

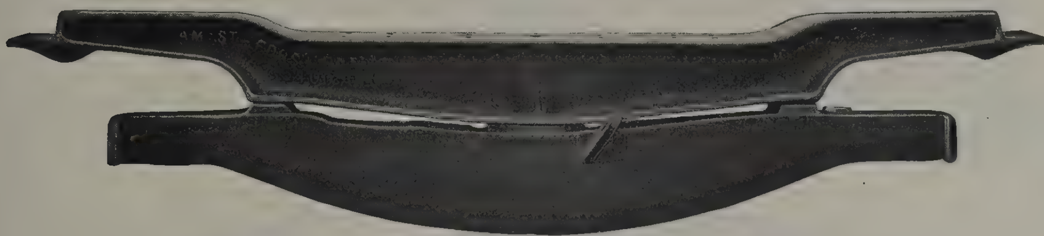


Fig. 1153—Cast Steel Truck and Body Bolsters for Freight Cars. American Steel Foundries.
Note.—For Other Views of Body and Truck Bolsters Combined See Body Bolsters.

Fig. 1154—Empire Truck Bolster for Freight Cars. National Railway Appliance Company.

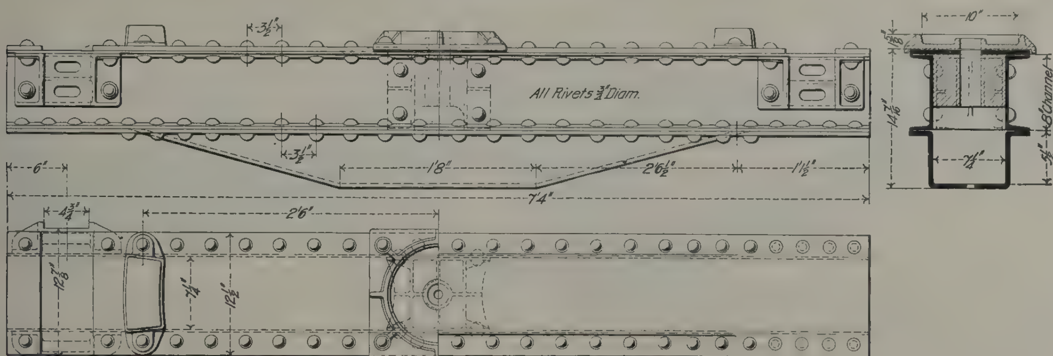


Fig. 1155—Monitor Truck Bolster for 40-Ton Capacity Freight Cars.
Chicago Railway Equipment Company.

Fig. 1156—Monitor Truck Bolster with Creco Roller Side Bearings for Freight Cars.
Chicago Railway Equipment Company.

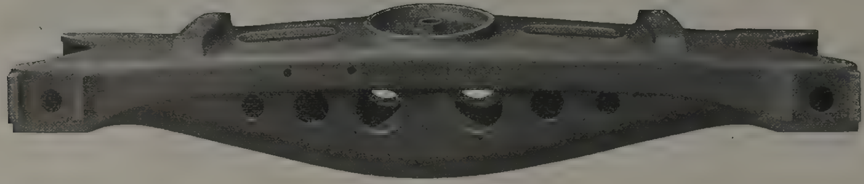


Fig. 1157—Gould Improved Z-Type Cast Steel Truck Bolster for Freight Cars. Gould Coupler Company.

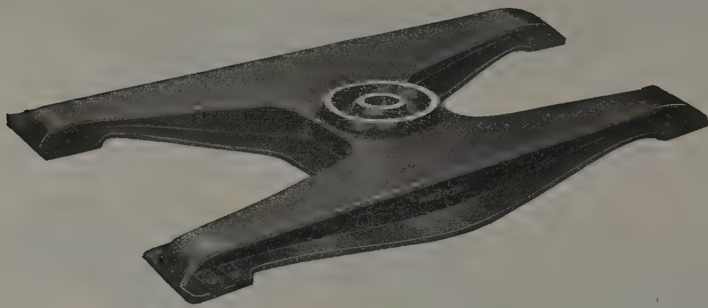


Fig. 1158—Commonwealth Cast Steel Bolster for Six-Wheel Passenger Train Car Truck. Commonwealth Steel Company.

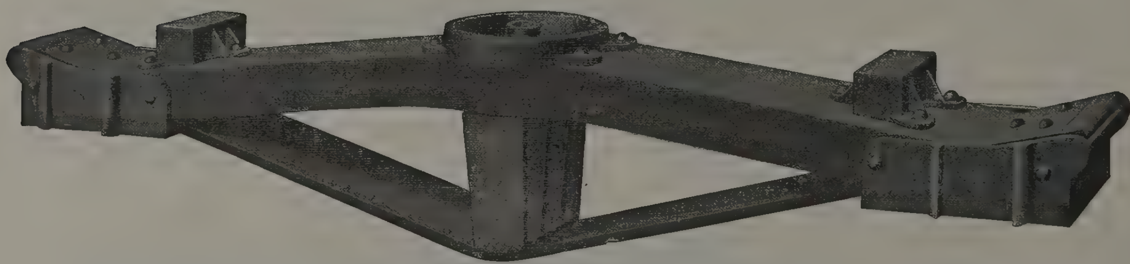


Fig. 1159—Huntoon Truck Bolster for 30, 40, 50 and 70-Ton Capacity Freight Cars. Plain Side Bearings. Joliet Railway Supply Company.

Fig. 1160—Huntoon Truck Bolster with Peerless Side Bearings for 30, 40, 50 and 70-Ton Capacity Freight Cars. Joliet Railway Supply Company.

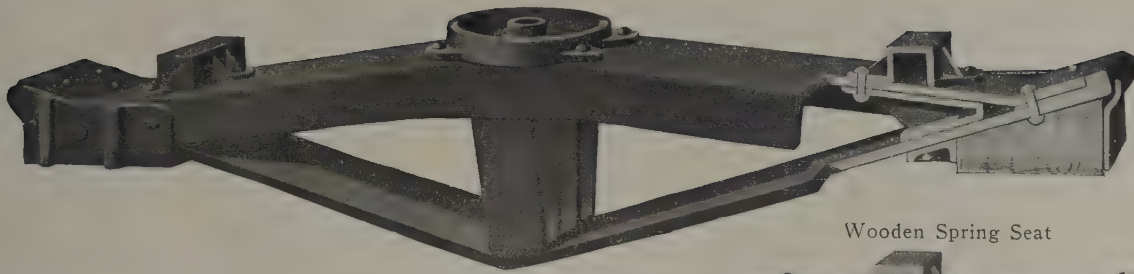
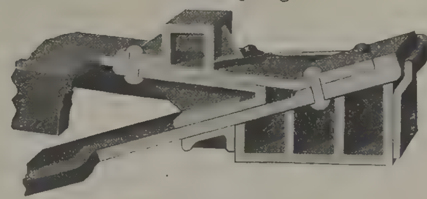


Fig. 1161—Huntoon Truck Bolster Showing End Construction.



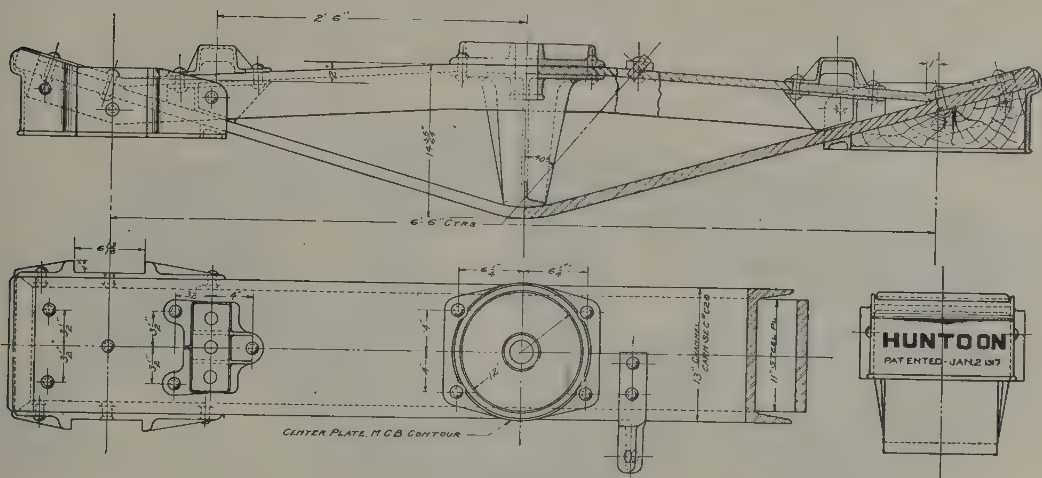


Fig. 1162—Huntoon Truck Bolster for 75-Ton Capacity Freight Cars.

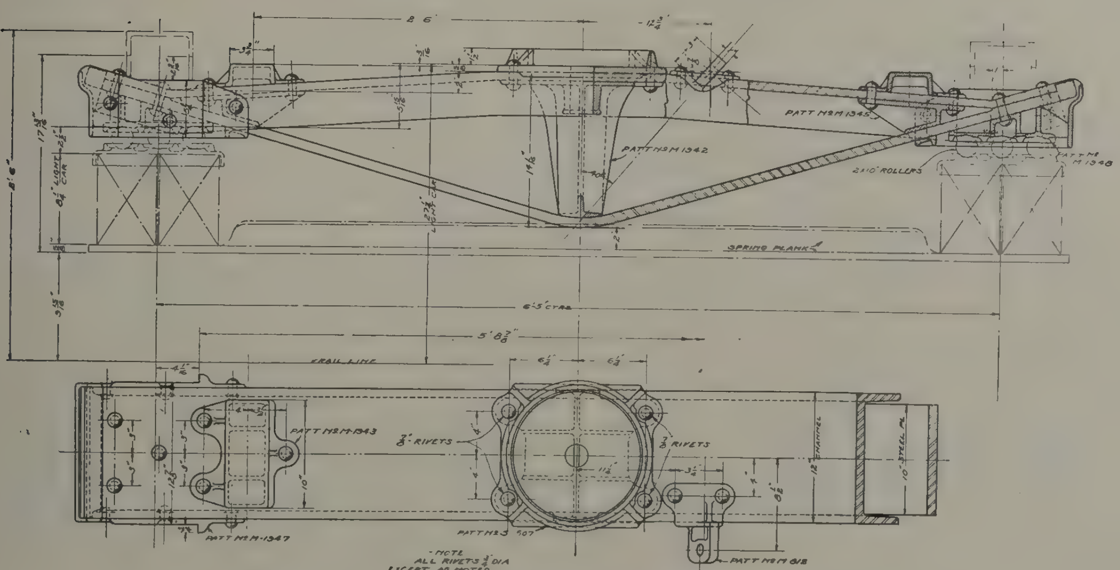


Fig. 1163—Huntoon Truck Bolster for 50-Ton Capacity Freight Cars.

Joliet Railway Supply Company.

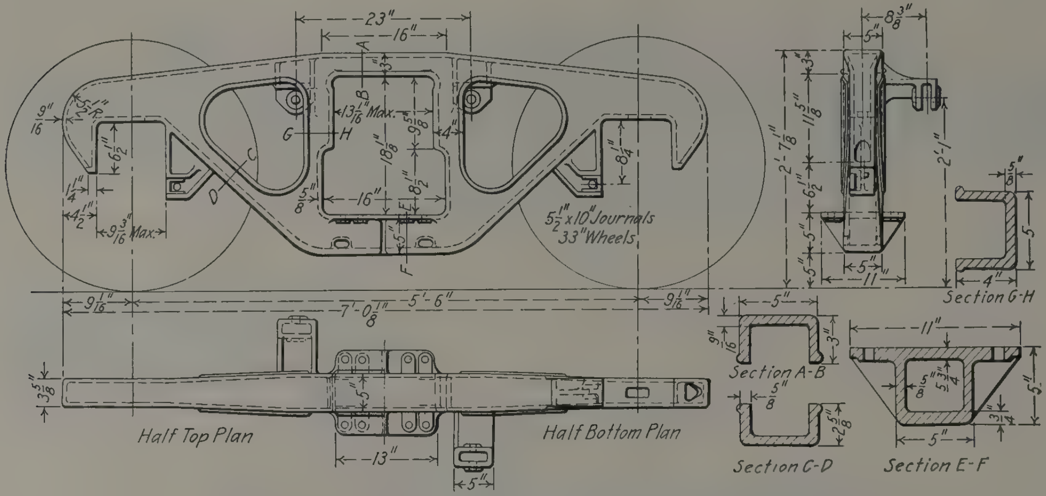


Fig. 1164—Buckeye Pedestal Channel Section Side Frame for 50-Ton Capacity Freight Cars.

Fig. 1165—Buckeye Pedestal Truck Frame.

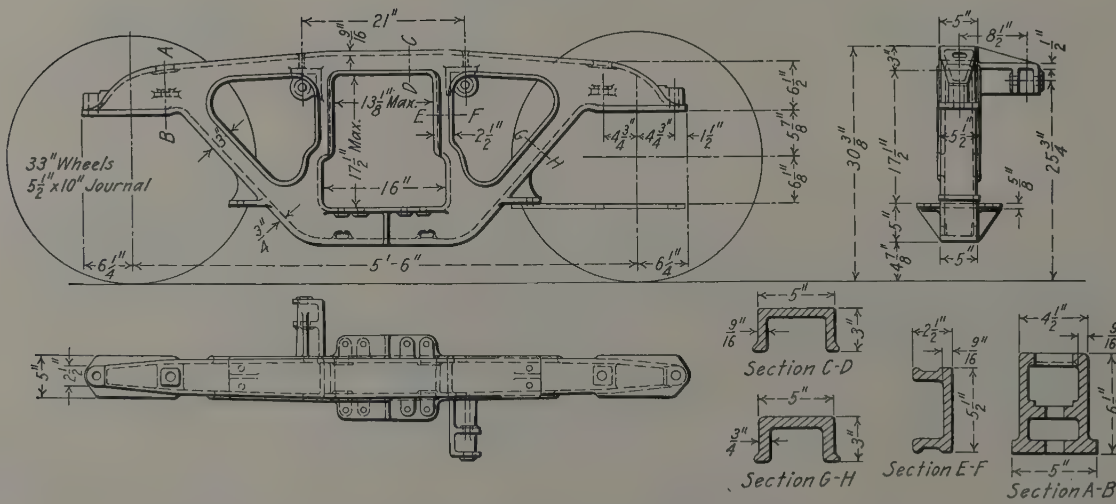


Fig. 1166—Buckeye Channel Section Truck Frame for 50-Ton Capacity Freight Cars.
Buckeye Steel Castings Company.

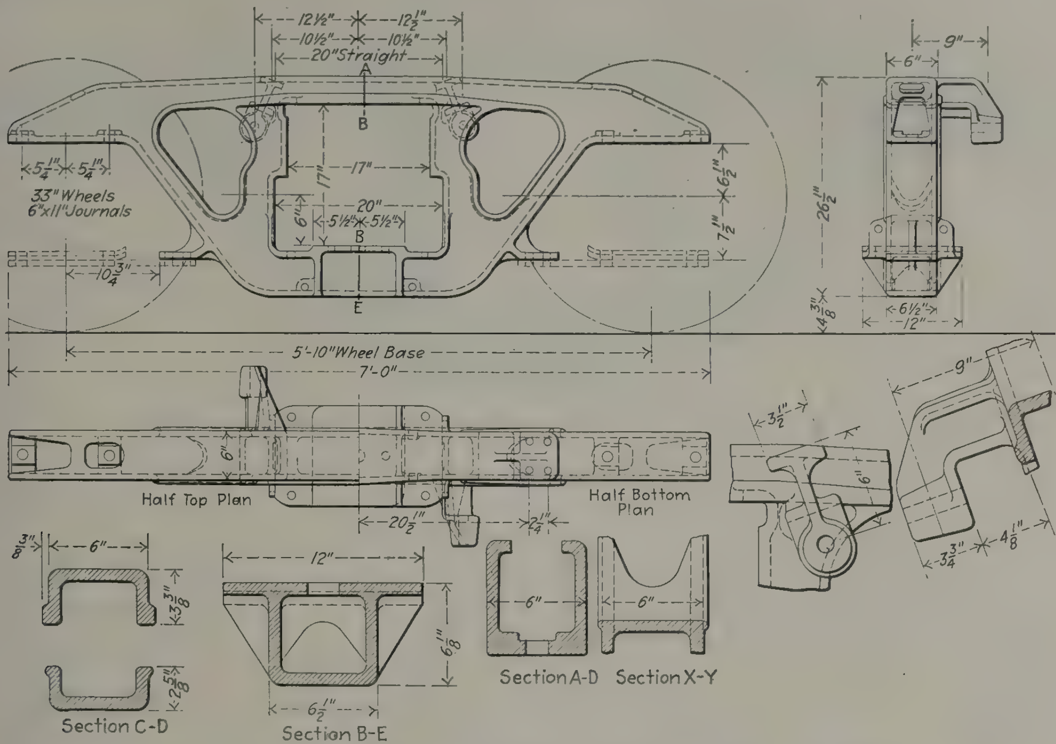


Fig. 1167—Cast Steel Truck Side Frame for 70-Ton Capacity. Buckeye Steel Castings Company.

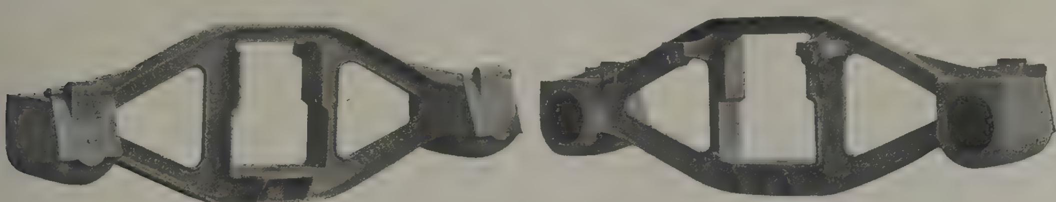


Fig. 1168—Bettendorf Cast Steel Side Frame for Freight Car Trucks. The Bettendorf Company.

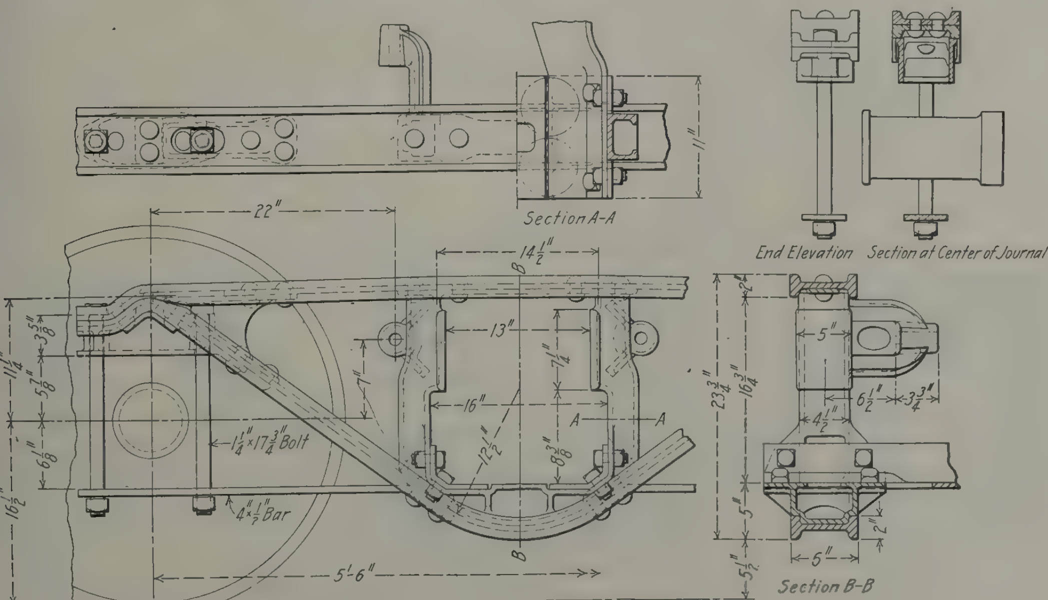


Fig. 1169—Built-Up Steel Side Frame. Summers Steel Car Company.

Fig. 1170—Andrews Cast Steel Freight Car Truck Side Frame for Use with Short Tie Bars. American Steel Foundries.

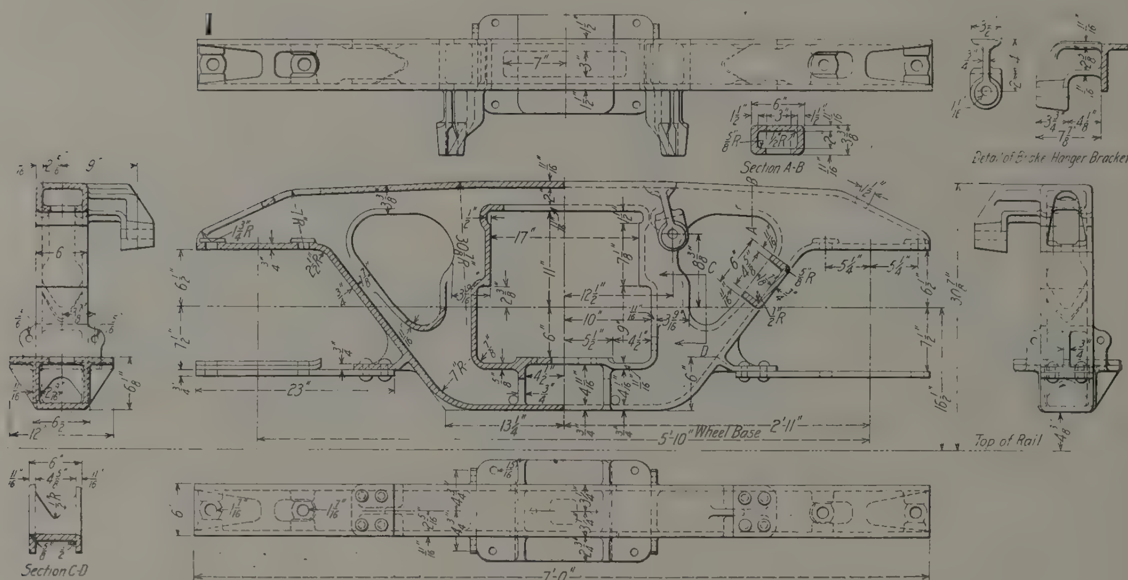


Fig. 1171—Side Frame for Trucks of Pennsylvania Railroad 70-Ton Capacity Freight Cars.

Fig. 1172—Vulcan Cast Steel Truck Side Frame. American Steel Foundries.

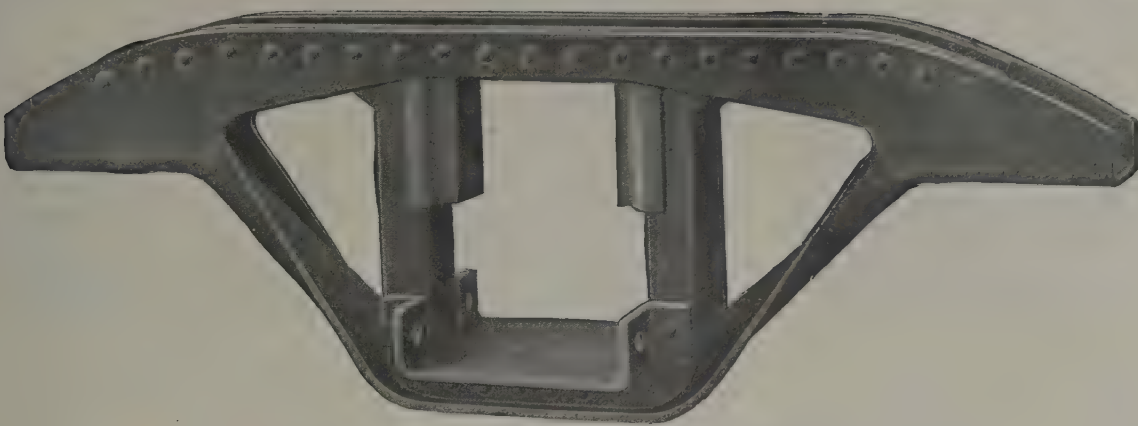


Fig. 1173—Forsythe Forged Steel Truck Side Frame. Allegheny Steel Company.

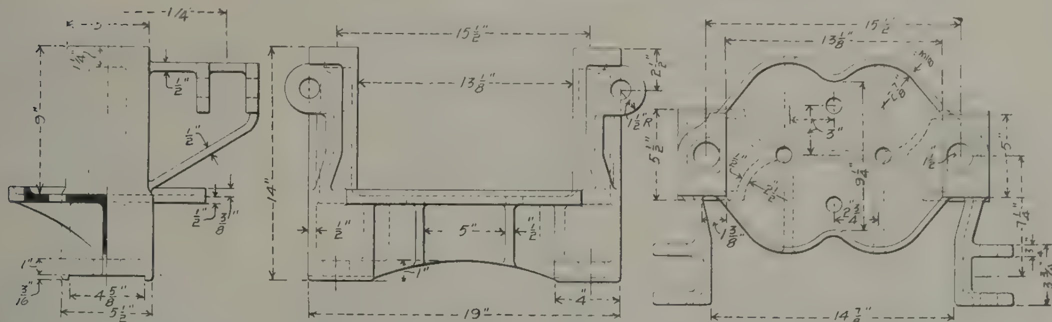


Fig. 1174—Cast Steel Combined Truck Column or Bolster Guide, Brake Hanger and Spring Seat. American Steel Foundries.

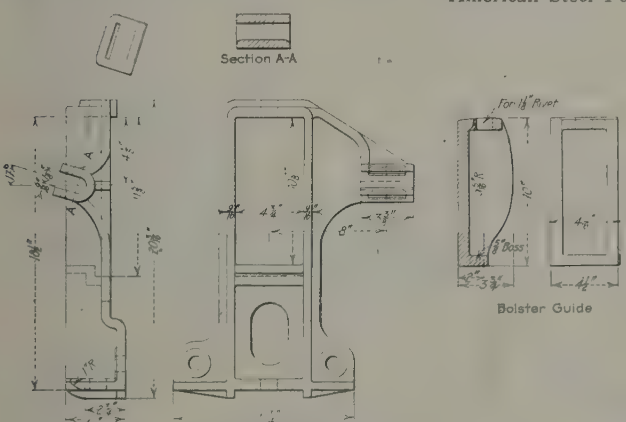


Fig. 1175—Boltless Column for 40-Ton Capacity Freight Car Truck. Dominion Steel Foundry Co., Ltd.

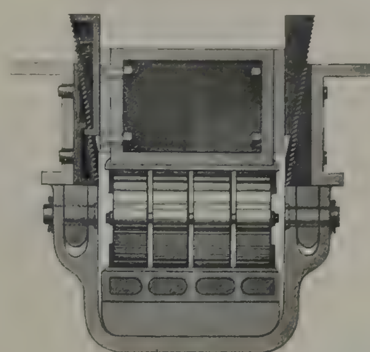


Fig. 1176—Automatic Adjustable Chafing Plate for Passenger Trucks. Commonwealth Steel Company.

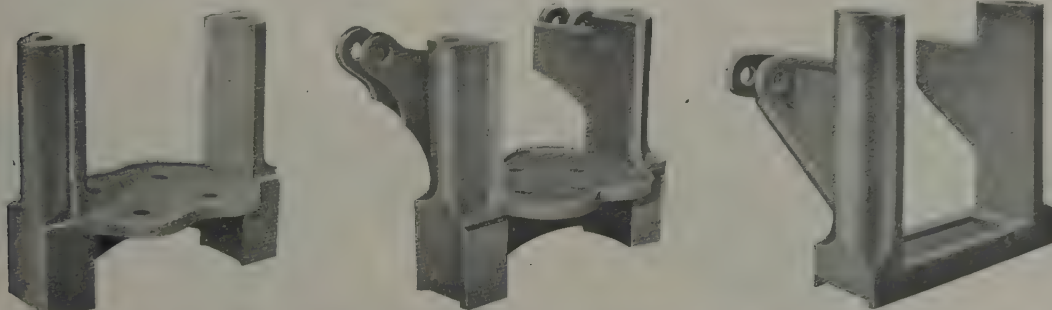


Fig. 1177—Cast Steel Combined Column or Bolster Guides and Spring Seats for Arch Bar Trucks. American Steel Foundries.

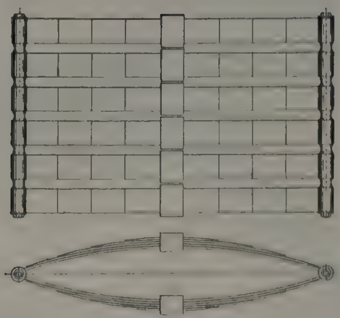


Fig. 1178—Sextuple Elliptic Spring.

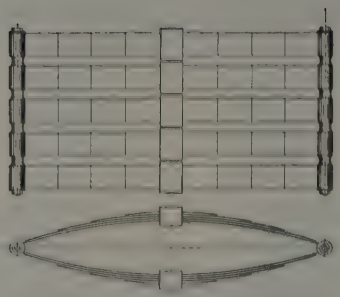


Fig. 1179—Quintuple Elliptic Spring.

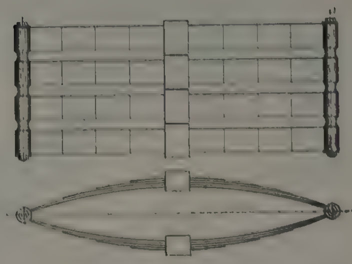


Fig. 1180—Quadruple Elliptic Spring.

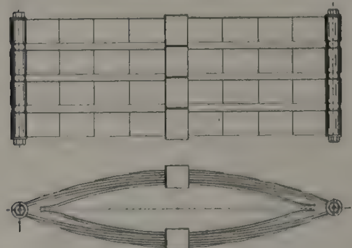


Fig. 1181—Graduated Quadruple Elliptic Spring.

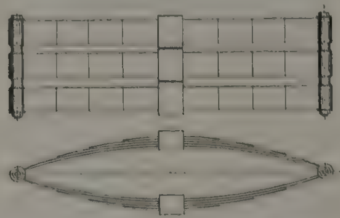


Fig. 1182 Triple Elliptic Spring.

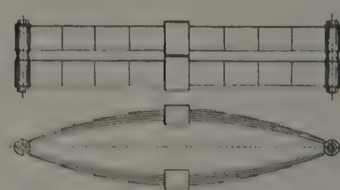


Fig. 1183—Double Elliptic Spring.

Fig. 1184—Single, Duplicate, Triple and Quadruple Elliptic Springs for Car Trucks. Pittsburgh Spring & Steel Company.

Fig. 1185—Full Elliptic Spring for Car Truck. Fort Pitt Spring & Manufacturing Company.

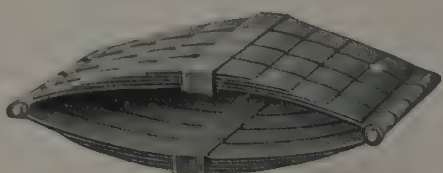


Fig. 1186—Quadruple Elliptic Spring for Passenger Car Trucks. Railway Steel Spring Company.

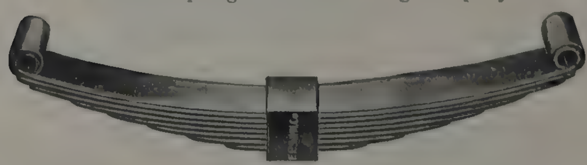


Fig. 1185A—Half Elliptic Scroll End Spring. Fort Pitt Spring & Manufacturing Company.

Fig. 1187—Triple Elliptic Bolster Spring. Standard Steel Works Company.

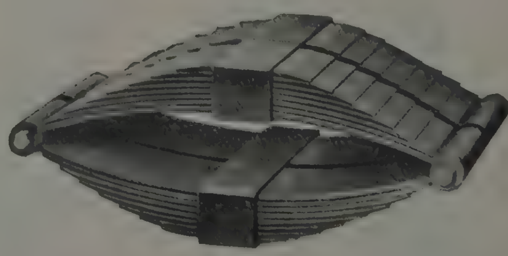


Fig. 1188—Duplicate Elliptic Spring for Passenger Car Trucks. Railway Steel Spring Company.

Fig. 1189—Four-Coil Bolster Spring. Railway Steel Spring Company.

Fig. 1190—Four-Coil Bolster Spring. Fort Pitt Spring & Manufacturing Company.

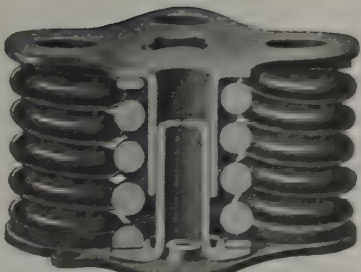


Fig. 1191—McCord Spring Dampener. McCord & Company.

Fig. 1192—Buffer Spring. Railway Steel Spring Company.

Fig. 1193—Double-Coil Truck Equalizer Spring. Railway Steel Spring Company.

Fig. 1194—Volute Buffer Spring. Pittsburgh Spring & Steel Company.

Fig. 1195—Harvey Friction Spring Gear. Frost Railway Supply Company.

Fig. 1196—Single Coil Controller Spring. American Steel Foundries.

Fig. 1197—Double-Coil Truck Spring. Fort Pitt Spring & Manufacturing Company.

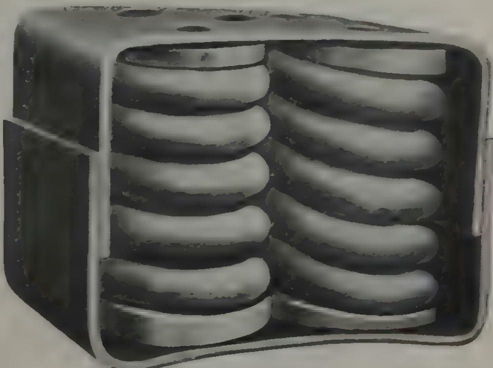


Fig. 1198—Double-Coil Controller Spring. American Steel Foundries.

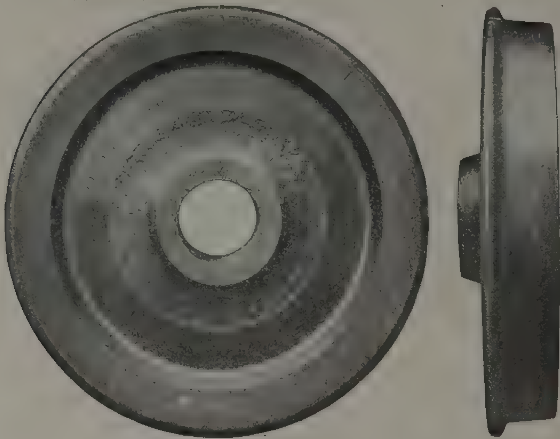
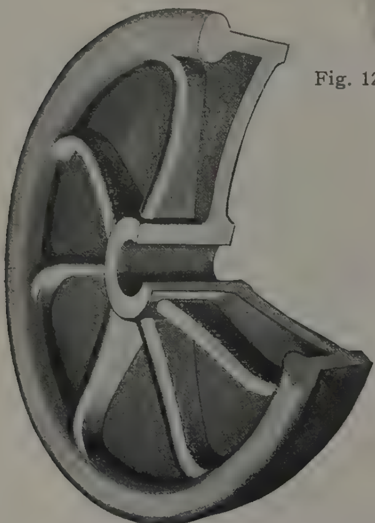


Fig. 1199—Solid Forged and Rolled Steel Freight Car Wheel. Carnegie Steel Company.

Fig. 1200—Chilled Cast Iron and Steel Spoke Wheel. Lobdell Car Wheel Company.

Fig. 1201—Solid Forged and Rolled Steel Wheel. Carnegie Steel Company.



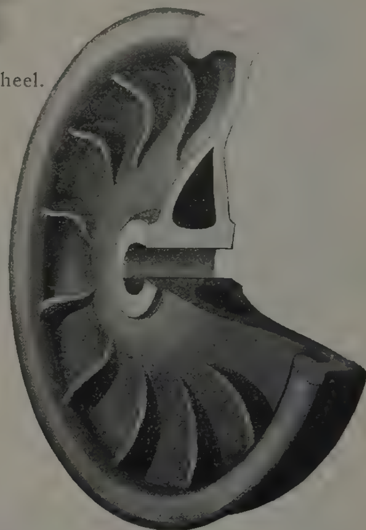


Fig. 1202—Single Plate Chilled Cast Iron Wheel. Fig. 1203—Double Plate Chilled Cast Iron Wheel. Lobdell Car Wheel Company.

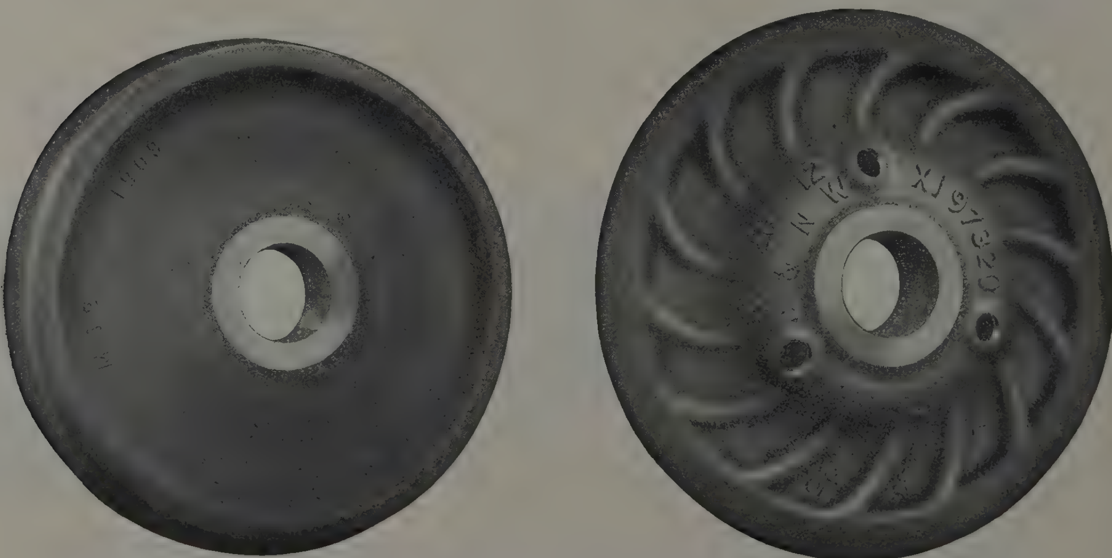


Fig. 1204—M. C. B. Standard Cast Iron Wheel for 50-Ton Capacity Freight Cars. Weight, 725 lbs. Association of Manufacturers of Chilled Car Wheels.

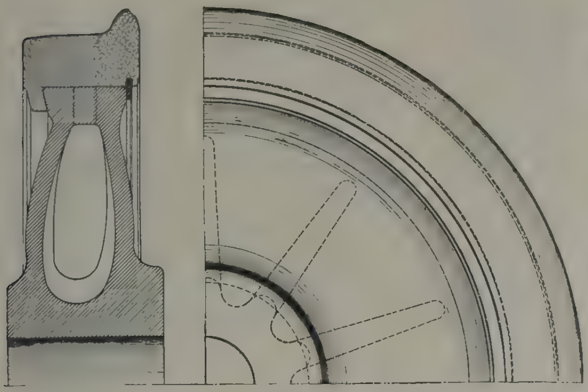


Fig. 1205—National No. 2 Coach Wheel. Cast Iron Double Plate Center, Having Internal Ribs, with Tire Secured by Shrinkage and Gibson Retaining Ring.

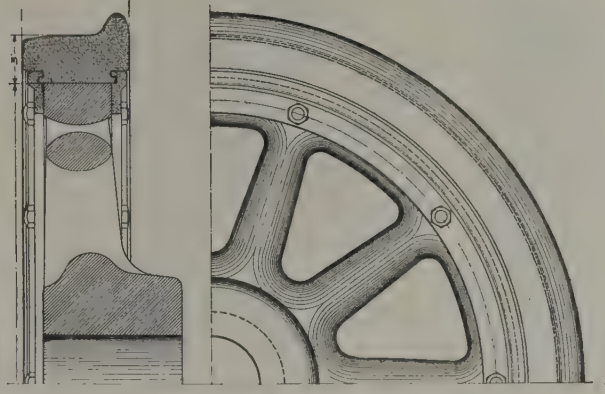


Fig. 1206—National No. 3 Coach Wheel. Cast Iron Spoke Center with Tire Secured by Shrinkage and Mansell Retaining Rings.

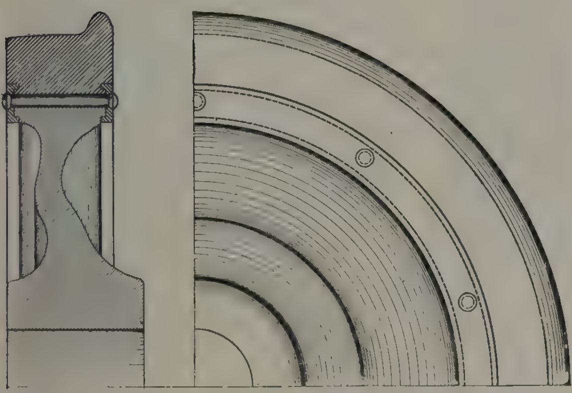


Fig. 1207—National No. 6 Coach Wheel. Cast Steel Disc Center with Tire Secured by Shrinkage and Double Lip Retaining Rings.

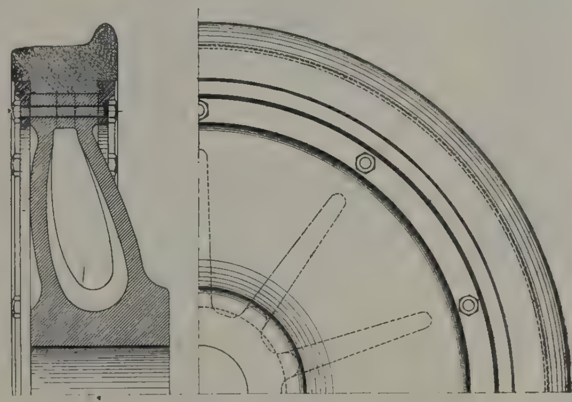


Fig. 1208—National No. 4 Coach Wheel. Cast Iron Double Plate Center, Having Internal Ribs, with Tire Secured by Shrinkage and Mansell Retaining Rings.

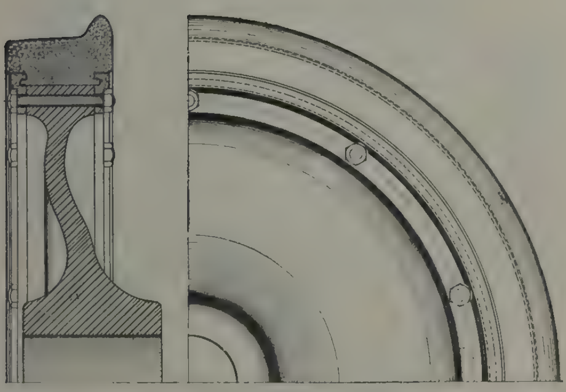


Fig. 1209—National No. 6 Coach Wheel. Cast Steel Disc Center with Tire Secured by Shrinkage and Mansell Retaining Rings.

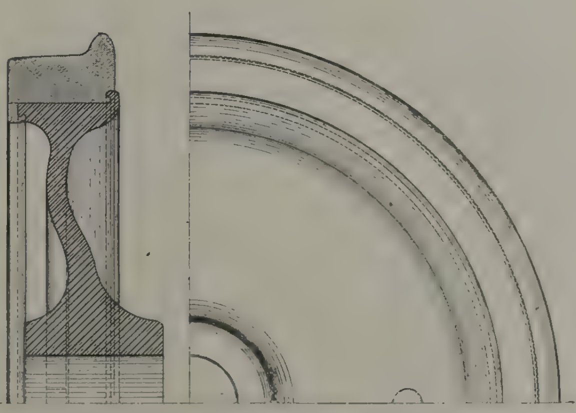


Fig. 1210—Boies No. 2 Coach Wheel. Cast Steel Disc Center with Tire Secured by Shrinkage and Integral Lock.

Railway Steel Spring Company.

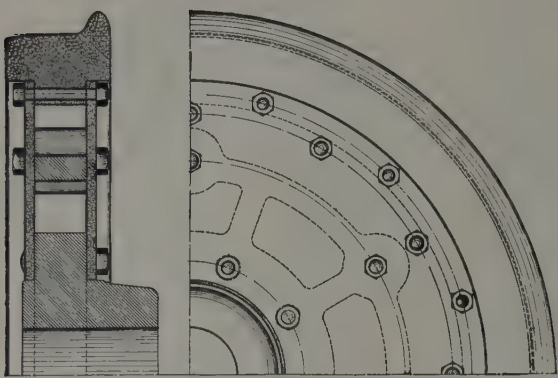


Fig. 1211—Paige Plate Coach Wheel. Cast Iron Spider with Steel Plates Secured by Bolts.
Railway Steel Spring Company.

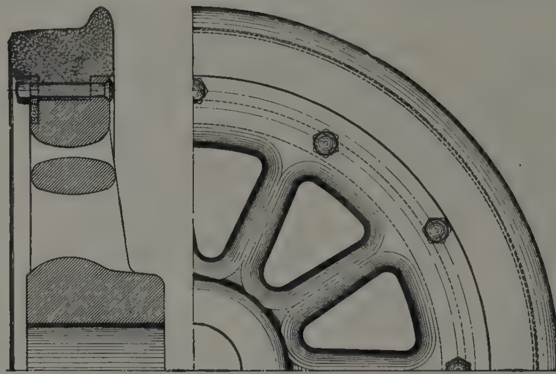


Fig. 1212—Paige Spoke Coach Wheel. Cast Iron Spoke Center with Tire Secured by Shrinkage, Retaining Rings and Bolts.
Railway Steel Spring Company.

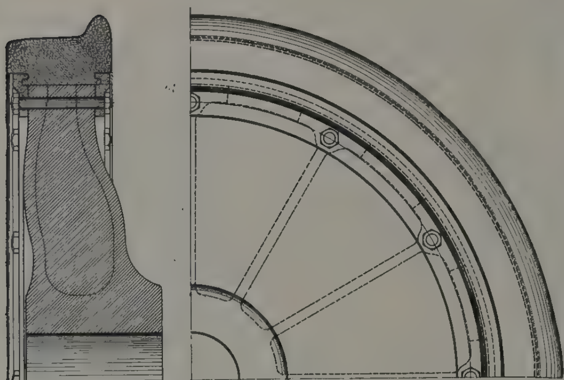


Fig. 1213—Allen No. 9 Coach Wheel. Cast Iron Double Plate Center with Tire Secured by Shrinkage and Mansell Retaining Rings.
Railway Steel Spring Company.

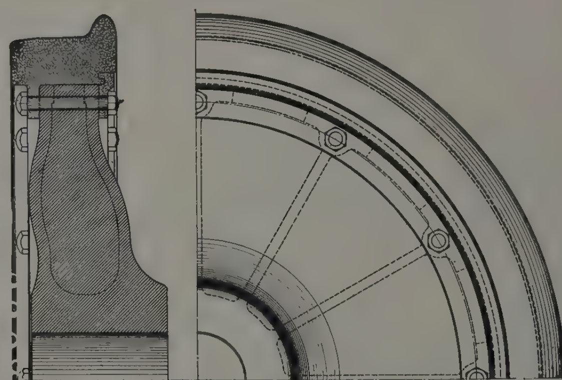


Fig. 1214—Allen No. 11 Coach Wheel. Cast Iron Double Plate Center, Having Internal Spokes, with Tire Secured by Shrinkage, Bolts and Mansell Retaining Rings.
Railway Steel Spring Company.

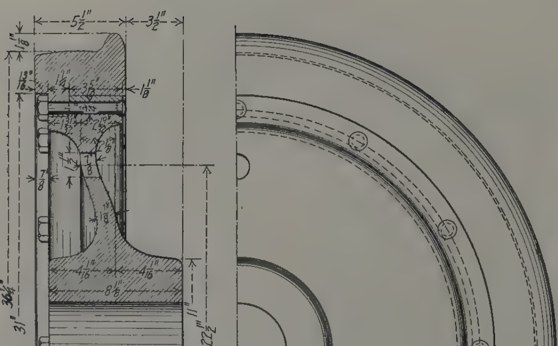


Fig. 1215—Bolted Type Coach Wheel with Cast Steel Plate Center.
Railway Steel Spring Company.

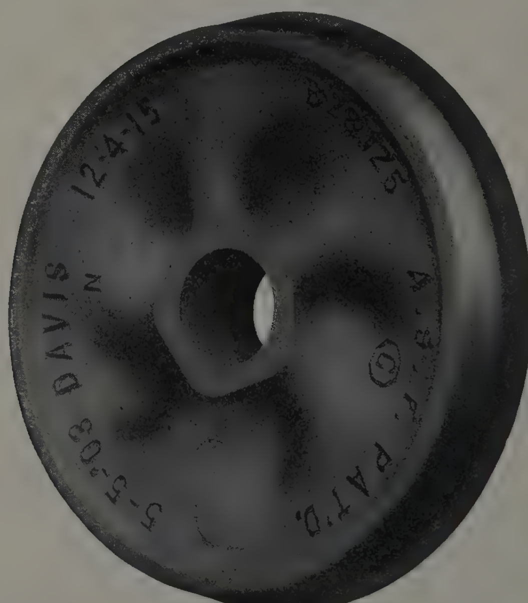


Fig. 1216—Davis Steel Wheel. American Steel Foundries. See Table of Recommended Weights on page 659.

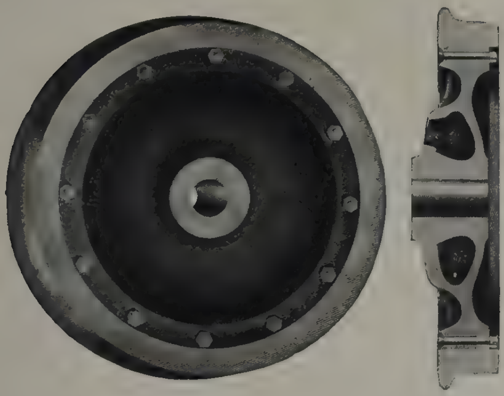


Fig. 1217—Cast Iron Plate Center with Tire Held by Shrinkage and Bolts.

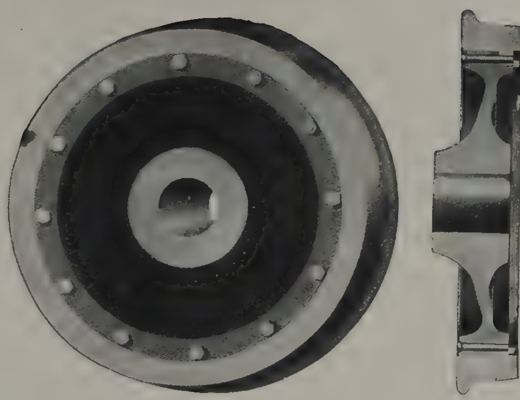


Fig. 1218—Cast Steel Plate Center with Tire Held by Shrinkage and Bolts.

Standard Steel Works Company.

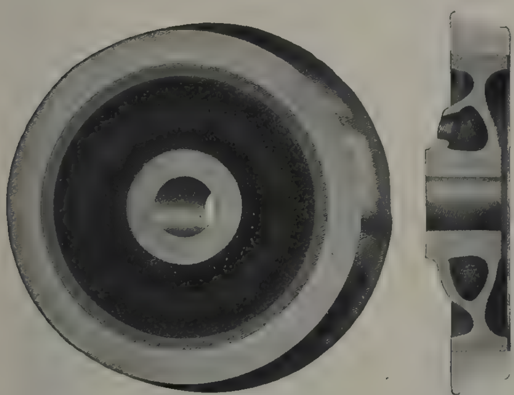


Fig. 1219—Cast Iron Plate Center with Tire Held by Shrinkage and Shoulder.

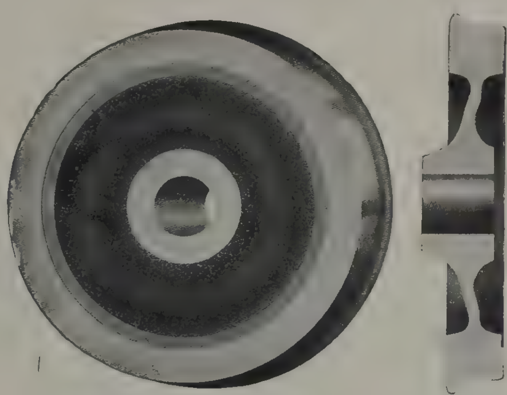


Fig. 1220—Cast Steel Plate Center with Tire Held by Shrinkage and Shoulder.

Standard Steel Works Company.

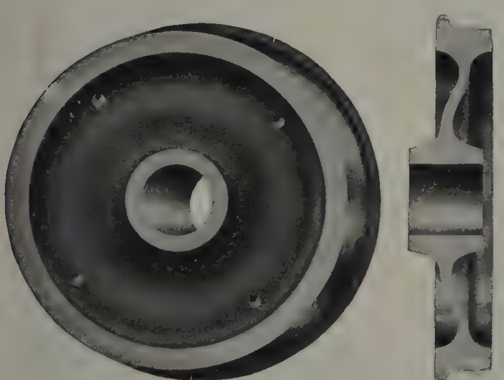


Fig. 1221—Solid Rolled Steel Wheel.

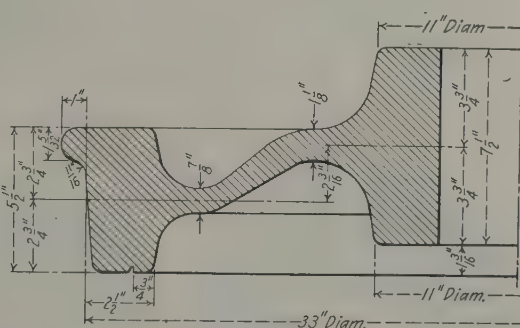


Fig. 1222—Rolled Steel Wheel.

Standard Steel Works Company.

33 Inch Freight Wheels

Size of Journal.	Weight Each.
4¼x8"	600 lbs.
5x9"	600 lbs.
5½x10"	600 lbs.
6x11"	665 lbs.

33 Inch Passenger and Tender Wheels

Size of Journal.	Weight Each.
4¼x8"	640 lbs.
5x9"	640 lbs.
5½x10"	640 lbs.
6x11"	675 lbs.

36 Inch Passenger and Tender Wheels

Size of Journal.	Weight Each.
4¼x8"	700 lbs.
5x9"	700 lbs.
5½x10"	700 lbs.
6x11"	740 lbs.

Recommended Weights of Davis Cast Steel Wheels. Shown in Fig. 1216.

RECOMMENDED WEIGHTS OF WHEELS

Freight and Passenger Cars—Griffin Wheel Co.

Freight Car Wheels.

Normal Capacity, Pounds.	Weight of Car, Pounds.	Total Load 10% Excess, Pounds.	Weight of Wheel, Pounds.	Size of Journal.	Remarks.
60,000	30,000	96,000	625	4¼"x 8"	M. C. B.
60,000	42,000	108,000	700	4¼"x 8"	
60,000	50,000	116,000	725	4¼"x 8"	
80,000	34,000	122,000	700	5" x 9"	M. C. B.
80,000	46,000	134,000	725	5" x 9"	
80,000	52,000	140,000	750	5" x 9"	
100,000	42,000	152,000	725	5½"x10"	M. C. B.
100,000	54,000	164,000	800	5½"x10"	
140,000	48,000	202,000	850	6" x11"	M. C. B.
140,000	56,000	210,000	850	6" x11"	

Passenger Car Wheels.

Type.	Weight of Car, Pounds.	Total Load, Pounds.	Weight of Wheel, Pounds.	Size of Journal.
8-wheel	50,000	65,000	700	3¾"x7"
8-wheel	60,000	80,000	725	3¾"x7"
8-wheel	70,000	90,000	800	4¼"x8"
8-wheel	80,000	100,000	800	4¼"x8"
12-wheel	80,000	100,000	700	4¼"x8"
8-wheel	90,000	110,000	850	5" x9"
12-wheel	90,000	110,000	725	5" x9"
8-wheel	100,000	120,000	850	5" x9"
12-wheel	100,000	120,000	750	5" x9"
12-wheel	120,000	140,000	800	5" x9"

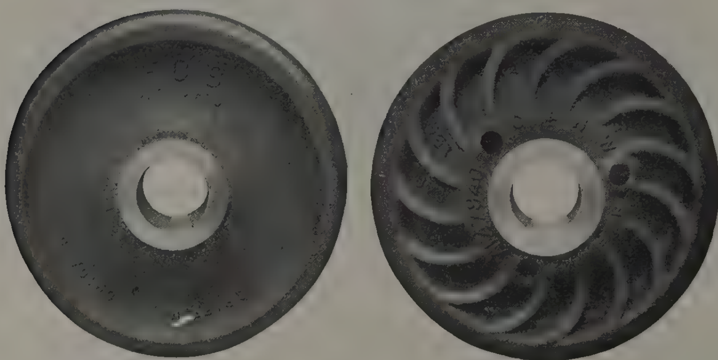


Fig. 1223—F. C. S. Wheel for Freight and Passenger Service. Griffin Wheel Company.

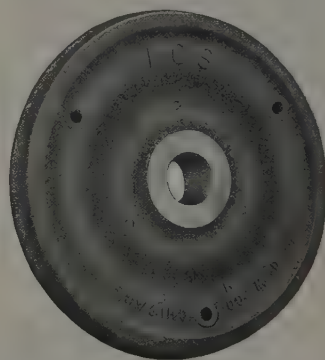


Fig. 1225—F. C. S. Wheel for Street and Interurban Service. Griffin Wheel Company.

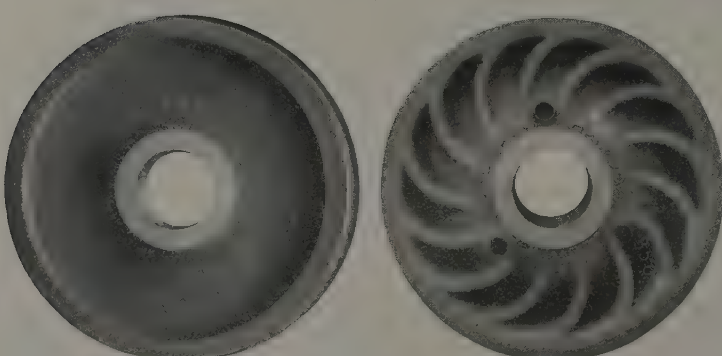


Fig. 1224—Chilled Cast Iron Wheel for 70-Ton Capacity Freight Car Truck. Griffin Wheel Company.

Fig. 1226—F. C. S. Wheel for Street and Interurban Service. Griffin Wheel Company.

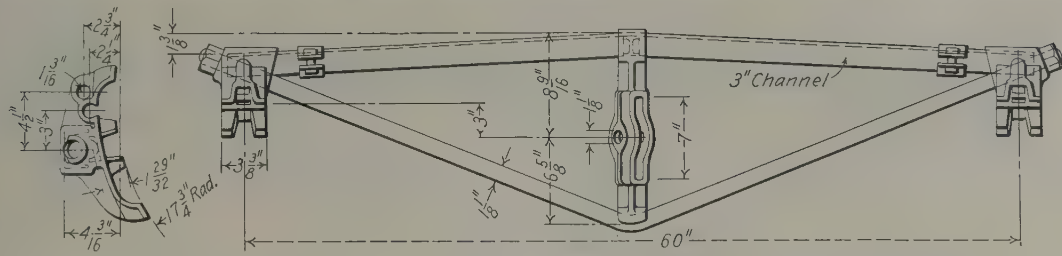


Fig. 1227—No. 2, 12,000 lb. Capacity Buffalo Brake Beam. Buffalo Brake Beam Company.

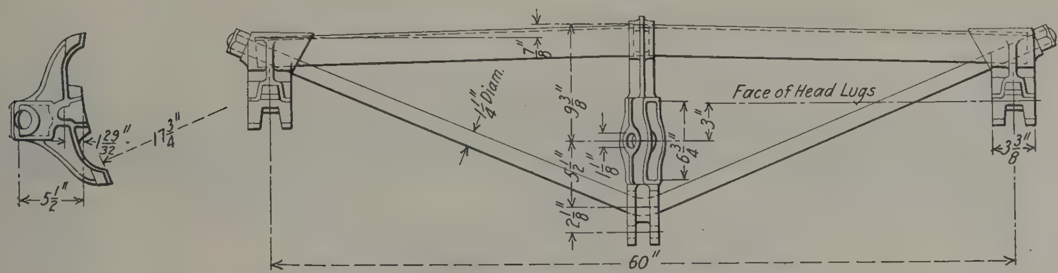


Fig. 1228—No. 2, 15,000 lb. Capacity Buffalo Truss Brake Beam. Buffalo Brake Beam Company.

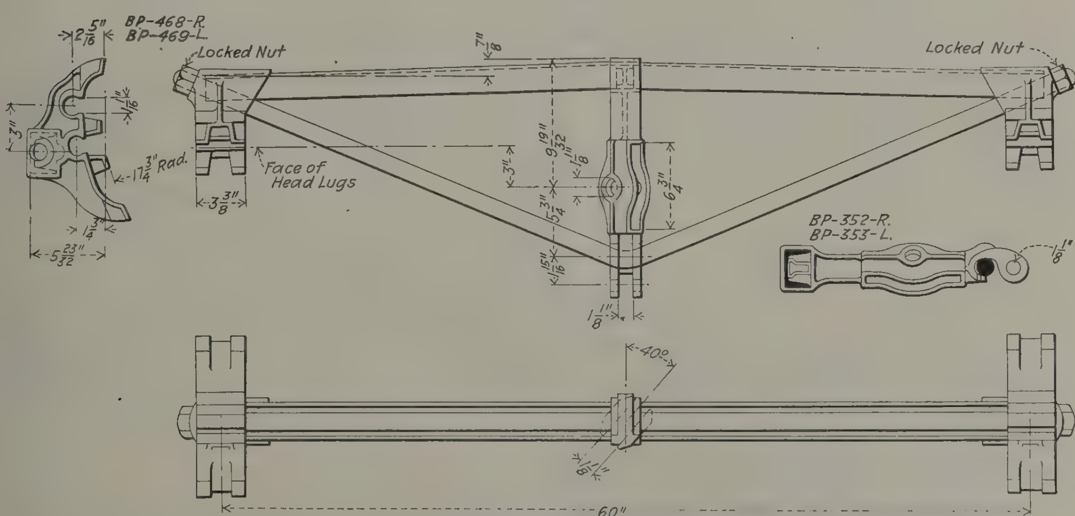


Fig. 1229—No. 3 Truss Brake Beam. Buffalo Brake Beam Company.

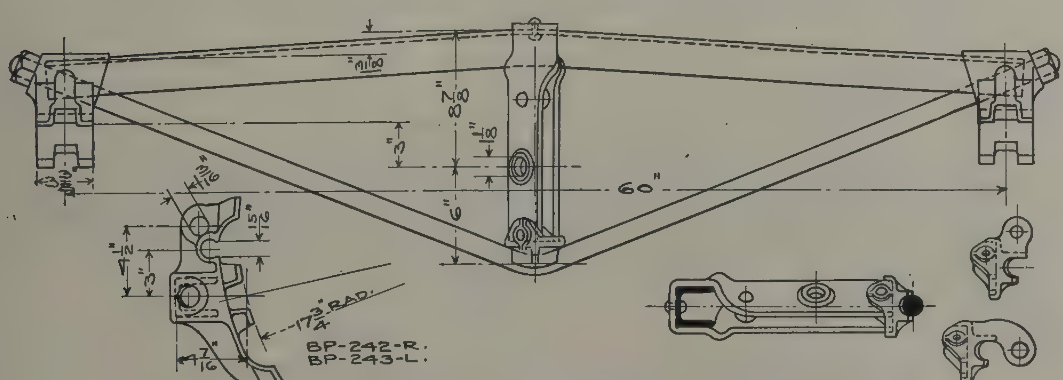


Fig. 1230—No. 3 Truss Buffalo Brake Beam. Buffalo Brake Beam Company.

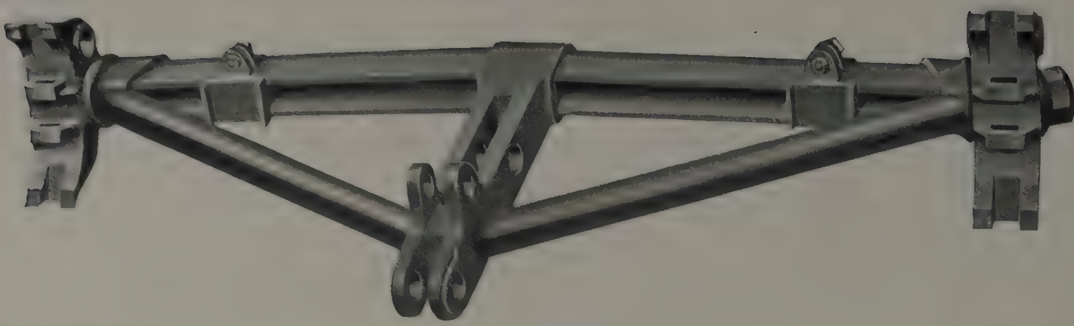


Fig. 1231—Buffalo Truss Brake Beam for High Speed Passenger Service. Buffalo Brake Beam Company.

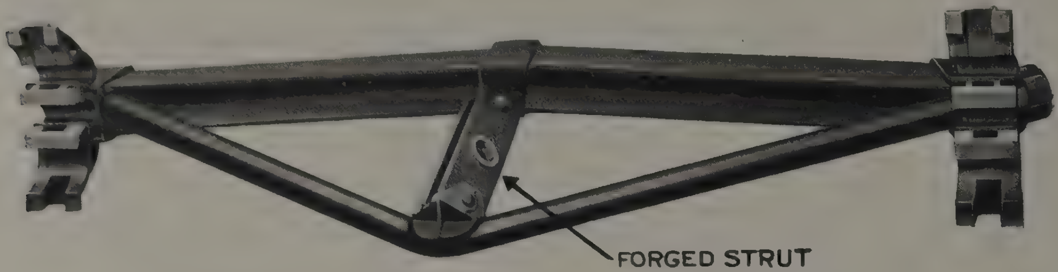


Fig. 1232—Buffalo Freight Truss Brake Beam. Buffalo Brake Beam Company.

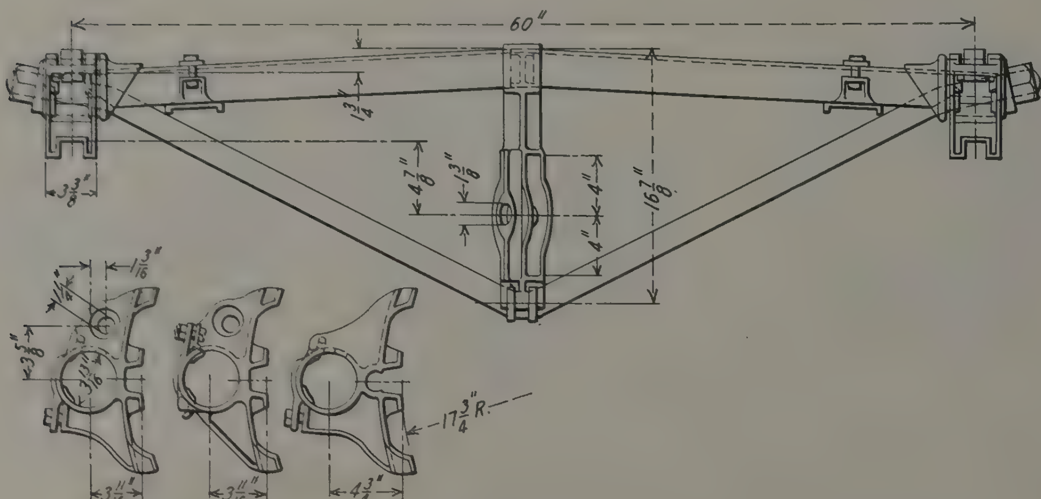


Fig. 1233—Buffalo Truss Brake Beam No. 5. Buffalo Brake Beam Company.

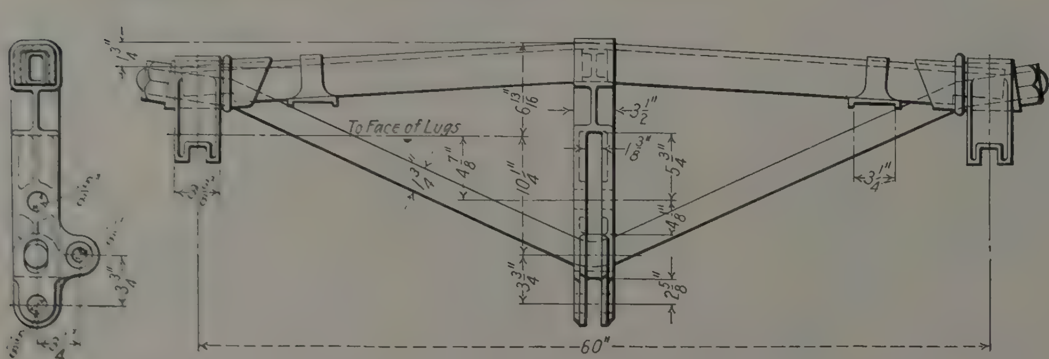


Fig. 1234—No. 7 Buffalo Truss Brake Beam. Buffalo Brake Beam Company.

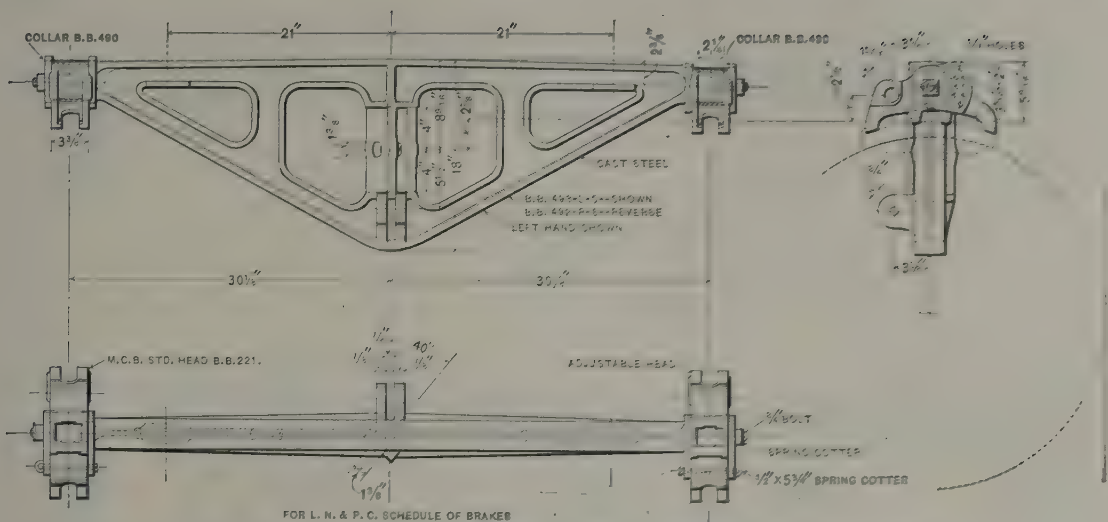


Fig. 1235—Vulcan Cast Steel Brake Beam. American Steel Foundries.

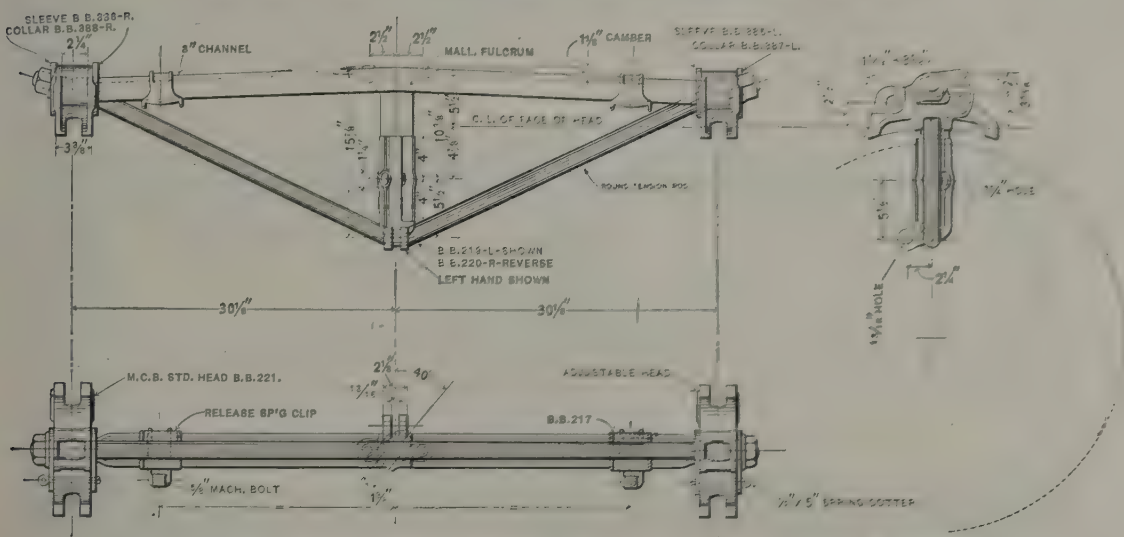


Fig. 1236—Hercules Brake Beam for Four-Wheel Passenger Train Car Trucks. American Steel Foundries.

Fig. 1237—Acme Brake Beam for Short Wheel Base Freight Car Trucks. American Steel Foundries.

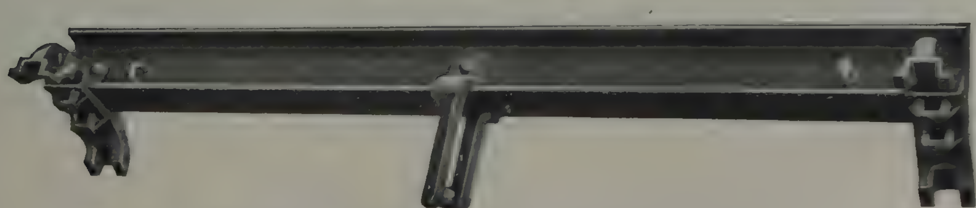


Fig. 1238—Acme Brake Beam for Freight Car Trucks. American Steel Foundries.

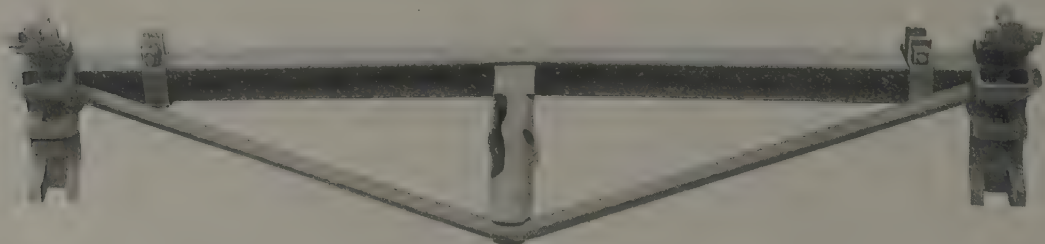


Fig. 1239—Ajax No. 102 Freight Brake Beam. No. 2 M. C. B. Standard.

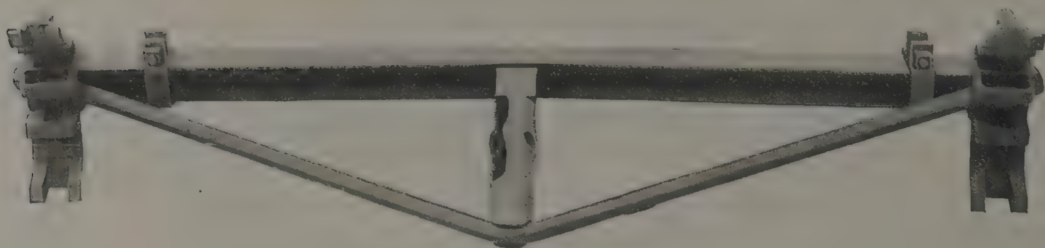


Fig. 1240—Ajax No. 105 Freight Brake Beam, 15,000 lb. Capacity.

Fig. 1241—Vulcan No. 121 Cast Steel, Adjustable Head, High Speed Passenger Brake Beam for Four-Wheel Trucks. For Use With P-C or L-N Air Brake Equipment.

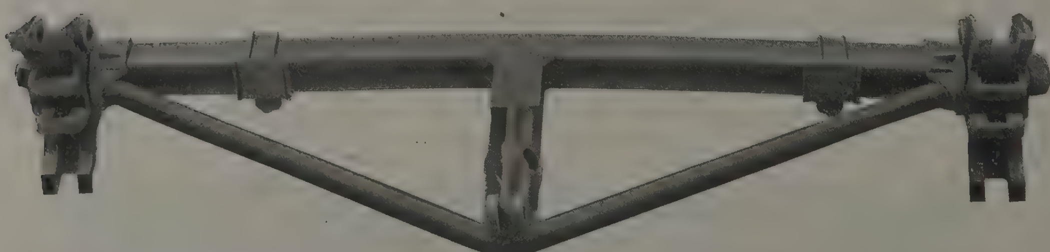


Fig. 1242—Hercules Adjustable Head Brake Beam for Four-Wheel High Speed Passenger Service.

Fig. 1243—Hercules Adjustable Head Brake Beam for Six-Wheel High Speed Passenger Service

American Steel Foundries.

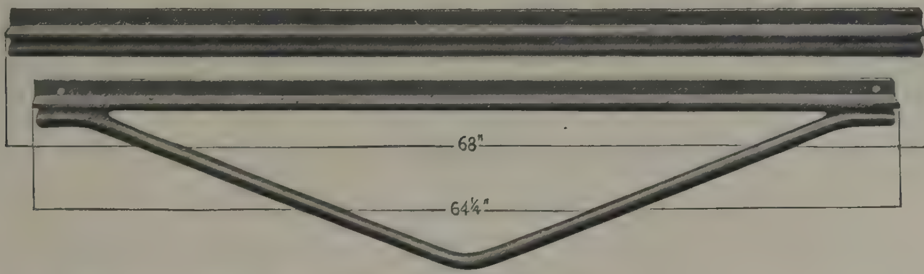


Fig. 1244—Method of Manufacture of Davis Solid Truss Brake Beam. Davis Brake Beam Company.

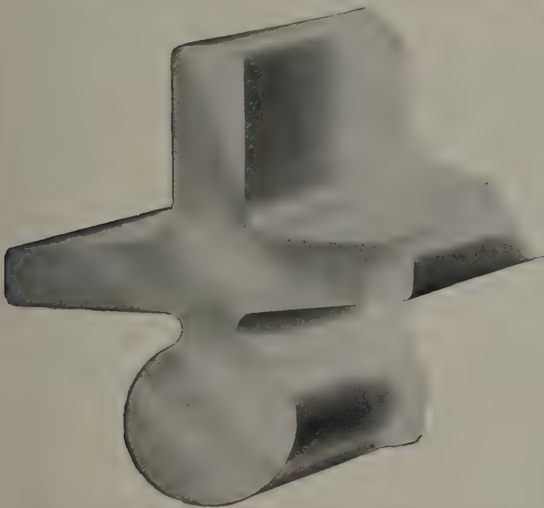


Fig. 1246—End of High Speed Brake Beam with Adjustable Head Removed to Show Locking Device. Davis Brake Beam Company.

Fig. 1245—Detail of Davis Brake Beam Section.

Fig. 1247—Davis Built-Up Brake Beam. Davis Brake Beam Company.

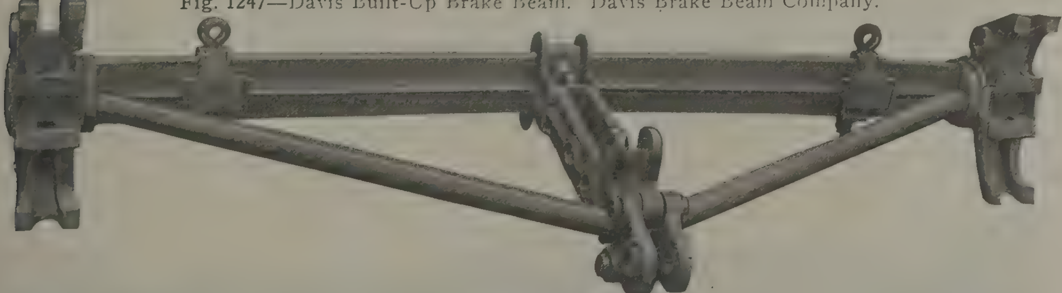


Fig. 1248—Davis Solid Truss Brake Beam No. 4 with Adjustable Heads and Forged Steel Strut Extension for High Speed Passenger Service. Davis Brake Beam Company.

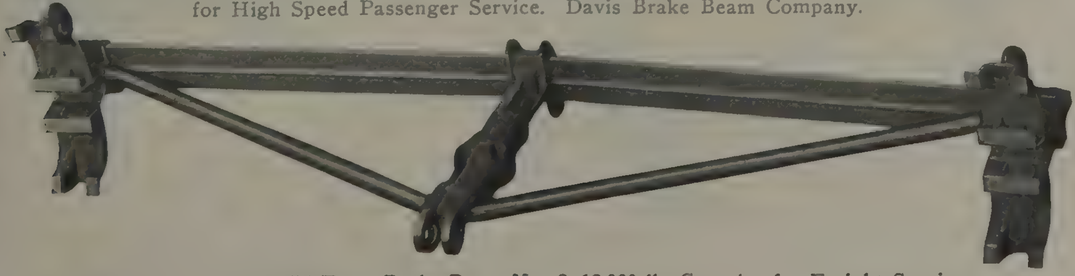


Fig. 1249—Davis Solid Truss Brake Beam No. 2, 12,000 lb. Capacity for Freight Service. Davis Brake Beam Company.

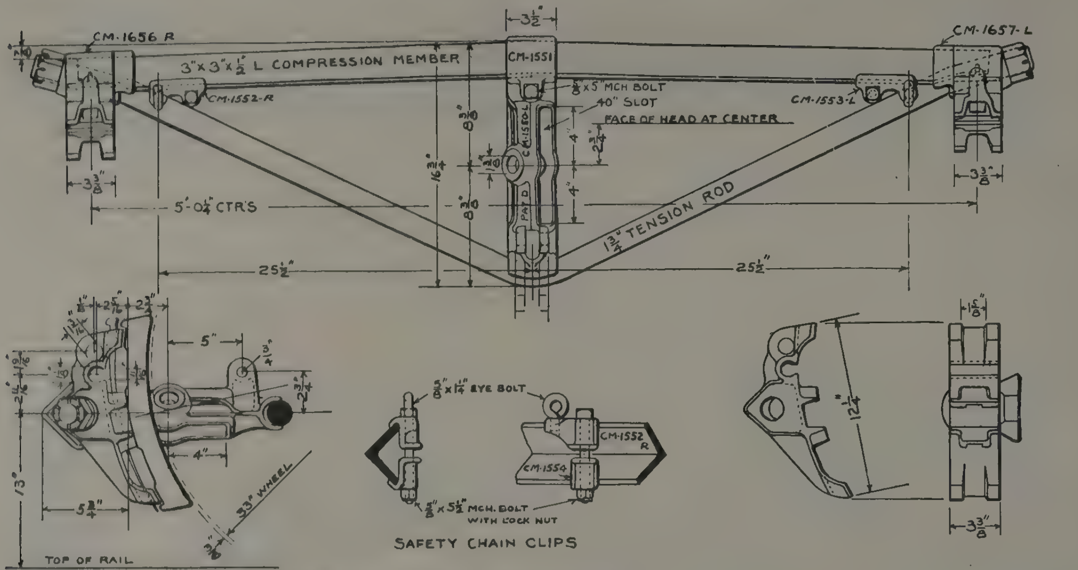


Fig. 1250—Waycott Brake Beam with Rigid Heads for High Speed Four-Wheel Trucks. Damascus Brake Beam Company.

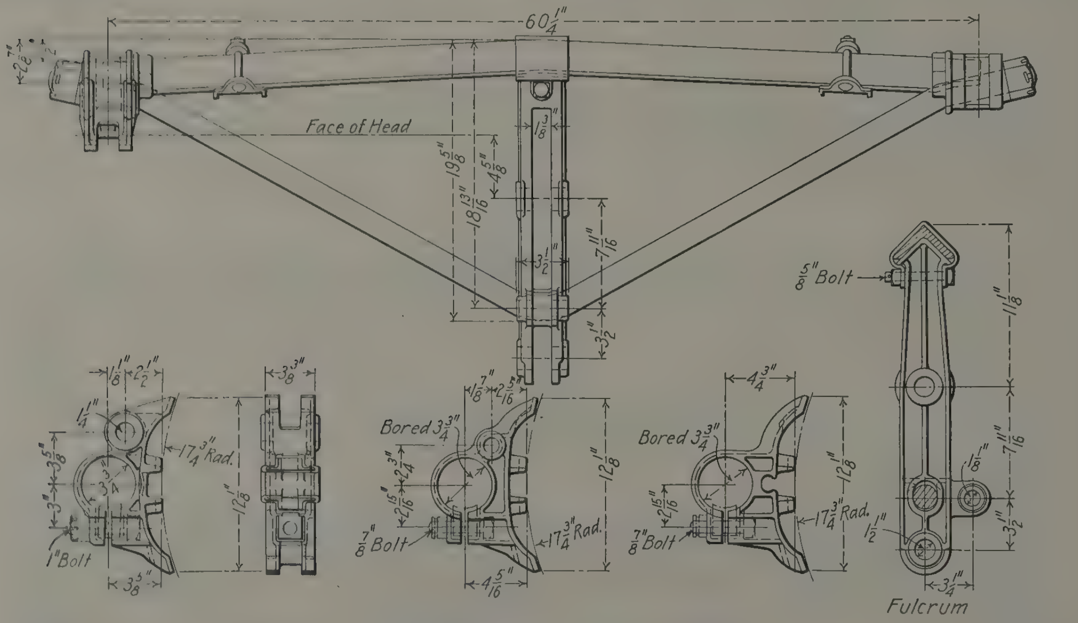


Fig. 1251—No. 2 Waycott Special High Speed Brake Beam for PC Brakes. Damascus Brake Beam Company.

Fig. 1252—No. 2 Waycott Special High Speed Brake Beam. Damascus Brake Beam Company.

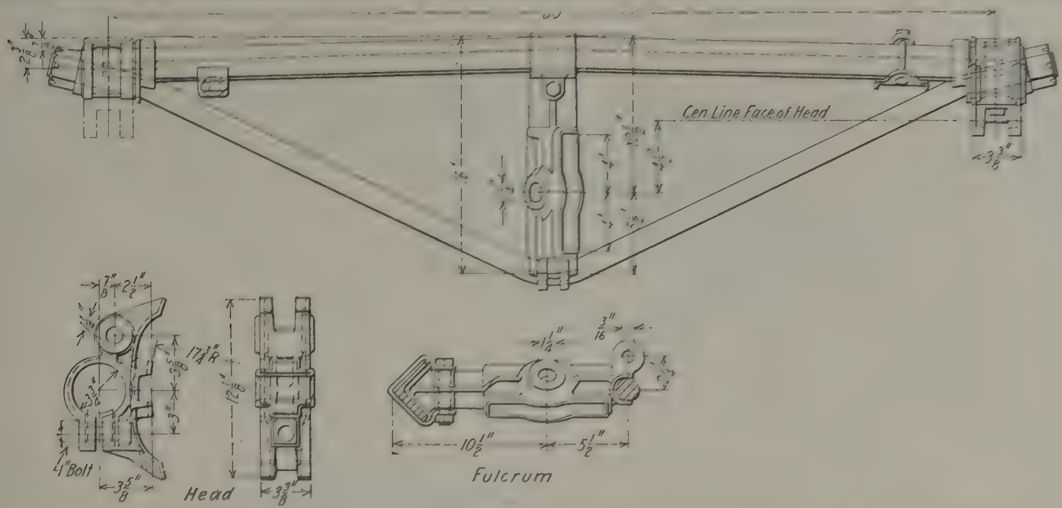


Fig. 1253—No. 1 Waycott Special High Speed Brake Beam. Damascus Brake Beam Company.

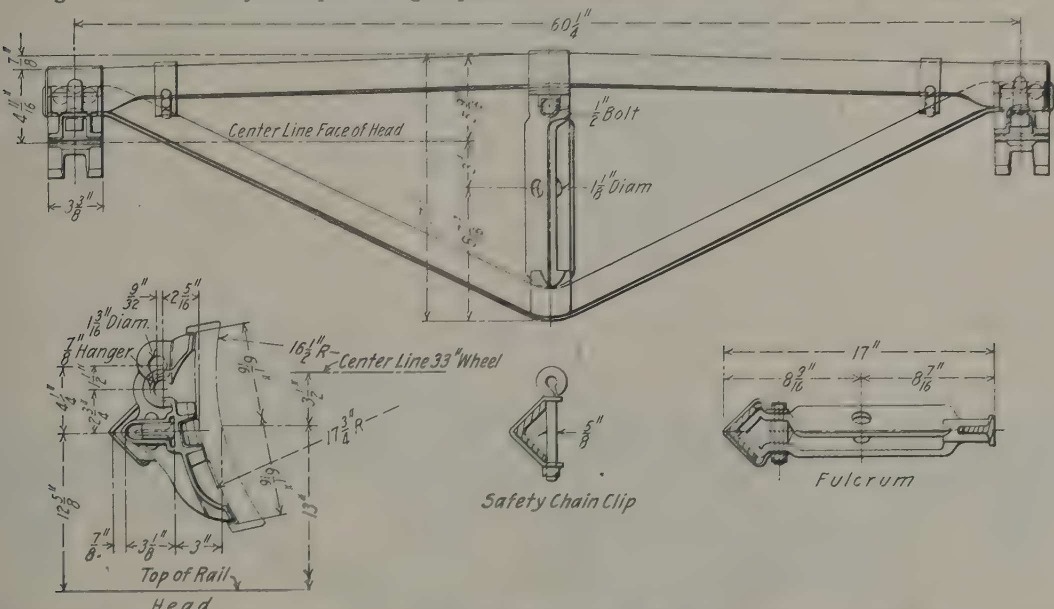


Fig. 1254—No. 2 Waycott Freight Brake Beam with Forged Steel Fulcrum. Damascus Brake Beam Company.

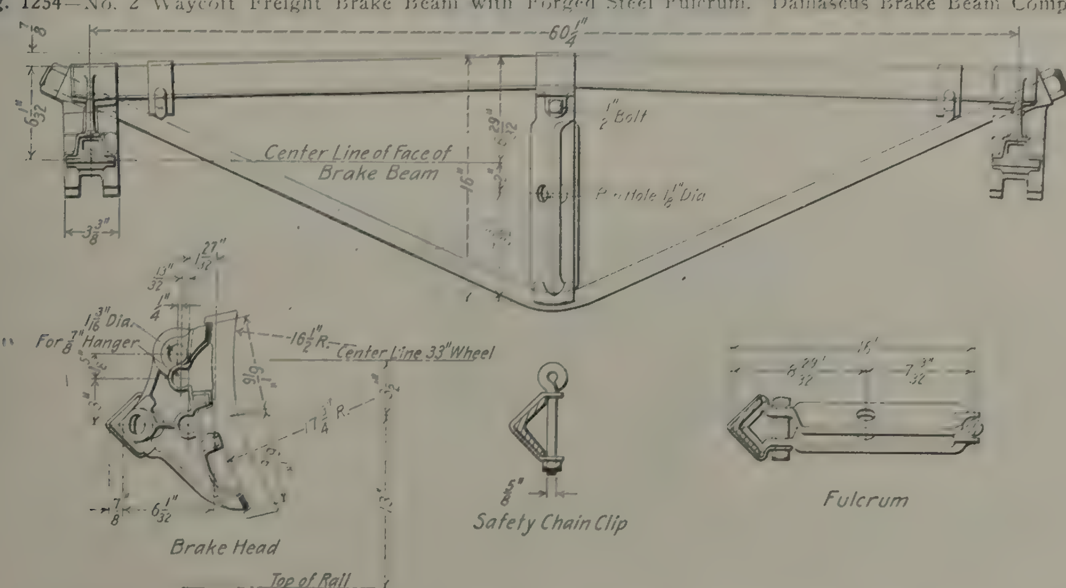


Fig. 1255—Anglrod M. C. B. No. 2 Freight Brake Beam. Damascus Brake Beam Company.

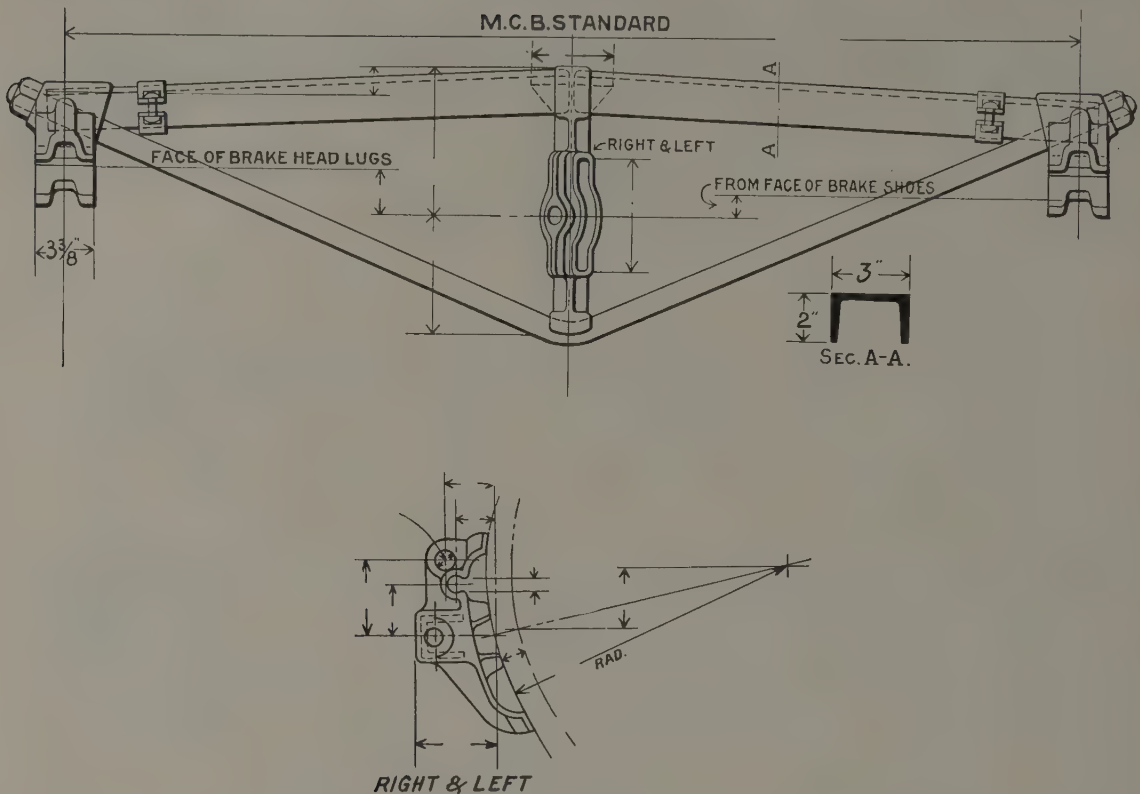


Fig. 1256—Pennsylvania Trussed Brake Beam, No. 1 and No. 2. Pennsylvania Brake Beam Company.

Fig. 1257—No. 1 Waycott Special High Speed Brake Beam. The Damascus Brake Beam Company

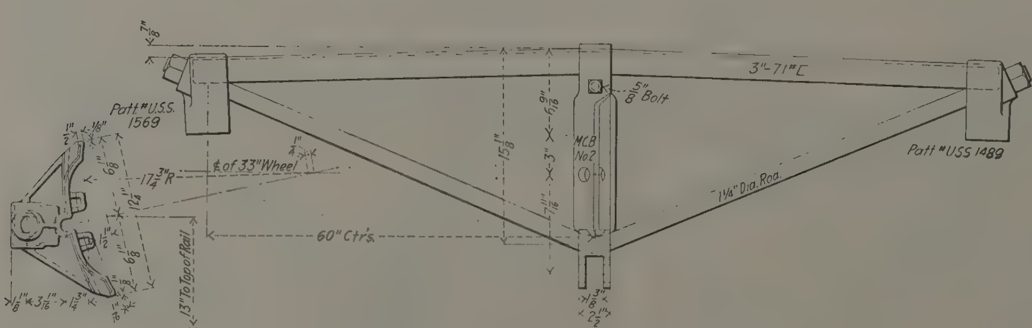


Fig. 1258—No. 2 Channel Brake Beam for U. S. Government Standard Cars. The Damascus Brake Beam Company.

Fig. 1259—Standard I-Beam Brake Beam with Drop Forged Fulcrum.

Fig. 1260—Standard Deck Beam Brake Beam with Malleable Iron Fulcrum.

Fig. 1261—Standard Deck Beam Brake Beam with Drop Forged Fulcrum.

Fig. 1262—Special Combination Deck and I-Beam Section Brake Beam with Drop Forged Fulcrum.

Pennsylvania Brake Beam Company.

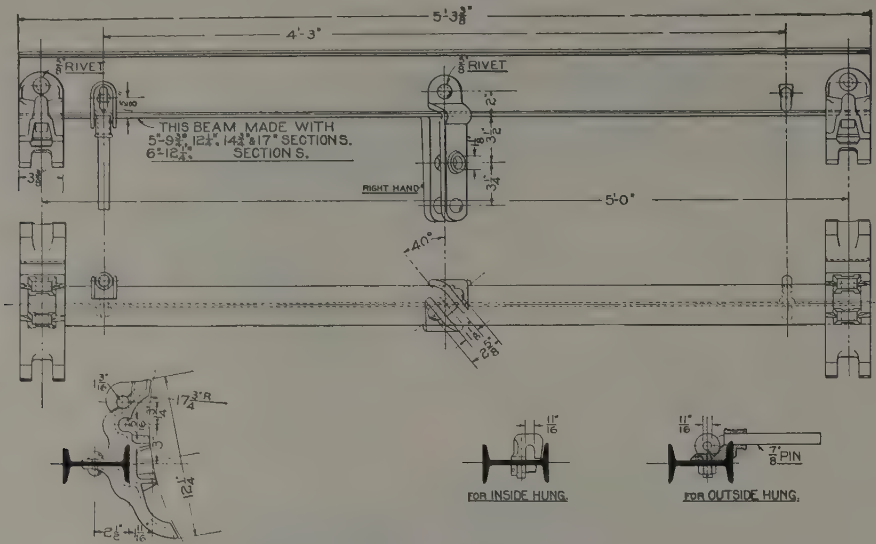


Fig. 1263—Monarch Solid Brake Beam.

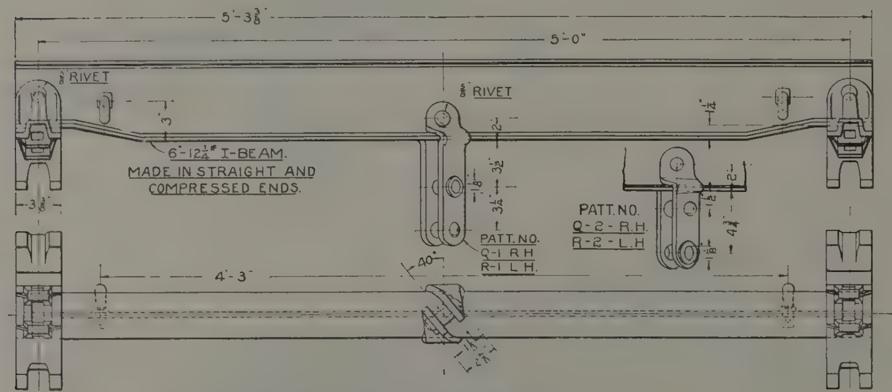


Fig. 1264—Monarch Solid Compressed End Brake Beam.

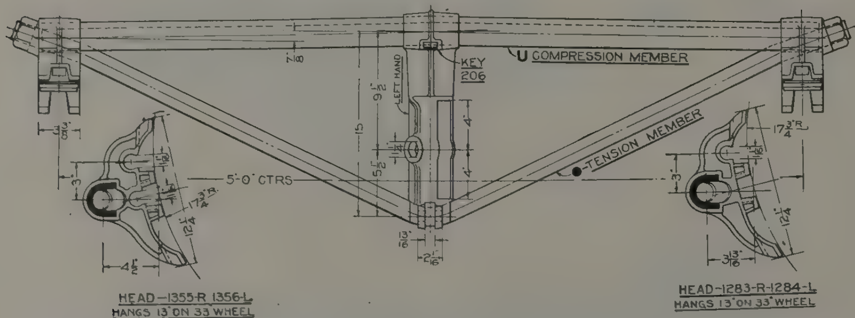


Fig. 1265—E L Creco Brake Beam for Use with Westinghouse Empty and Load Brake for Heavy Freight Service.

Fig. 1266—Kewanee Brake Beam.

Chicago Railway Equipment Company.

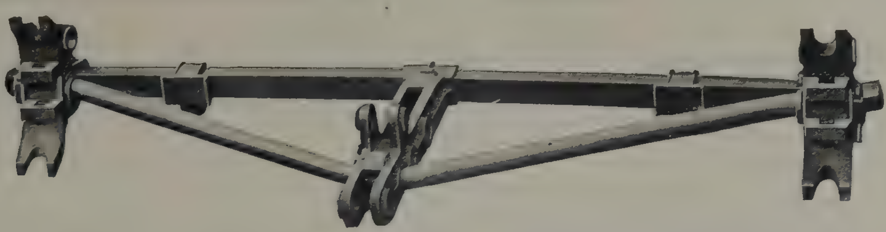


Fig. 1267—Diamond Special Brake Beam for High Speed Six-Wheel Trucks.

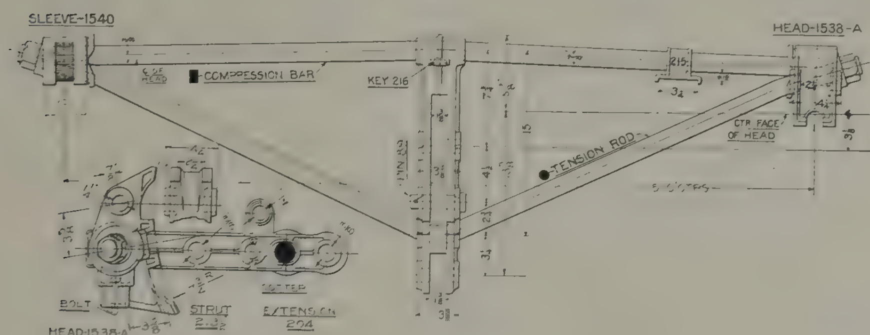
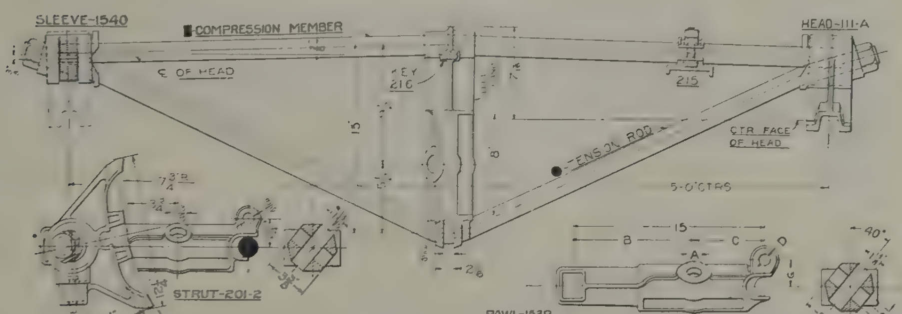


Fig. 1268—Diamond Special Triple Brake Beam for High Speed Six-Wheel Trucks.



STRUT

PATT. NO.	A	B	C	D	E	F	G
201-R. 202-L.	$1\frac{1}{8}''$	$9\frac{1}{2}''$	$5\frac{1}{2}''$	$\frac{13}{16}''$	$\frac{13}{16}''$	$2\frac{1}{16}''$	$2\frac{1}{4}''$
211-R. 212-L.	$1\frac{1}{4}''$	$9\frac{1}{2}''$	$5\frac{1}{2}''$	$\frac{13}{16}''$	$\frac{13}{16}''$	$2\frac{1}{16}''$	$2\frac{1}{4}''$
235-R. 236-L.	$1\frac{1}{4}''$	$8\frac{1}{4}''$	$6\frac{3}{4}''$	$1\frac{1}{8}''$	$1\frac{1}{8}''$	$2\frac{5}{8}''$	$2\frac{3}{8}''$

Fig. 1269—Diamond Special Double Brake Beam for High Speed Four-Wheel Trucks.

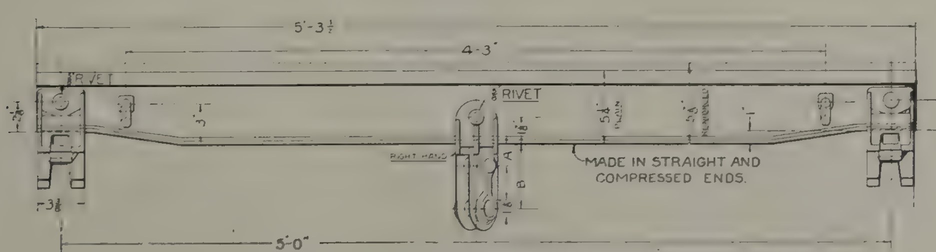


Fig. 1270—Sterlingworth Compressed End Frejght Brake Beam.

Fig. 1271—Sterlingworth Freight Brake Be am. Chicago Railway Equipment Company.

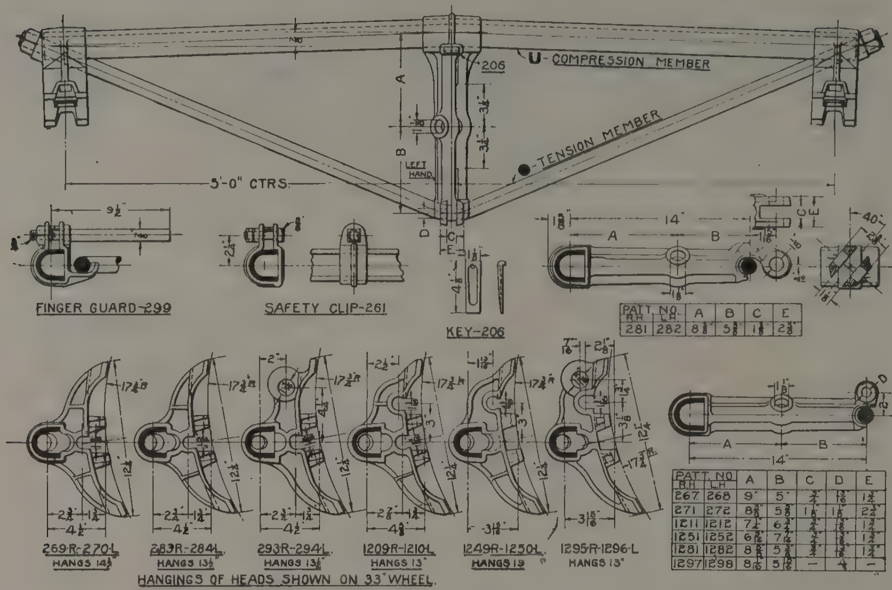


Fig. 1272—Creco Brake Beam for Heavy Freight Service.

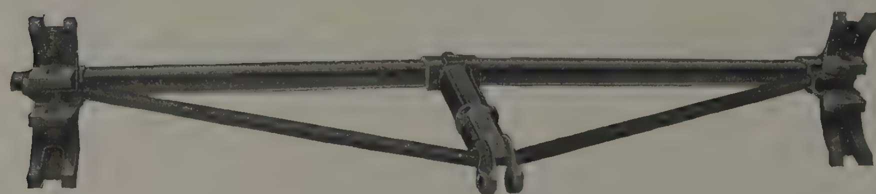


Fig. 1273—Creco Standard Freight Brake Beam.

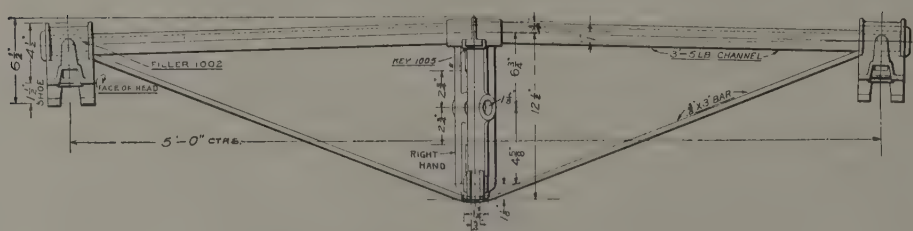


Fig. 1274—Reliance Freight Brake Beam.

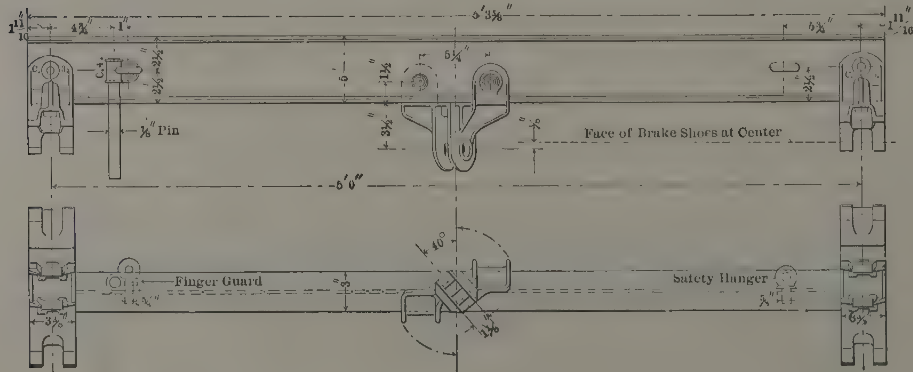


Fig. 1275—Ninety-Six Freight Brake Beam.

Chicago Railway Equipment Company.

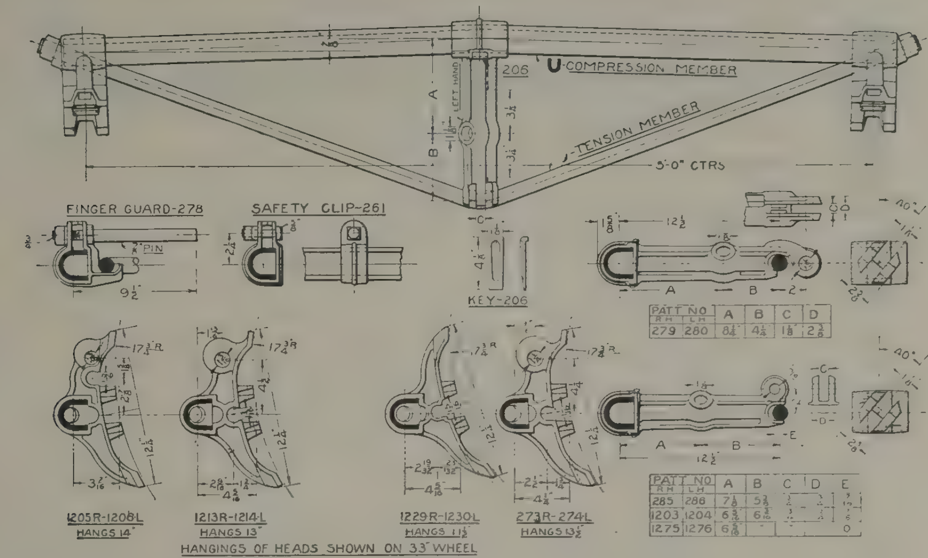


Fig. 1276—Cresco Freight Brake Beam for M. C. B. No. 1 and No. 2 Capacities.

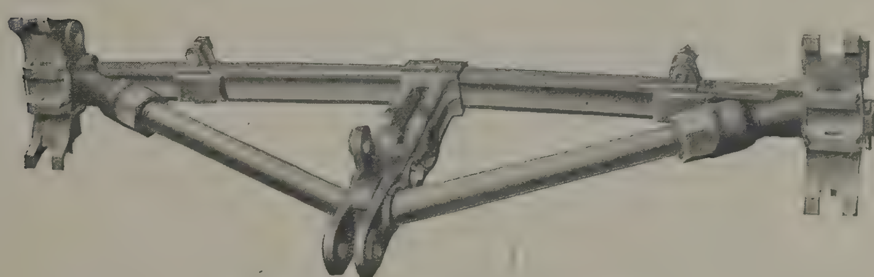


Fig. 1277—P C Creco Triple Brake Beam.

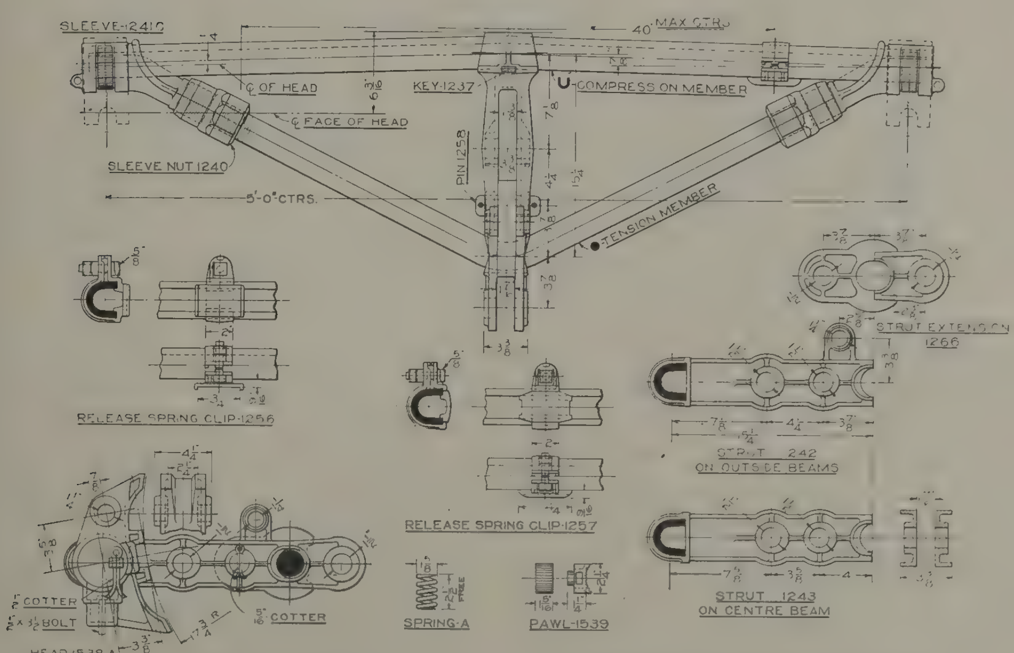


Fig. 1278—P C Creco Brake Beam for Heavy Service with Six-Wheel Trucks.

Chicago Railway Equipment Company.

Fig. 1279—Drexel Brake Beam with Keyed Strut.

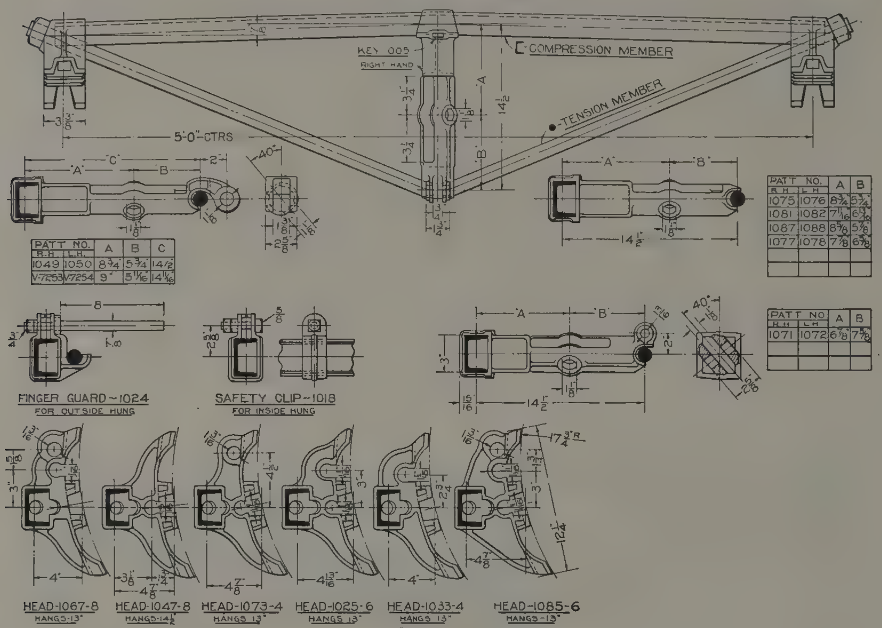


Fig. 1280—Drexel M. C. B. No. 2 Brake Beam with Keyed Strut.

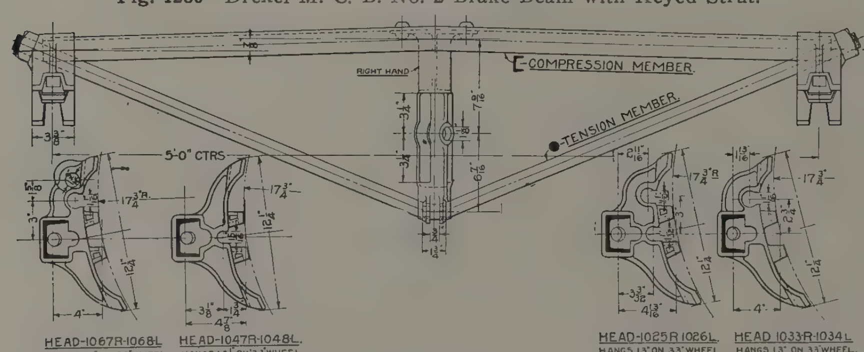


Fig. 1281—Drexel Brake Beam with Keyed Strut for Special Freight Service.

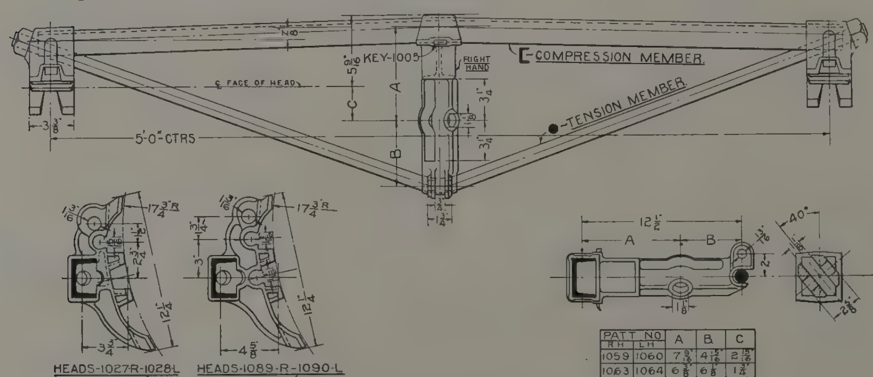


Fig. 1282—Drexel No. 1 M. C. B. Brake Beam with Keyed Strut.

Chicago Railway Equipment Company.

Fig. 1283—Drexel Brake Beam for Freight Service.

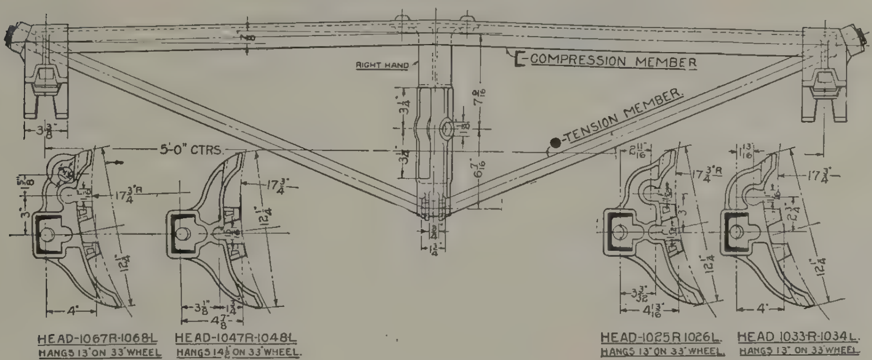


Fig. 1284—Drexel M. C. B. No. 2 Freight Brake Beam.

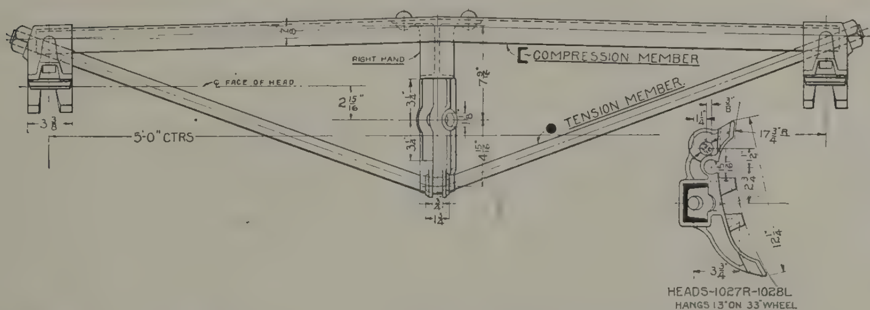


Fig. 1285—Drexel M. C. B. No. 1 Freight Brake Beam with Riveted Strut.

Fig. 1286—National Hollow Brake Beam for Six-Wheel Trucks.

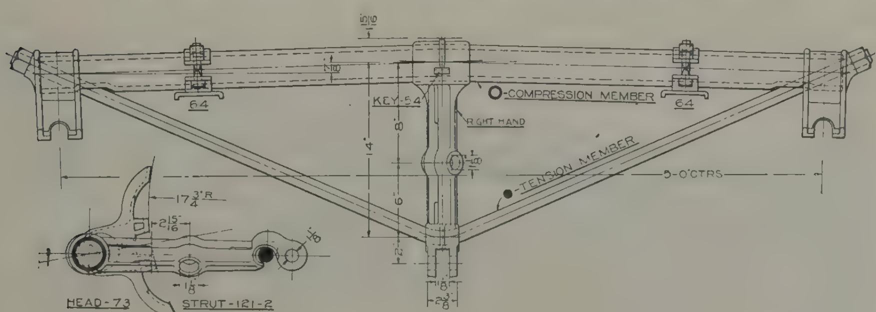


Fig. 1287—National Hollow 2½-in. Brake Beam with Rigid Heads for Heavy Freight Service.

Chicago Railway Equipment Company.

Fig. 1288—Huntoon Standard Freight Brake Beam. Joliet Railway Supply Company.

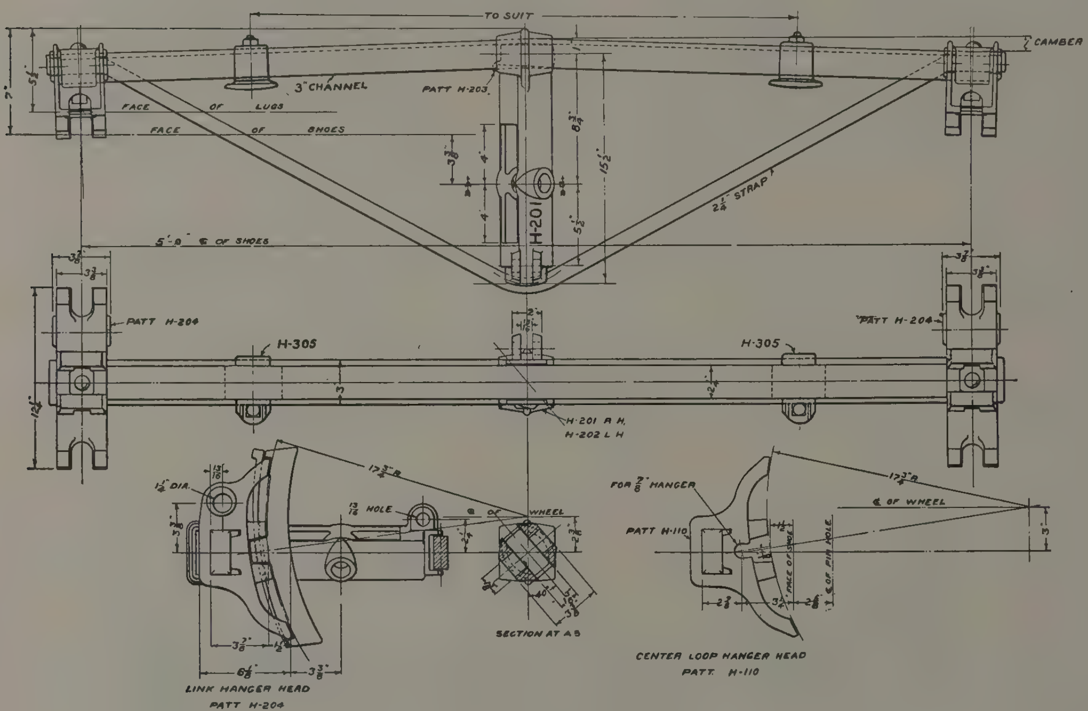


Fig. 1289—Huntoon Standard Brake Beam for Four-Wheel Passenger Car Trucks.
Joliet Railway Supply Company.

Fig. 1290—Huntoon Rigid Head Brake Beam for Four-Wheel Passenger Car Trucks.
Capacity, 28,000 lb. Joliet Railway Supply Company.

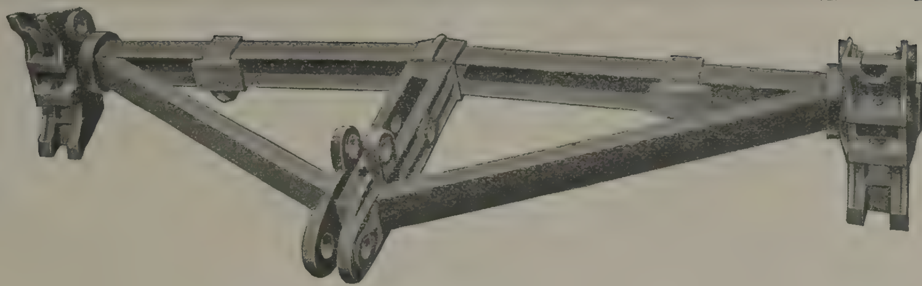


Fig. 1291—Huntoon Standard Brake Beam for Six-Wheel Passenger Car Trucks. Joliet Railway Supply Company.

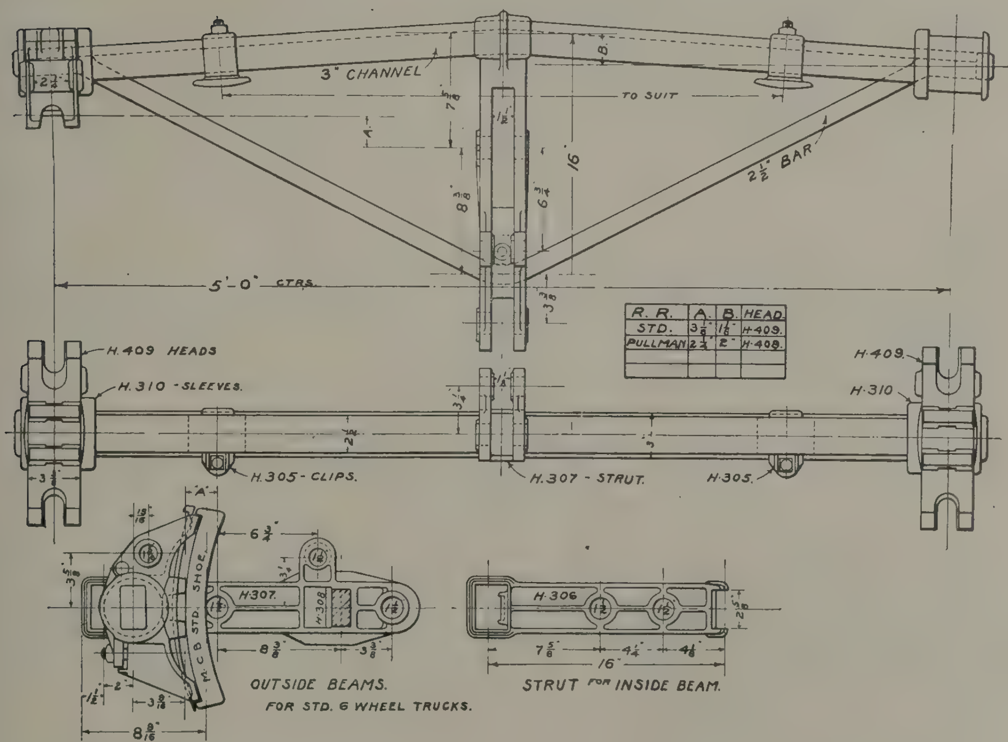
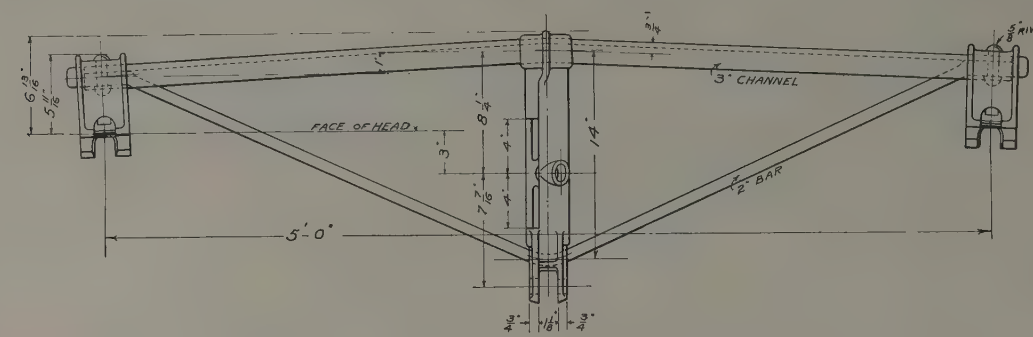


Fig. 1292—Huntoon Adjustable Head Brake Beam for Six-Wheel Passenger Car Trucks. Capacity, 40,000 lbs. Joliet Railway Supply Company.

Fig. 1293—Huntoon Adjustable Head Passenger Brake Beam Details. Joliet Railway Supply Company.



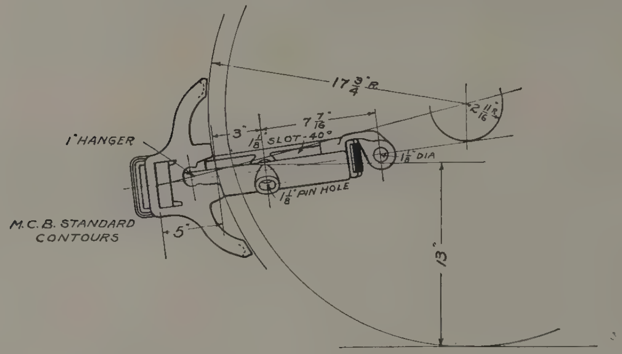


Fig. 1294—Huntoon No. 2, U. S. Government Standard Interchange Brake Beam for Freight Car Trucks. Joliet Railway Supply Company.

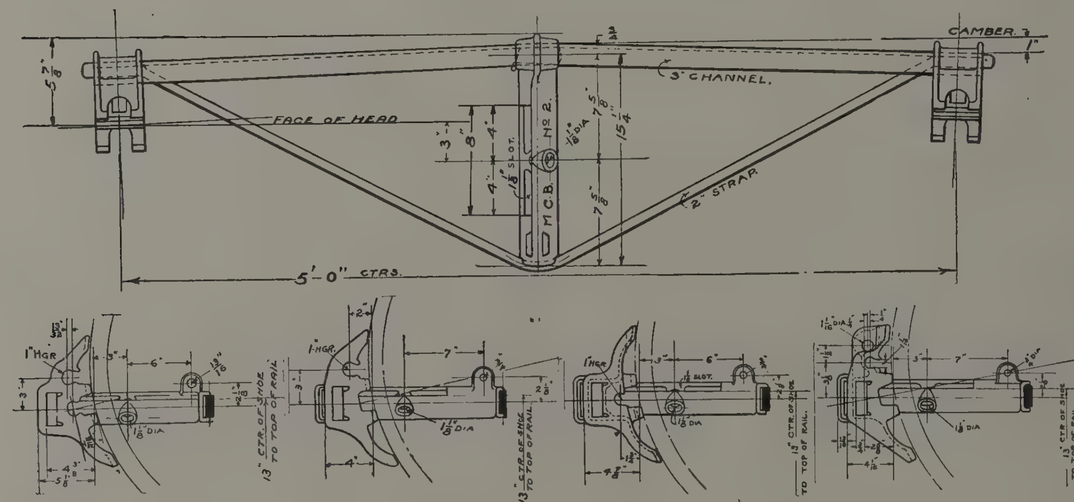
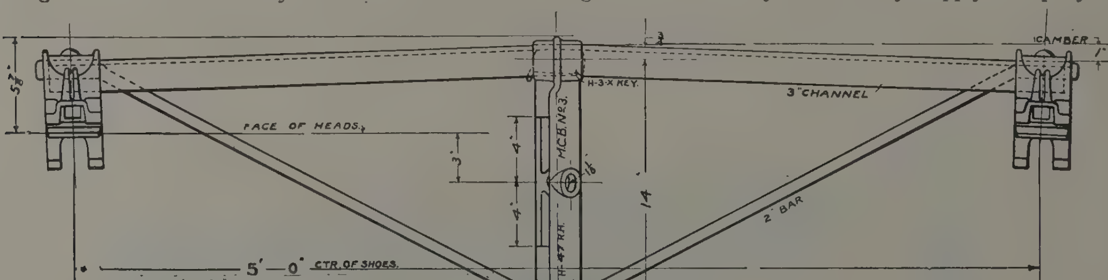


Fig. 1295—Huntoon Heavy No. 2 Brake Beam for Freight Car Trucks. Joliet Railway Supply Company.



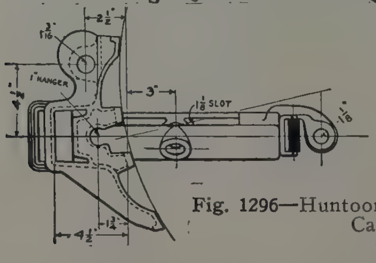


Fig. 1296—Huntoon Special No. 3 Brake Beam for New York Central Freight Car Trucks. Joliet Railway Supply Company.

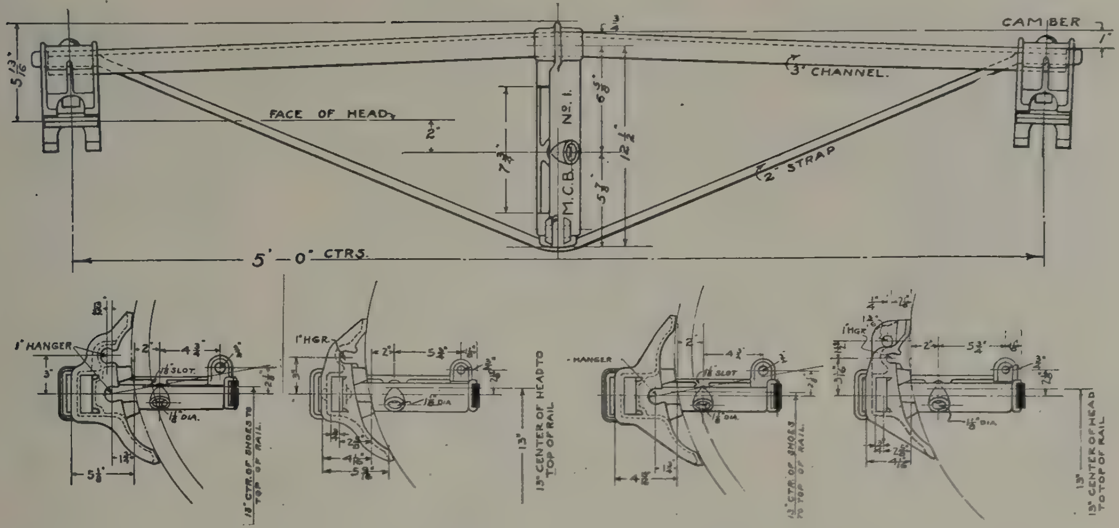


Fig. 1297—Huntoon M. C. B. No. 1 Brake Beam. Joliet Railway Supply Company.

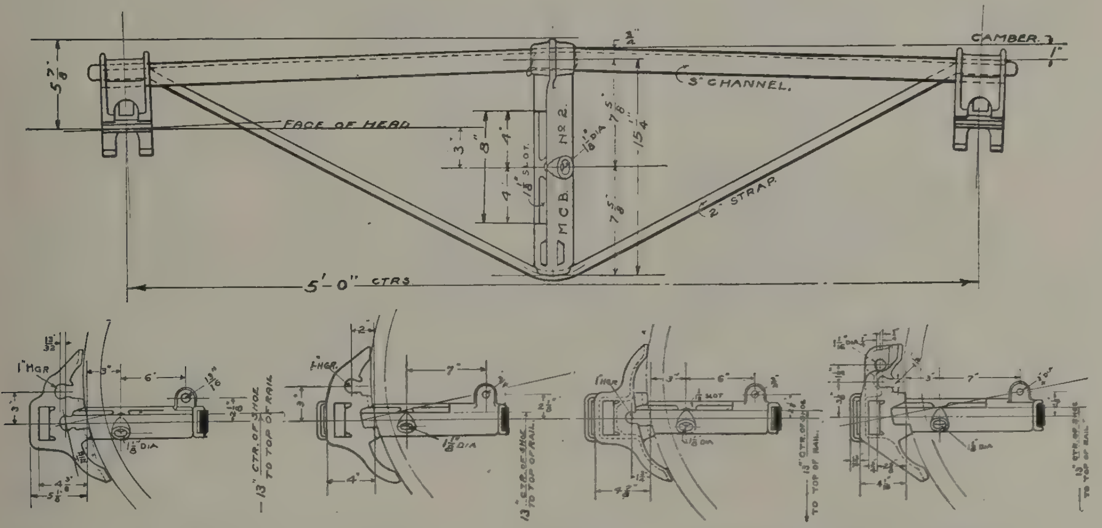


Fig. 1298—Huntoon M. C. B. No. 2 Brake Beam. Joliet Railway Supply Company.

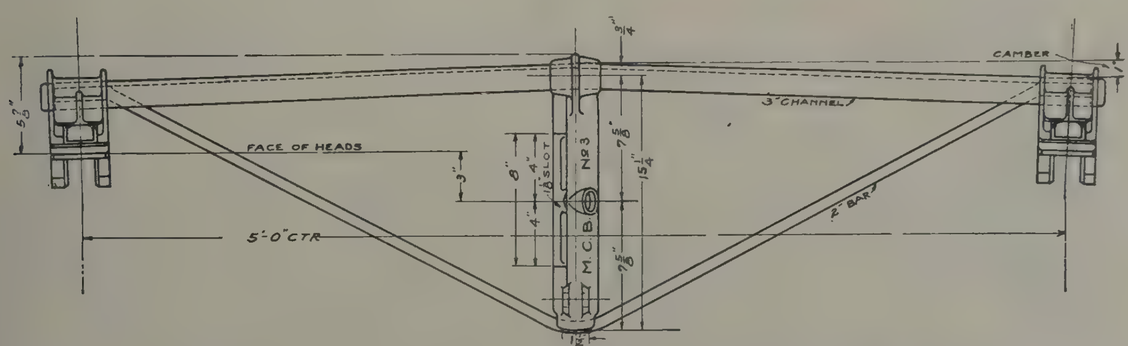
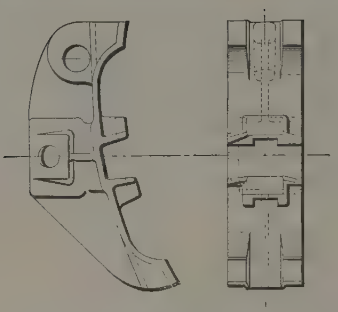


Fig. 1299—Huntoon M. C. B. No. 3 Brake Beam. Joliet Railway Supply Company.



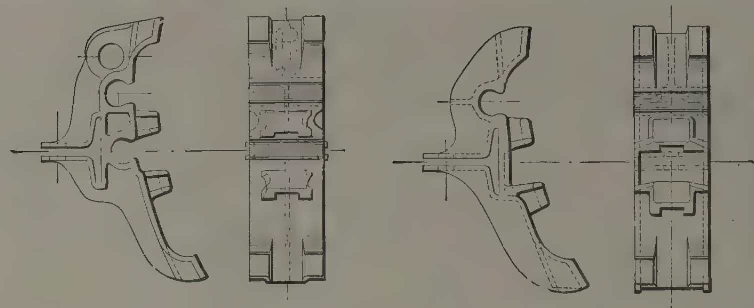


Fig. 1300—Brake Head for Ajax Brake Beams. Fig. 1301—Brake Heads for Acme Brake Beams. American Steel Foundries.

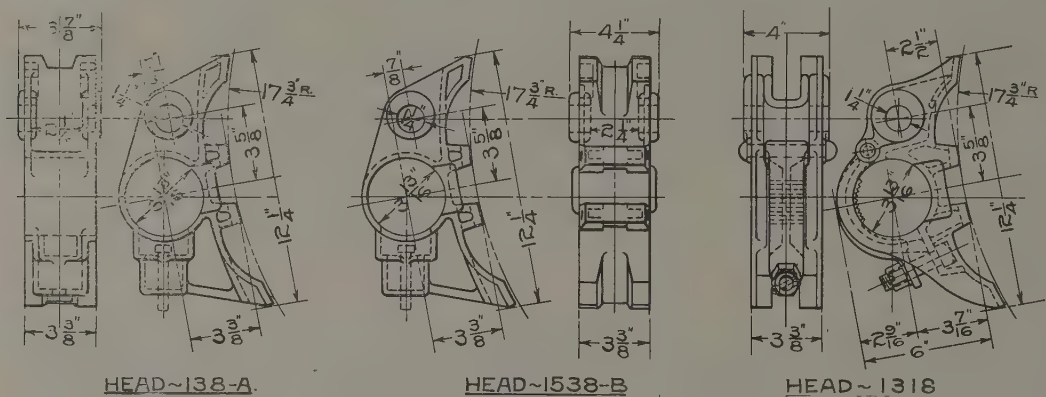


Fig. 1302—Creco Standard Adjustable Brake Heads. Chicago Railway Equipment Company.

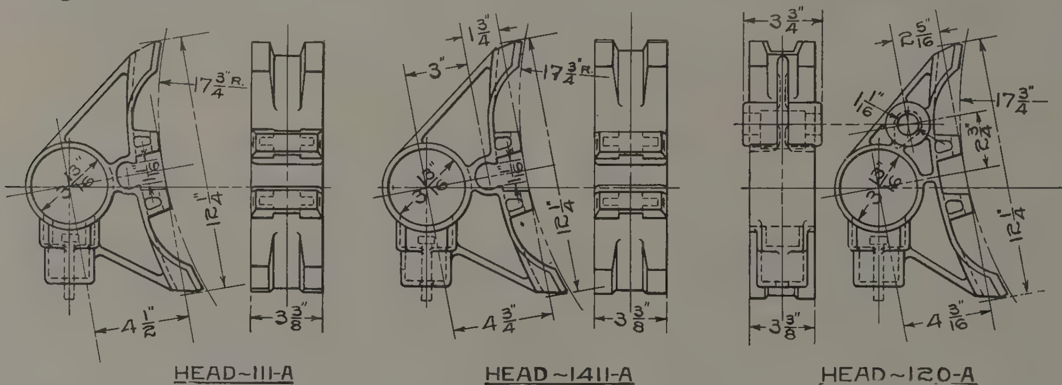


Fig. 1303—Creco Standard Adjustable Brake Heads. Chicago Railway Equipment Company.

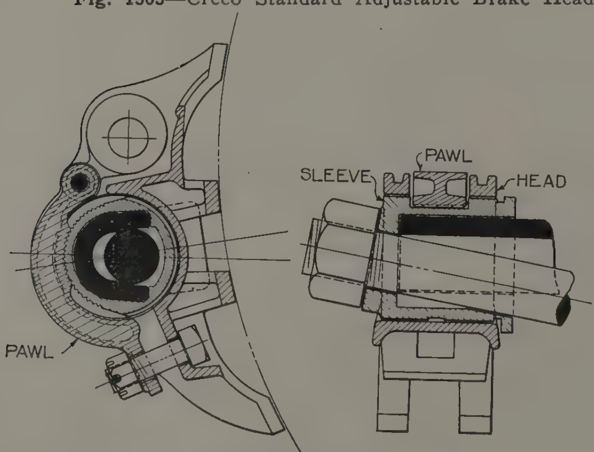


Fig. 1304—Semi-Adjustable Head for Creco Brake Beam. Chicago Railway Equipment Company.

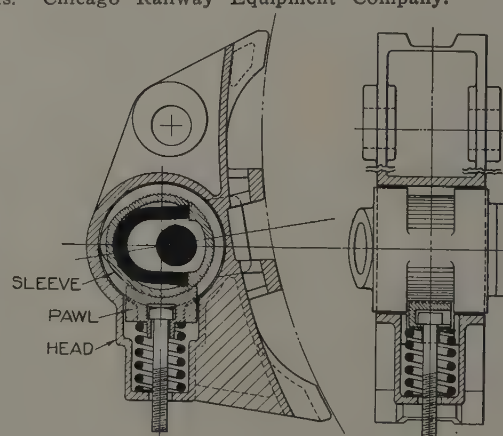


Fig. 1305—Automatic Adjustable Head and Sleeve for Creco Brake Beams. Chicago Railway Equipment Company.

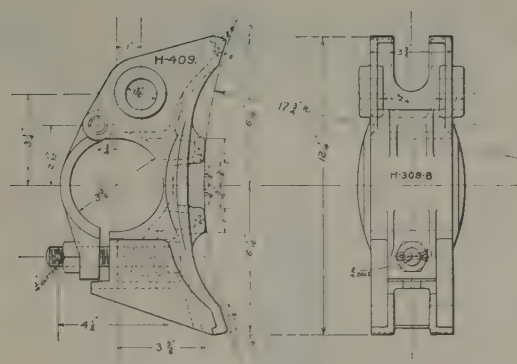


Fig. 1306—Huntoon Adjustable Brake Head.
Joliet Railway Supply Company.

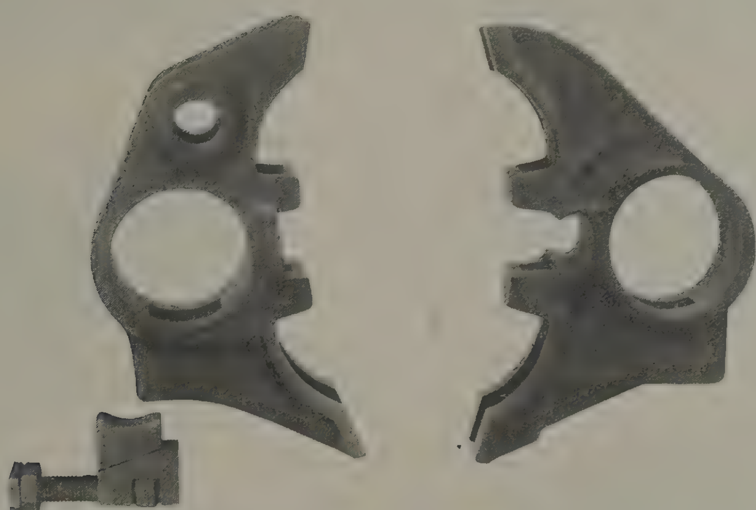
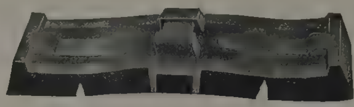


Fig. 1307—Adjustable Brake Heads for Vulcan, Hercules and Ajax Passenger Brake Beams.
American Steel Foundries.

Top Hanger, Bottom Adjustment. Top Hanger, Top Adjustment. Center Hanger, Bottom Adjustment.

Fig. 1308—Buffalo Adjustable Brake Heads. Buffalo Brake Beam Company.

Showing Reinforcing Steel Back and Lug.

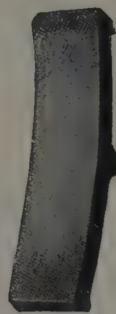


Broken Brake Shoe Held by Steel Back.

Brake Shoe Worn to Steel Back.

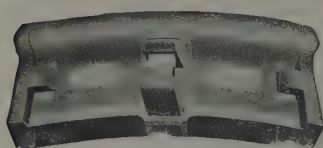
Plain Gray Iron Type.

Special Chilled Type.



Diamond S Type.

Fig. 1309—Special Reinforced Unflanged Brake Shoes. American Brake Shoe & Foundry Company.



Reinforcing Steel Back and Steel Lug.

Diamond S Type with Full Flange.

Fig. 1310—Special Reinforced Flanged Brake Shoes. American Brake Shoe & Foundry Company.

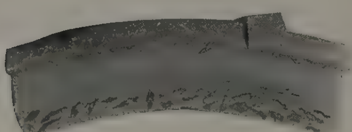


Fig. 1311—Truing Up Brake Shoe. American Abrasive Metals Company.

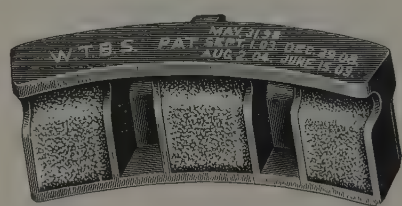


Fig. 1312—Wheel Truing Brake Shoe. Wheel Truing Brake Shoe Company.

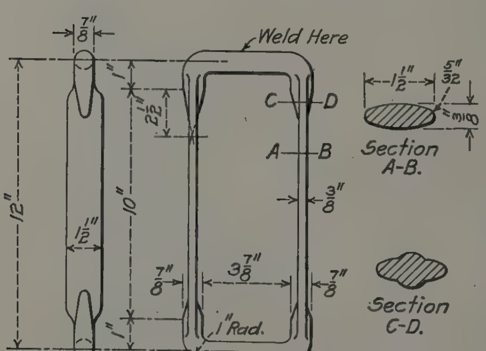


Fig. 1313—Brake Beam Hanger Designed for Lateral Flexibility. Q & C Company.

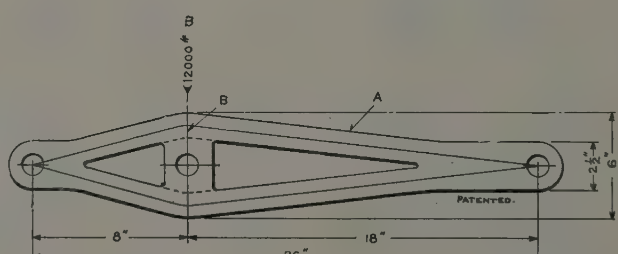


Fig. 1314—Trussed Brake Lever with Welded-In Strut. Schaefer Equipment Company.

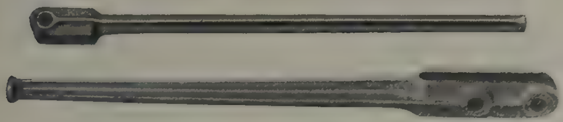


Fig. 1315—Cylinder Push Rods. National Malleable Castings Company

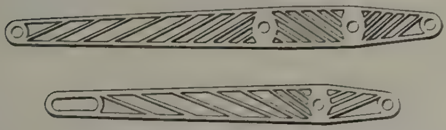
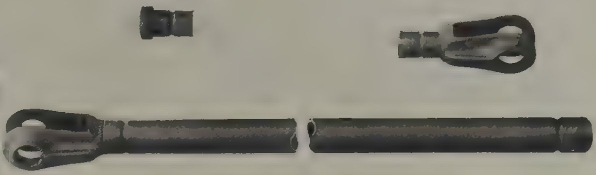


Fig. 1316—Malleable Iron Brake Levers. Dayton Malleable Iron Company.



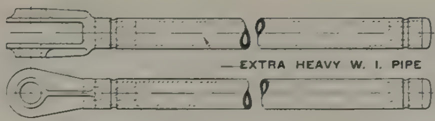


Fig. 1317—National Cylinder Push Rod Jaw and Tip. National Malleable Castings Company.

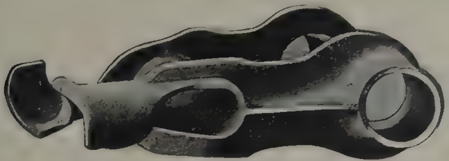


Fig. 1318—Western One-Hole Brake Jaw.

Fig. 1319—One-Hole Malleable Iron Brake Jaw.

Fig. 1320—Western Three-Hole Brake Jaw.

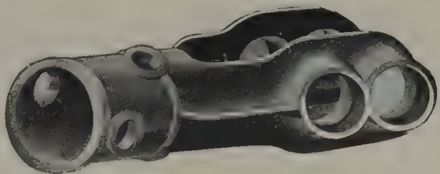


Fig. 1321—Two-Hole Malleable Iron Brake Jaw.

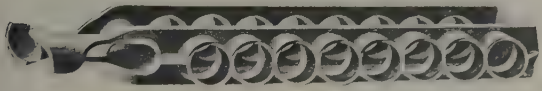


Fig. 1322—Western Dead Lever Guide.

Fig. 1323—Western Bottom Connecting Rod with Center of Extra Heavy Pipe.

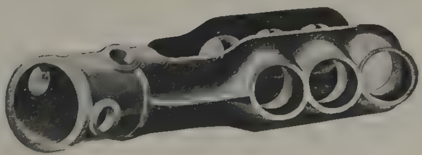


Fig. 1324—Three-Hole Malleable Iron Brake Jaw.

Figs. 1318-1324, Western Railway Equipment Company.

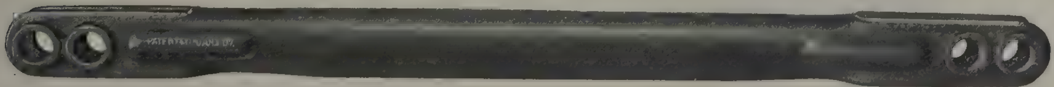


Fig. 1325—Two-Hole Straight Type Connection Rod for Freight Car Trucks. Schaefer Equipment Company.

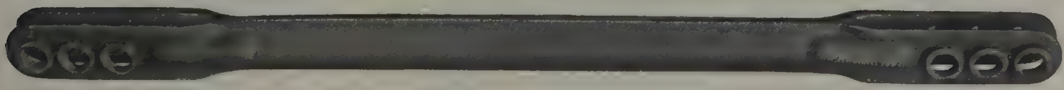


Fig. 1326—Three-Hole Straight Type Connection Rod for Freight Car Trucks. Schaefer Equipment Company.

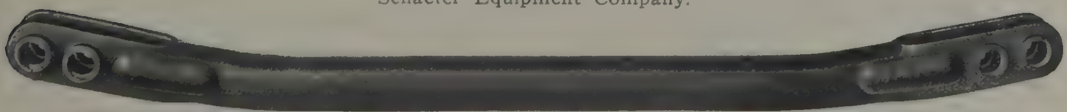


Fig. 1327—Two-Hole Offset Type Connection Rod for Freight and Passenger Car Trucks. Schaefer Equipment Company.

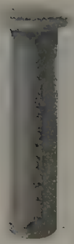


Fig. 1328—Brake Lever Pin.

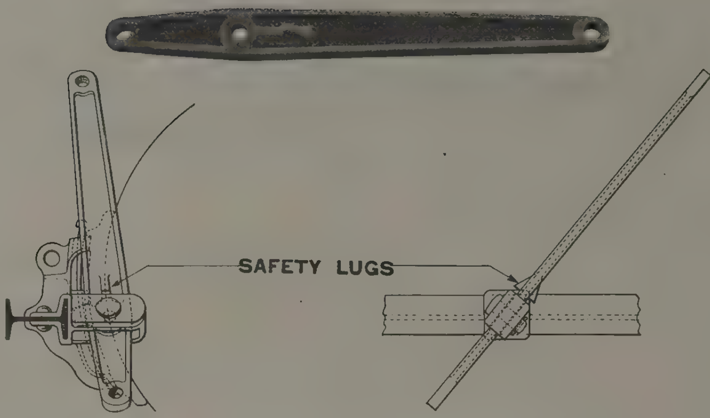


Fig. 1329 -National Safety Brake Lever.

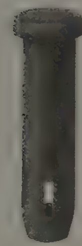


Fig. 1330—Brake Lever Pin.

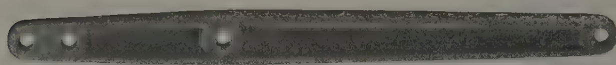


Fig. 1331—Cylinder Lever.

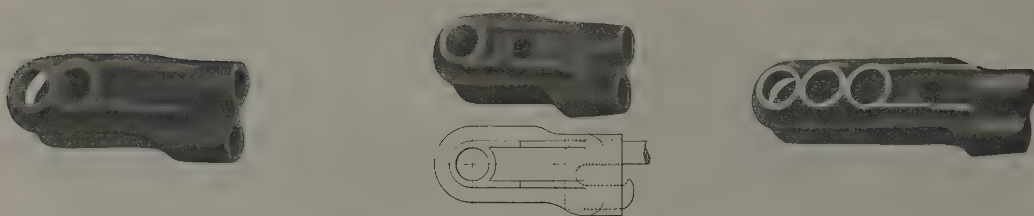


Fig. 1332—National Brake Jaws.

Fig. 1333—Truck Lever Connections.

Fig. 1334—The "National" Dead Lever Guide.

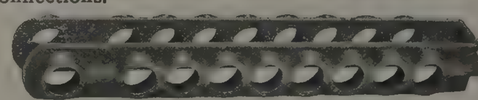


Fig. 1335—Dead Lever Guide or Brake Lever Stop.

Fig. 1336—"National" Sheave Jaw.

Fig. 1337—Floating Lever Bracket.

Fig. 1338—Two-Piece Adjustable Brake Beam Fulcrum.

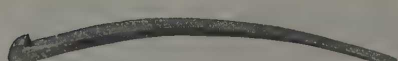


Fig. 1339—Brake Shoe Key, M. C. B. Standard.

Fig. 1340—Finger Guard.

National Malleable Castings Company.

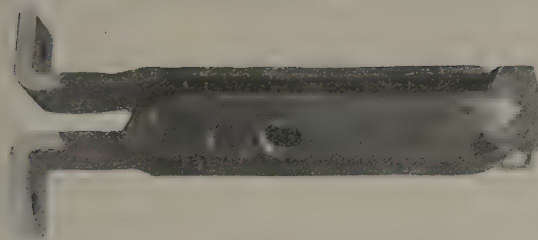


Fig. 1341—Channel Brake Beam Forged Steel Fulcrum. Damascus Brake Beam Company.

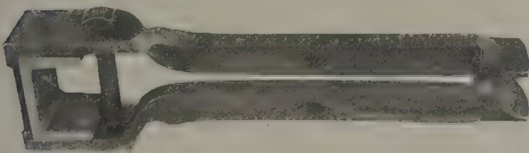


Fig. 1343—Channel Brake Beam Forged Steel Strut for Outside Application. Damascus Brake Beam Company.

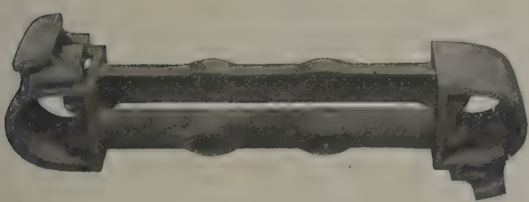


Fig. 1345—Creco Duplex Strut for Brake Beams. Chicago Railway Equipment Company.

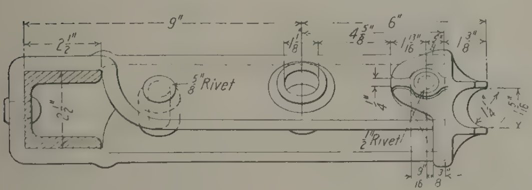


Fig. 1347—Forged Steel Strut. Buffalo Brake Beam Company.

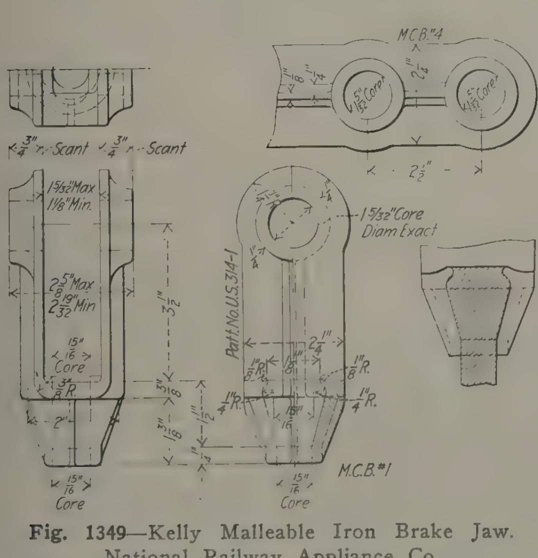


Fig. 1349—Kelly Malleable Iron Brake Jaw. National Railway Appliance Co.

Fig. 1342—U-Section Forged Steel Fulcrum. Damascus Brake Beam Company.

Fig. 1344—Anglerod Forged Steel Fulcrum. Damascus Brake Beam Company.

Fig. 1346—Waycott Brake Beam Forged Steel Fulcrum. Damascus Brake Beam Company.

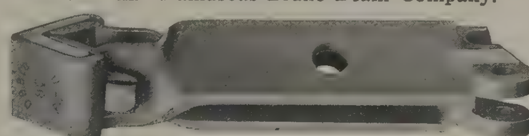


Fig. 1346A—Channel Brake Beam Forged Steel Fulcrum. Damascus Brake Beam Company.

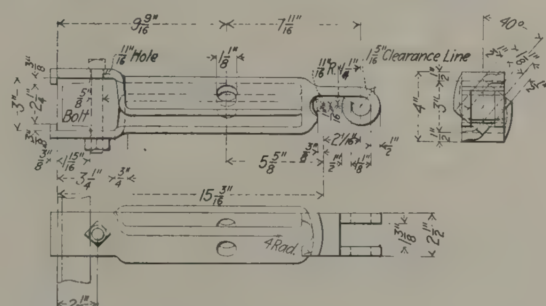


Fig. 1348—Forged Steel Fulcrum for U. S. Standard No. 2 Channel Brake Beam. Damascus Brake Beam Company.

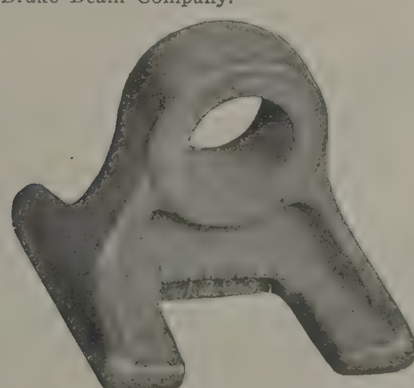


Fig. 1350—Sliding Chair for Creco Third Point Support. Chicago Railway Equipment Company.

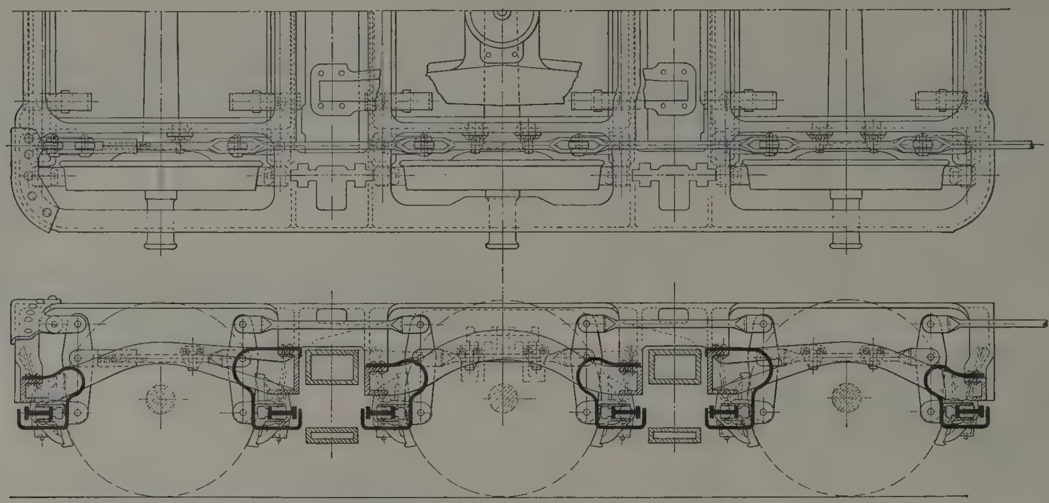


Fig. 1351—Creco Brake Beam Clasp Brake Arrangement for Triple Truck.
Chicago Railway Equipment Company.

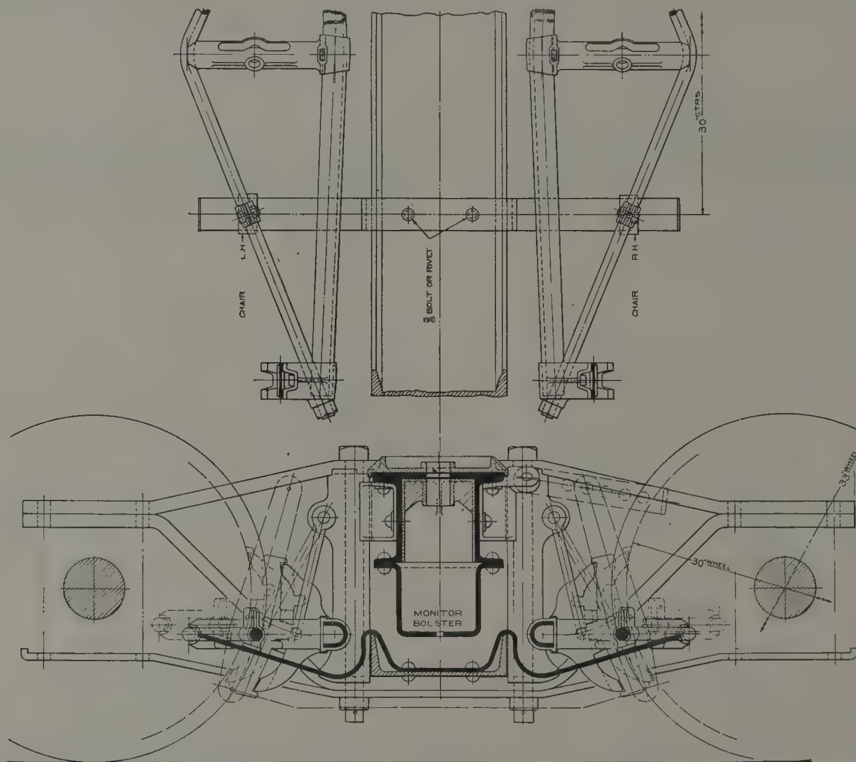


Fig. 1352—Creco Four-Point Support and Safety Device as Applied to Rigid Diamond Freight Car Truck.
Chicago Railway Equipment Company.

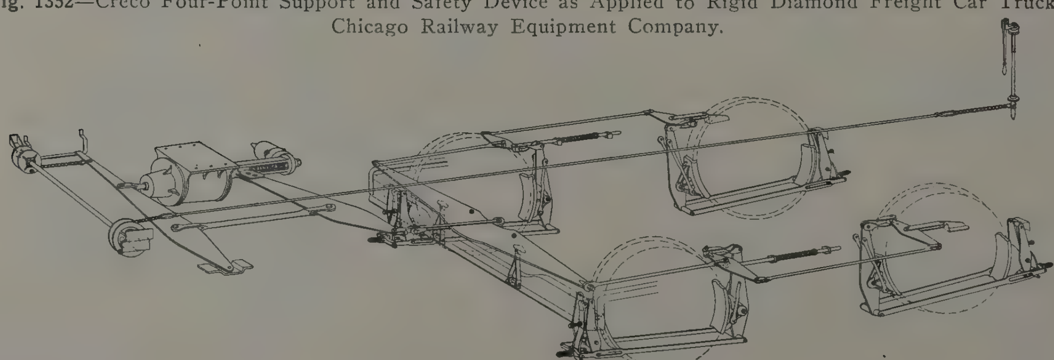


Fig. 1353—Arrangement of Brake Rigging for Clasp Brakes of New York, Westchester & Boston Suburban Cars.

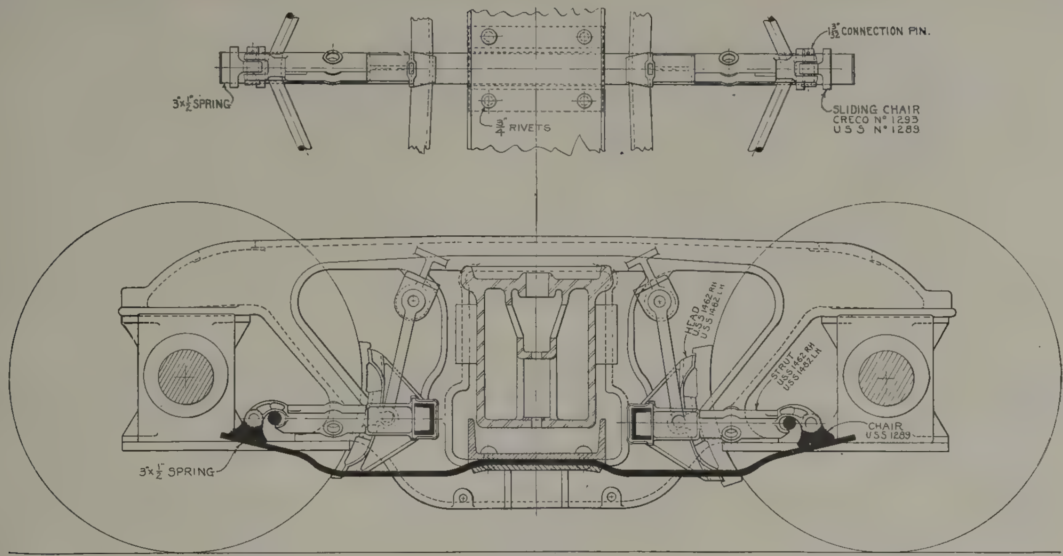


Fig. 1354—Creco Third-Point Support and Safety Device with Creco Third-Point Chair as Applied to the 100,000 Cars of 40, 50 and 70-ton Capacities, Built for the United States Railroad Administration. Chicago Railway Equipment Company.

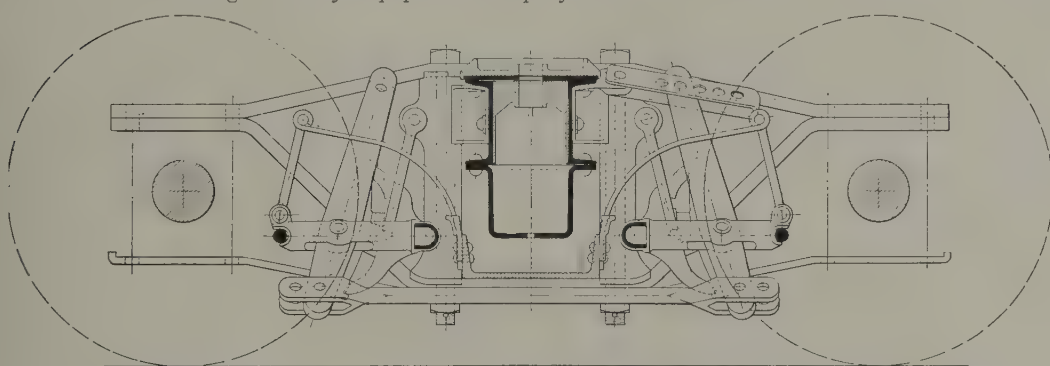


Fig. 1355—Inside Hung Creco Brake Beams Applied to Rigid Diamond Freight Car Truck. Chicago Railway Equipment Company.

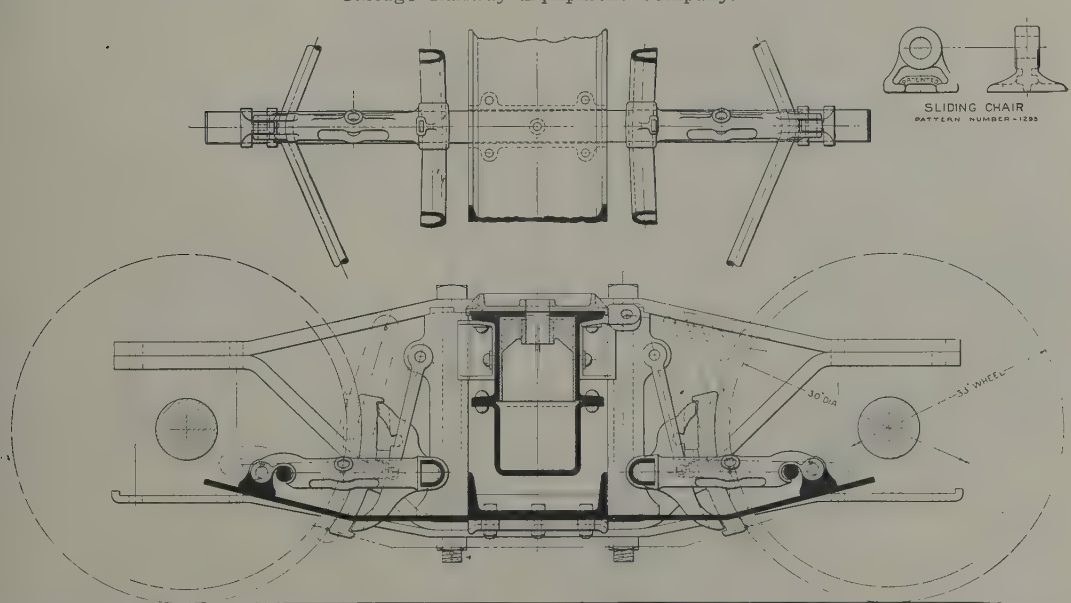


Fig. 1356—Creco Sliding Third-Point Support and Safety Device Applied to Rigid Diamond Freight Car Truck. Chicago Railway Equipment Company.

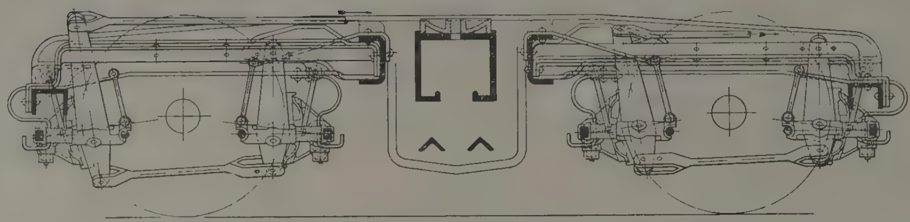


Fig. 1357—Diamond Special Brake Beam Clasp Brake Arrangement for Four-Wheel Trucks. Chicago Railway Equipment Company.

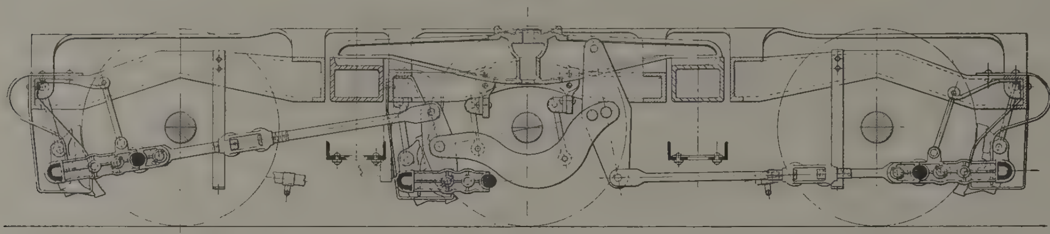


Fig. 1358—Arrangement of Brake Rigging for Triple Brakes on Six-Wheel Passenger Car Trucks. Chicago Railway Equipment Company.

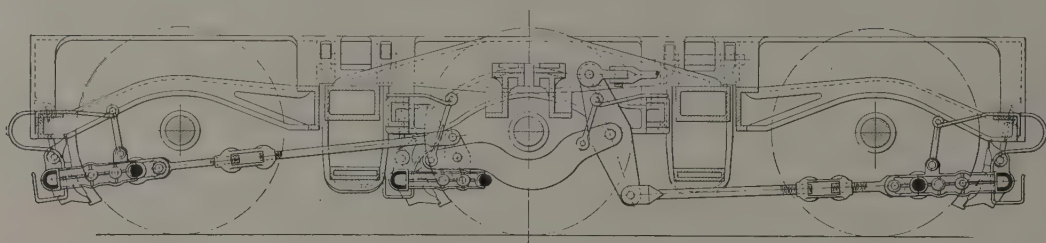


Fig. 1359—Standard Triple Arrangement of Brake Rigging for All-Steel Six-Wheel Passenger Car Trucks. Chicago Railway Equipment Company.

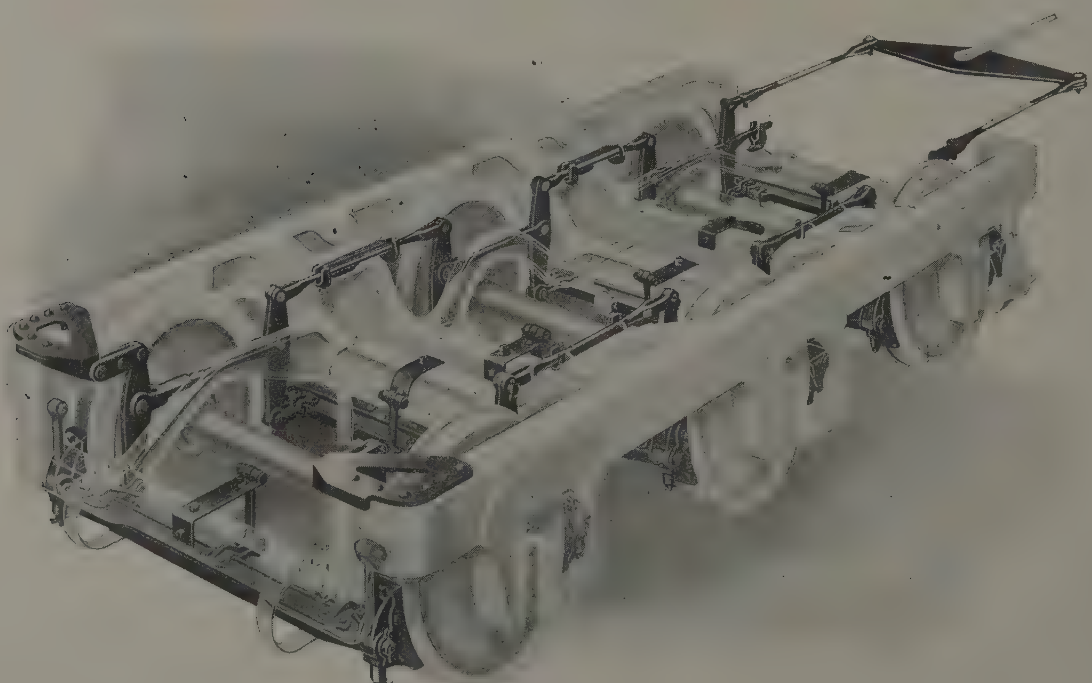


Fig. 1360—Simplex Clasp Brake. American Steel Foundries.

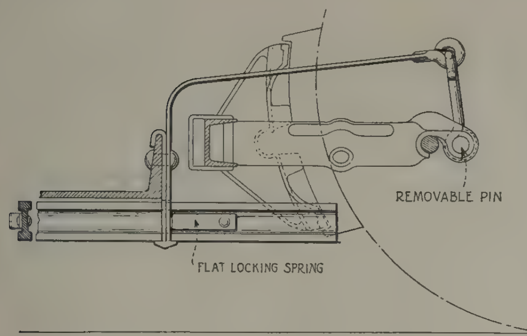


Fig. 1361—Atlas Brake Beam Safety Guard and Third-Point Support. American Steel Foundries.

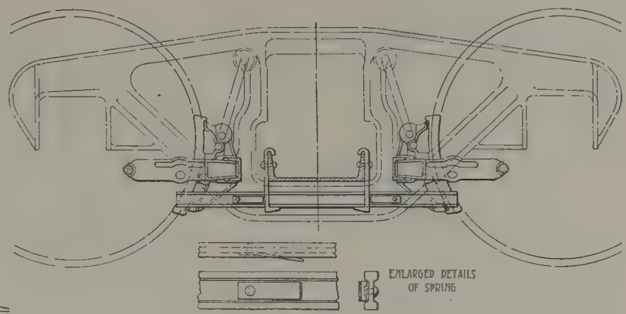


Fig. 1362—Elliott Safety Hanger. American Steel Foundries.

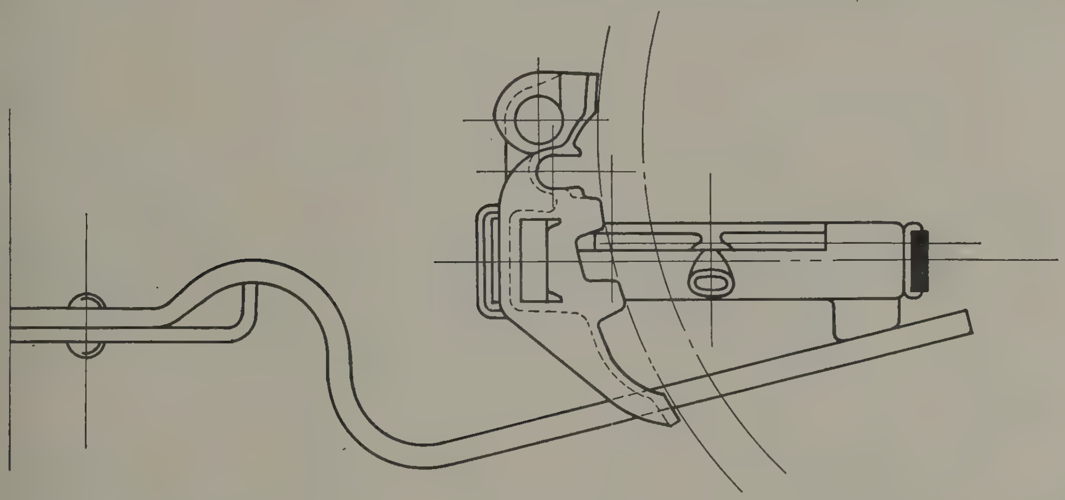


Fig. 1363—Joliet Brake Beam Third Support and Safety Guard. Joliet Railway Supply Company.

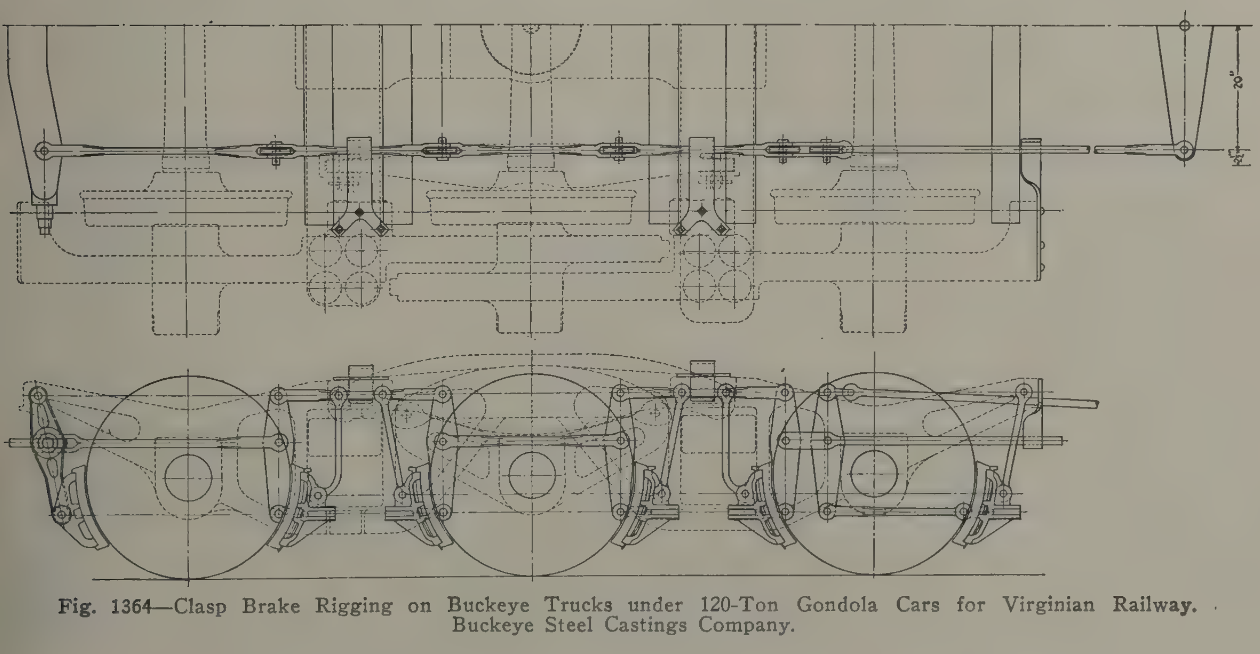


Fig. 1364—Clasp Brake Rigging on Buckeye Trucks under 120-Ton Gondola Cars for Virginian Railway. Buckeye Steel Castings Company.

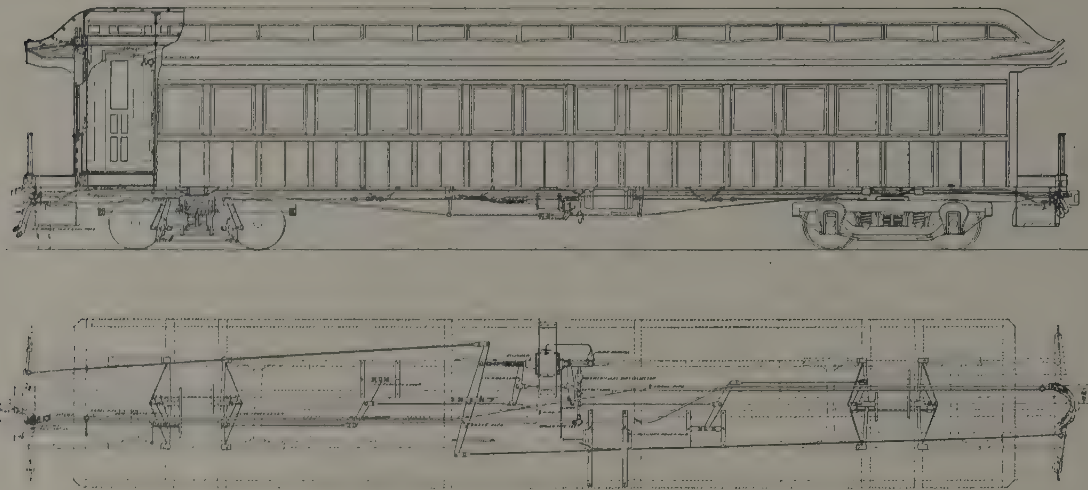


Fig. 1365—Westinghouse Air Brake and Train Air Signal Apparatus Applied to a Passenger Train Car.

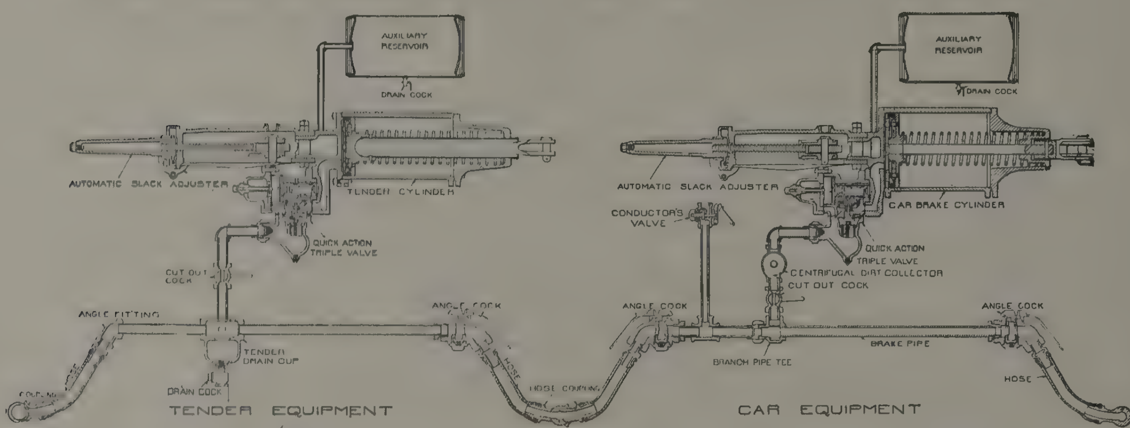


Fig. 1366—Diagram of Westinghouse Old Standard Quick Action Air Brake Apparatus for Passenger Train Cars.

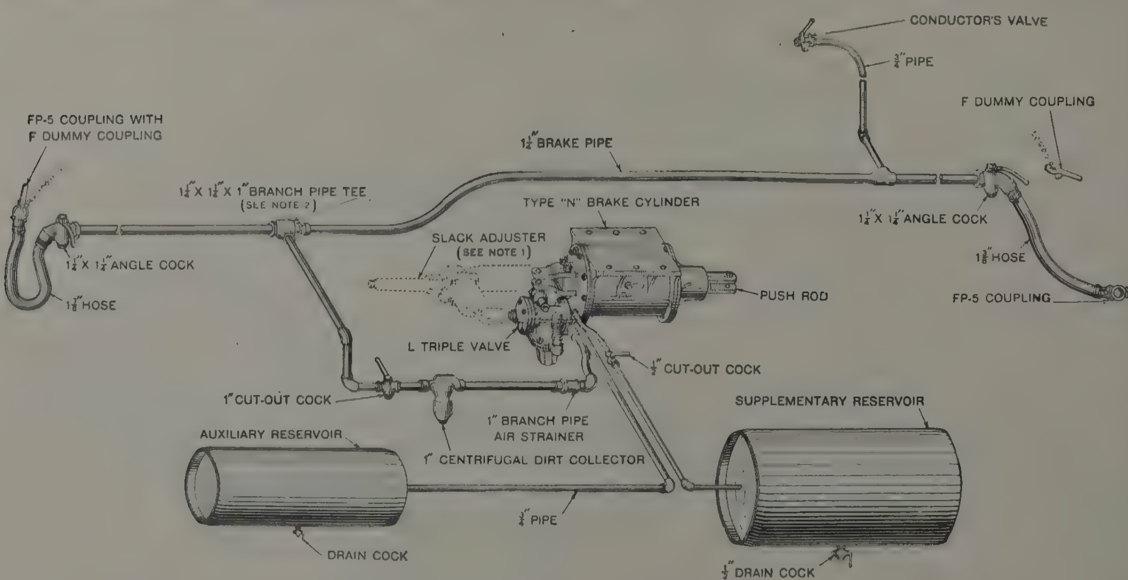


Fig. 1367—L N Passenger Brake Equipment.

Westinghouse Air Brake Company.

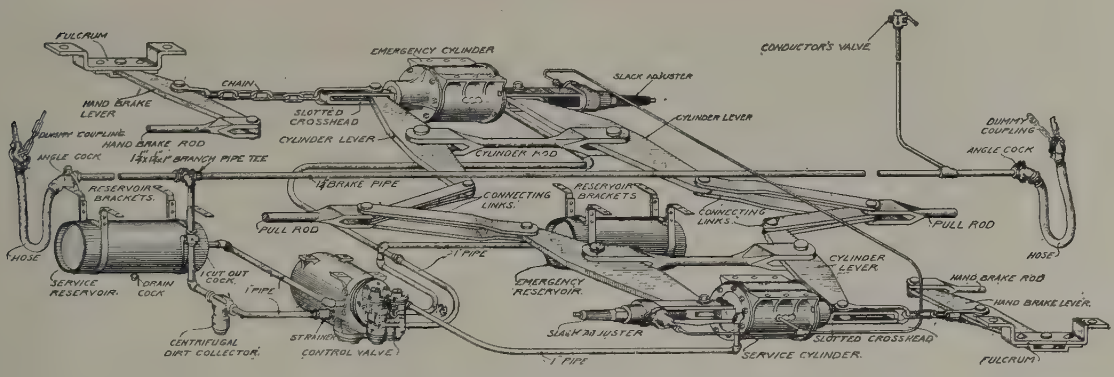


Fig. 1368—P C Passenger Brake Equipment with Cylinders Pointing in Opposite Directions.

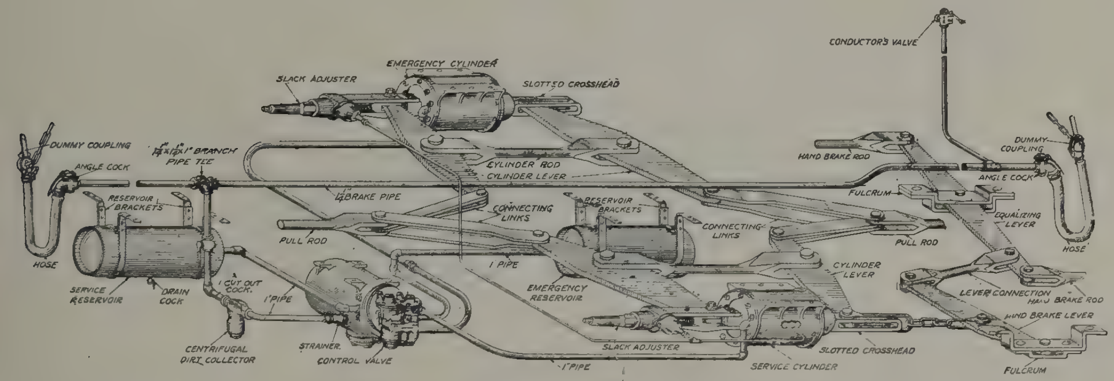


Fig. 1369—P C Passenger Brake Equipment with Cylinders Pointing in the Same Direction.

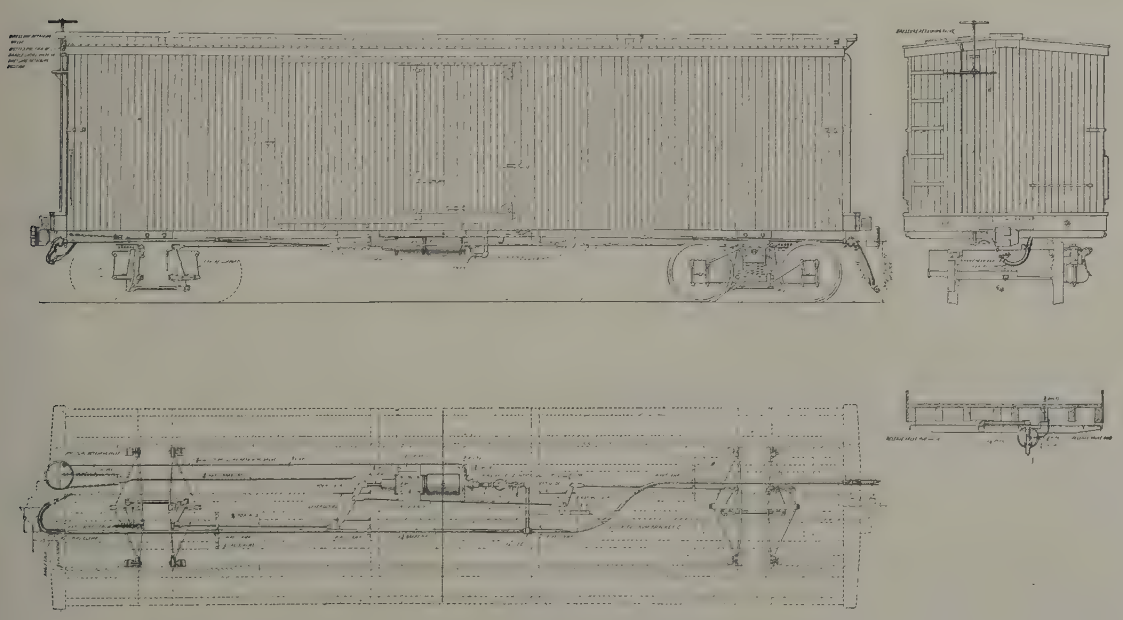


Fig. 1370—Westinghouse Single Cylinder Air Brake Equipment Applied to a Freight Car.

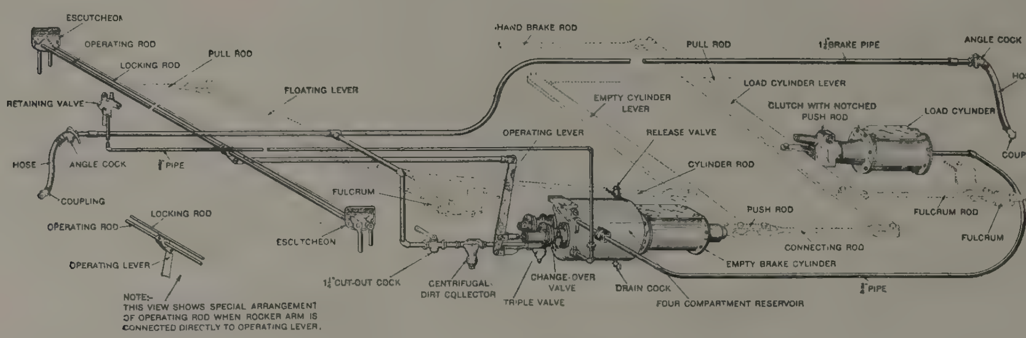


Fig. 1371—Empty and Load Freight Brake Equipment.

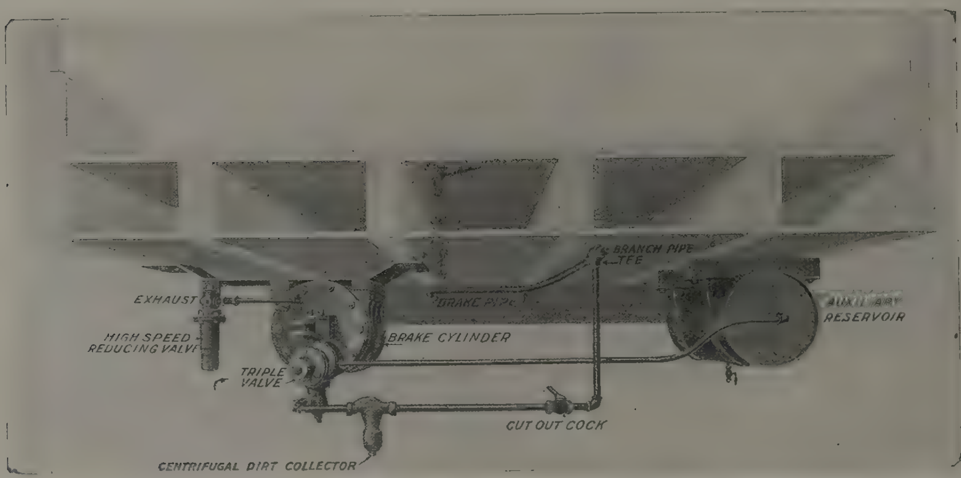


Fig. 1372—Arrangement of High Speed Brake Under Passenger Train Car.

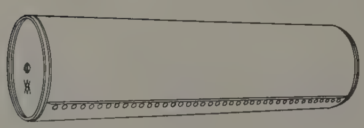


Fig. 1373—Main Reservoir.

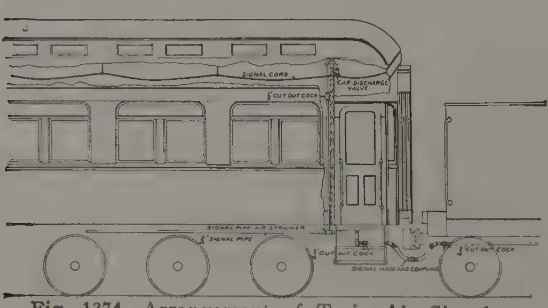


Fig. 1374—Arrangement of Train Air Signal on Passenger Train Car.

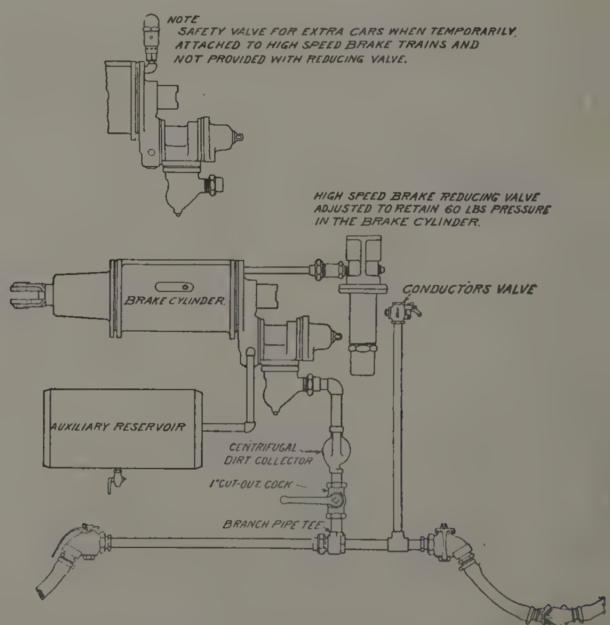


Fig. 1375—Diagram of Apparatus for High Speed Brake on Passenger Train Car.

Westinghouse Air Brake Company.

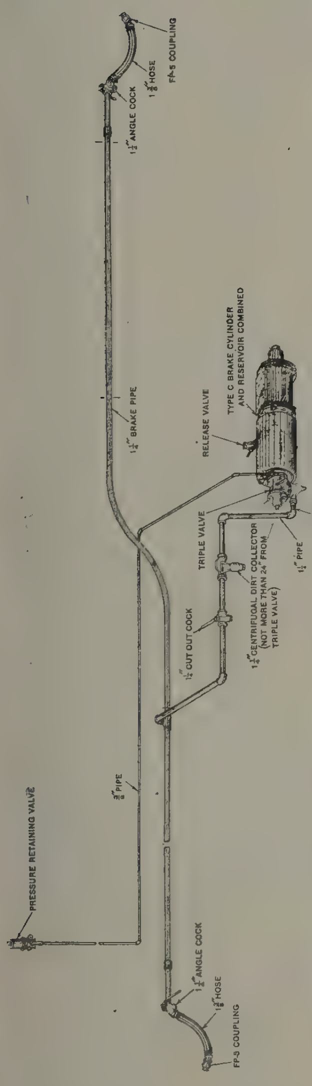


Fig. 1376—Piping Diagram of Standard Single Cylinder Freight Brake Equipment, Schedule KC.

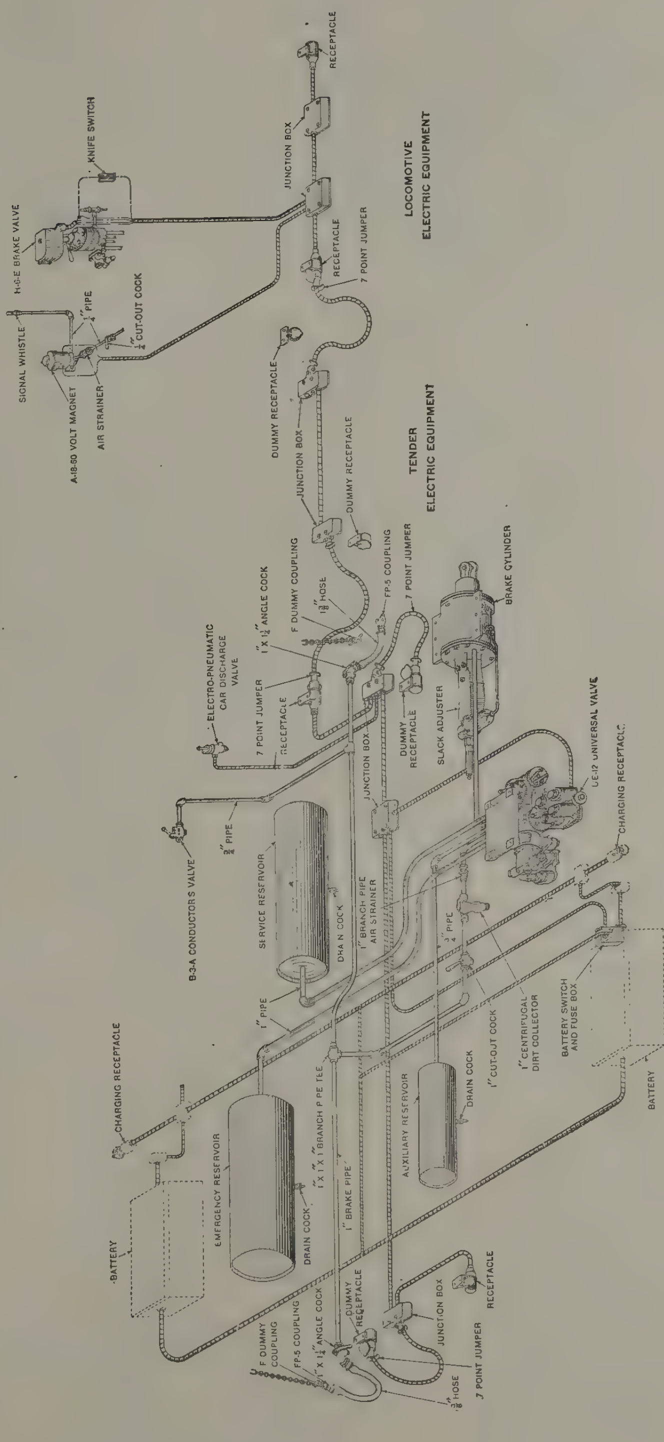


Fig. 1377—Piping Diagram of Westinghouse Universal Common Standard Electro-Pneumatic Brake Equipment, Schedule UCE, Complete for Engine, Tender and Car.

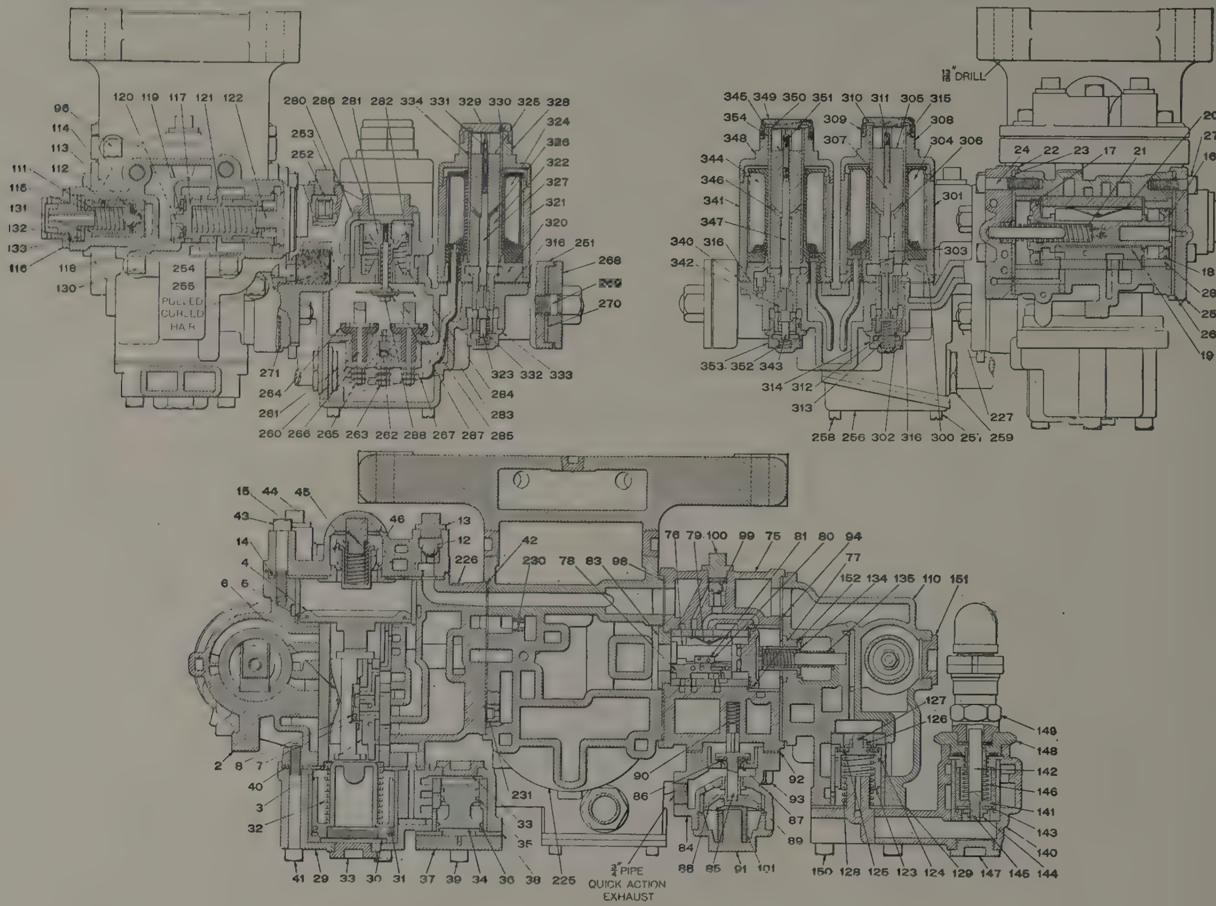


Fig. 1378—Universal Valve, Type UE-12.

List of Parts of Universal Valve, Fig. 1378.

Equalizing Portion.

2 *Equalizing Body*
3 *Equalizing Slide Valve*
4 *Equalizing Piston*
5 *Equalizing Piston Ring*
6 *Equalizing Slide Valve Spring*
7 *Equalizing Graduating Valve*
8 *Graduating Valve Spring*
11 *Equalizing Cylinder Cap*
12 *⅝-in. Ball Check*
13 *Check Valve Cap Nut*
14 *Cylinder Cap Gasket*
15 *Square Head Cap Screw*
16 *Release Piston*
17 *Release Piston Ring*
18 *Release Piston Ring*
19 *Release Slide Valve*
20 *Release Slide Valve Spring*
21 *Release Piston Spring*
22 *Application Piston Cover*
23 *Application Piston Cover Gasket*
24 *Square Head Cap Screw*
25 *Release Piston Cover*
26 *Release Piston Cover Gasket*
27 *Square Head Cap Screw*
28 *Release Piston Bush*
29 *Charging Valve Body*
30 *Graduated Release Piston*
31 *Graduated Release Piston Ring*
32 *Graduated Release Piston Spring*
33 *Flush Nut*
34 *Charging Valve*
35 *Charging Valve Piston Ring*
36 *Charging Valve Piston Ring*
37 *Charging Valve Cover*
38 *Charging Valve Cover Gasket*
39 *Square Head Cap Screw*
40 *Charging Valve Body Gasket*
41 *Square Head Cap Screw*
42 *Gasket (between Equal. Portion and Pipe Bracket)*
43 *Square Head Cap Screw*
44 *Graduating Sleeve*
45 *Graduating Spring*
46 *Graduating Nut*

Quick Action Portion With High Pressure Cap Having Protection Valve and Safety Valve.

75 *Emergency Body Complete*
76 *Emergency Piston*
77 *Emergency Piston Ring*
78 *Emergency Slide Valve*
79 *Emergency Slide Valve Spring*
80 *Emergency Graduating Valve*
81 *Emergency Graduating Valve Spring*
83 *Flush Nut*
84 *Quick Action Valve Case*
85 *Quick Action Valve*
86 *Quick Action Valve Seat*
87 *Quick Action Valve Nut*
88 *Quick Action Piston*
89 *Quick Action Piston Ring*
90 *Quick Action Valve Spring*
91 *Cap Nut for Quick Action Valve Case*
92 *Quick Action Valve Case Gasket*
93 *Stud and Nut*
94 *High Pressure Cap Gasket*
96 *Cap Screw*
98 *Gasket (between Quick Action Portion and Pipe Bracket)*
99 *½-in. Ball Check*
100 *Ball Check Cap Nut*
101 *Spring to hold Quick Action Piston against Quick Action Valve Stem*

High Pressure Cap having Protection Valve and Safety Valve Cap

110 *High Pressure Cap Body*
111 *Protection Valve*
112 *Protection Valve Seat*
113 *Protection Valve Nut*
114 *Cotter*
115 *Protection Valve Spring*
116 *Protection Valve Cap Nut*
117 *Intercepting Valve*
118 *Intercepting Valve Seat*
119 *Intercepting Valve Nut*
120 *Cotter*
121 *Intercepting Valve Spring*
122 *Intercepting Valve Cap Nut*
123 *High Pressure Valve*
124 *Piston Ring*
125 *High Pressure Valve Seat*
126 *High Pressure Valve Seat Nut*
127 *Cotter*
128 *High Pressure Valve Spring*
129 *Safety Valve Bracket Gasket*
130 *Cap Screw*
131 *Protection Valve Seat*
132 *Protection Valve Washer*
133 *Protection Valve Seat Nut*
134 *Emergency Piston Stop*
135 *Emergency Piston Stop Spring*
140 *Safety Valve Bracket Body*
141 *Cut-off Valve*

142 *Cut-off Valve Stem*
143 *Cut-off Valve Seat*
144 *Cut-off Valve Nut*
145 *Cotter*
146 *Cut-off Valve Spring*
147 *Flush Nut*
148 *Cut-off Valve Cap Nut*
149 *E-7 Safety Valve*
150 *Cap Screw*
151 *Flush Nut*
152 *Emergency Piston Stop Nut*

Type C—Pipe Bracket.

225 *Type C Pipe Bracket*
226 *Stud Nut*
227 *Stud Nut*
230 *Service Choke Plug*
231 *Exhaust Choke Plug*

Electric Portion—Magnet Bracket Portion.

251 *Magnet Bracket*
252 *Check Valve*
253 *Check Valve Cap Nut*
254 *Cap Nut for Strainer*
255 *Perforated Plates for Strainer*
256 *Junction Box Cover*
257 *Cap Screw*
258 *Cap Screw*
259 *Lock Nut for Conduit*
260 *Terminal Block*
261 *Switch Terminal*
262 *Terminal Block Screw*
263 *Copper Coated Machine Bolt*
264 *Switch Terminal Insulator*
265 *Copper Coated Hex. Nut*
266 *Copper Coated Washer*
267 *Terminal Clips*
268 *Magnet Cutout Cap*
269 *Stud and Nut for Magnet Cut-out Cap*
270 *Magnet Cut-out Gap Gasket*
271 *Gasket between Magnet Bracket and Pipe Bracket*

Emergency Switch Portion.

280 *Switch Cylinder (Bushed)*
281 *Switch Piston*
282 *Switch Piston Ring*
283 *Contact*
284 *Piston Spring*
285 *Contact Spring*
286 *Switch Cap Nut*
287 *Contact Washer*
288 *Cotter*

Release Magnet.

300 *Back Strap*
301 *Cover*
302 *Magnet Core (Bushed)*
303 *Valve*
304 *Magnet Coil*
305 *Plunger*
306 *Special Washer*
307 *Armature Stem*
308 *Top Cover*
309 *Magnet Cap*
310 *Gasket for Magnet Cap*
311 *Cotter*
312 *Spring Guide*
313 *Spring*
314 *Magnet Valve Cap*
315 *Sleeve*
316 *Magnet Gasket*

Emergency Magnet.

320 *Back Strap*
321 *Cover*
322 *Magnet Core (Bushed)*
323 *Valve*
324 *Magnet Coil*
325 *Plunger*
326 *Special Washer*
327 *Armature Stem*
328 *Top Cover*
329 *Magnet Cap*
330 *Gasket for Magnet Cap*
331 *Cotter*
332 *Spring*
333 *Magnet Valve Cap*
334 *Sleeve*

Service Magnet.

340 *Back Strap*
341 *Cover*
342 *Magnet Core (Bushed)*
343 *Valve*
344 *Magnet Coil*
345 *Plunger*
346 *Special Washer*
347 *Armature Stem*
348 *Top Cover*
349 *Magnet Cap*
350 *Gasket for Magnet Cap*
351 *Cotter*
352 *Spring*
353 *Magnet Valve Cap*
354 *Sleeve*

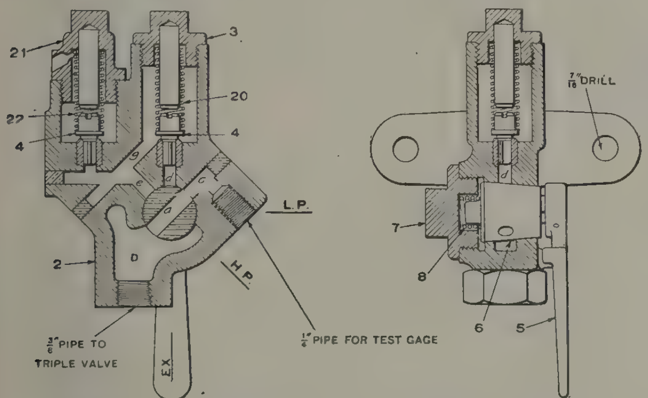


Fig. 1379—Spring Type Double Pressure Retaining Valve.

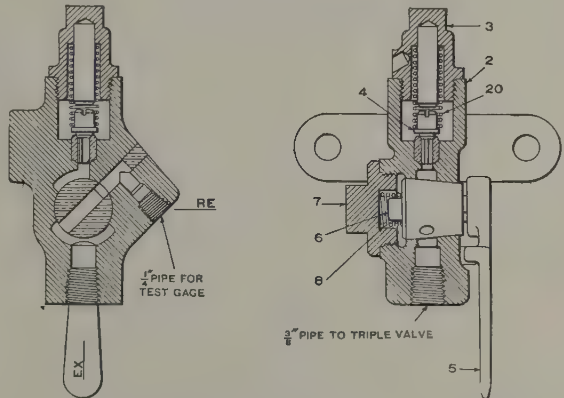
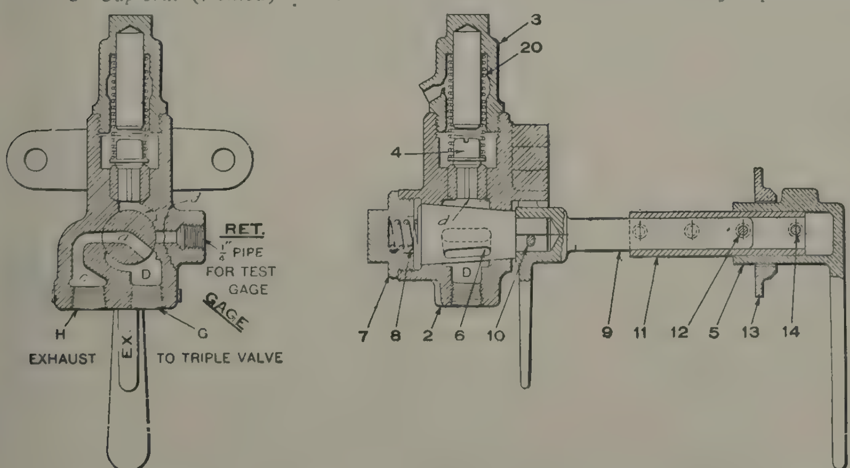


Fig. 1380—Spring Type Single Pressure Retaining Valve.

Parts of Retaining Valve, Figs. 1379 and 1380.

2 *Body*
3 *Cap Nut (Vented)*
4 *Valve*
5 *Handle*
6 *Cock Key*
7 *Cock Key Cap*
20 *Spring*
8 *Cock Key Spring*



Parts of Retaining Valve, Fig. 1381.

2 *Body*
3 *Cap Nut*
4 *Valve*
5 *Handle*
6 *Cock Key*
7 *Cock Key Cap*
8 *Cock Key Spring*
9 *Extension Socket*
10 *Cotter*
11 *Extension Sleeve*
12 *Socket and Sleeve Pin*
13 *Escutcheon*
14 *Handle Pin*
20 *Valve Spring*

Fig. 1381—Spring Type Double Pressure Retaining Valve for Vestibule Cars.
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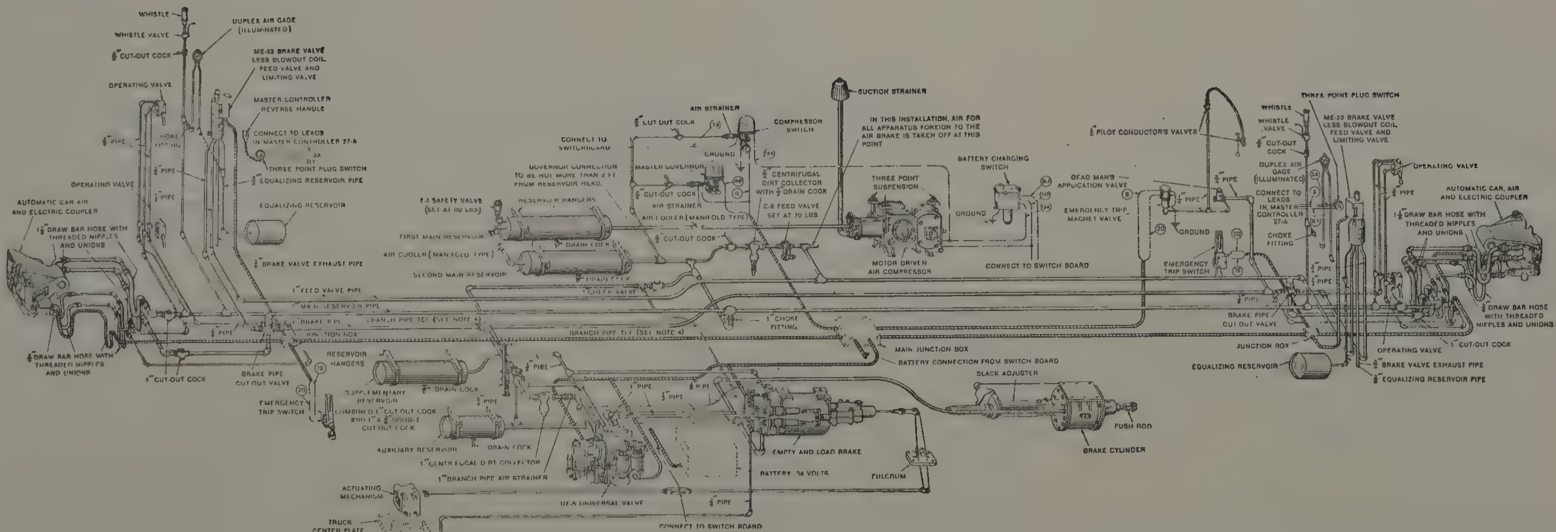


Fig. 1382—Westinghouse Universal Common Standard Brake Equipment, Schedule AMUE, with Empty and Load Feature. New York Municipal Railway.

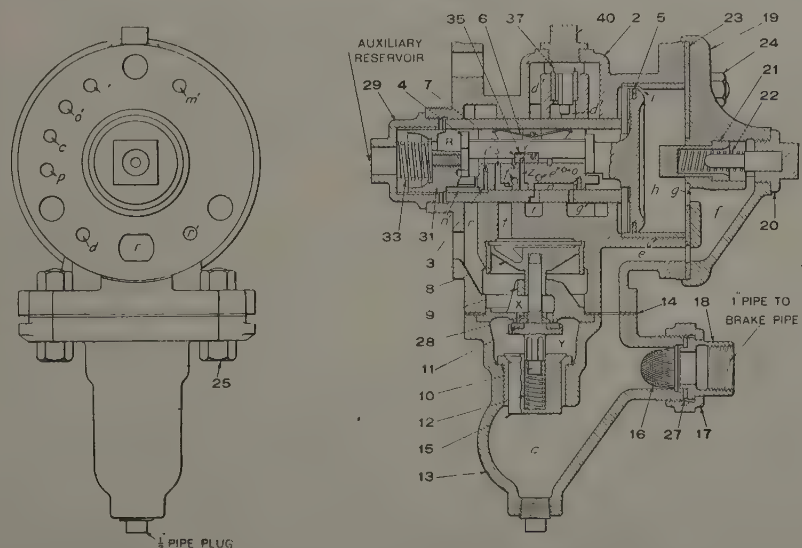


Fig. 1382-A—Standard Quick-Action, Quick-Service, Uniform Release, Uniform Recharge, Empty and Load Freight Triple Valve, Type K-2-L.

Parts of Triple Valve, Fig. 1382-A.

2 *Body*
3 *Slide Valve*
4 *Main Piston*
5 *Main Piston Ring*
6 *Main Slide Valve Spring*
7 *Graduating Valve*
8 *Emergency Piston*
9 *Emergency Valve Seat*
10 *Emergency Valve*
11 *Rubber Seat*
12 *Check Valve Spring*
13 *Check Valve Case*
14 *Check Valve Case Gasket*
15 *Check Valve*
16 *Strainer*
17 *Union Nut*
18 *Union Swivel*
19 *Cylinder Cap*
20 *Graduating Nut*
21 *Graduating Sleeve*
22 *Graduating Spring*
23 *Cylinder Cap Gasket*
24 *Tee Head Bolt and Nut*
25 *Hexagon Head Bolt and Nut for Check Valve Case*
27 *Union Gasket*
28 *Emergency Valve Nut*
29 *Cap*
31 *Stop*
33 *Spring*
35 *Graduating Valve Spring*
37 *Take-up Reservoir Check Valve*
40 *Take-up Reservoir Check Valve Cap Nut*

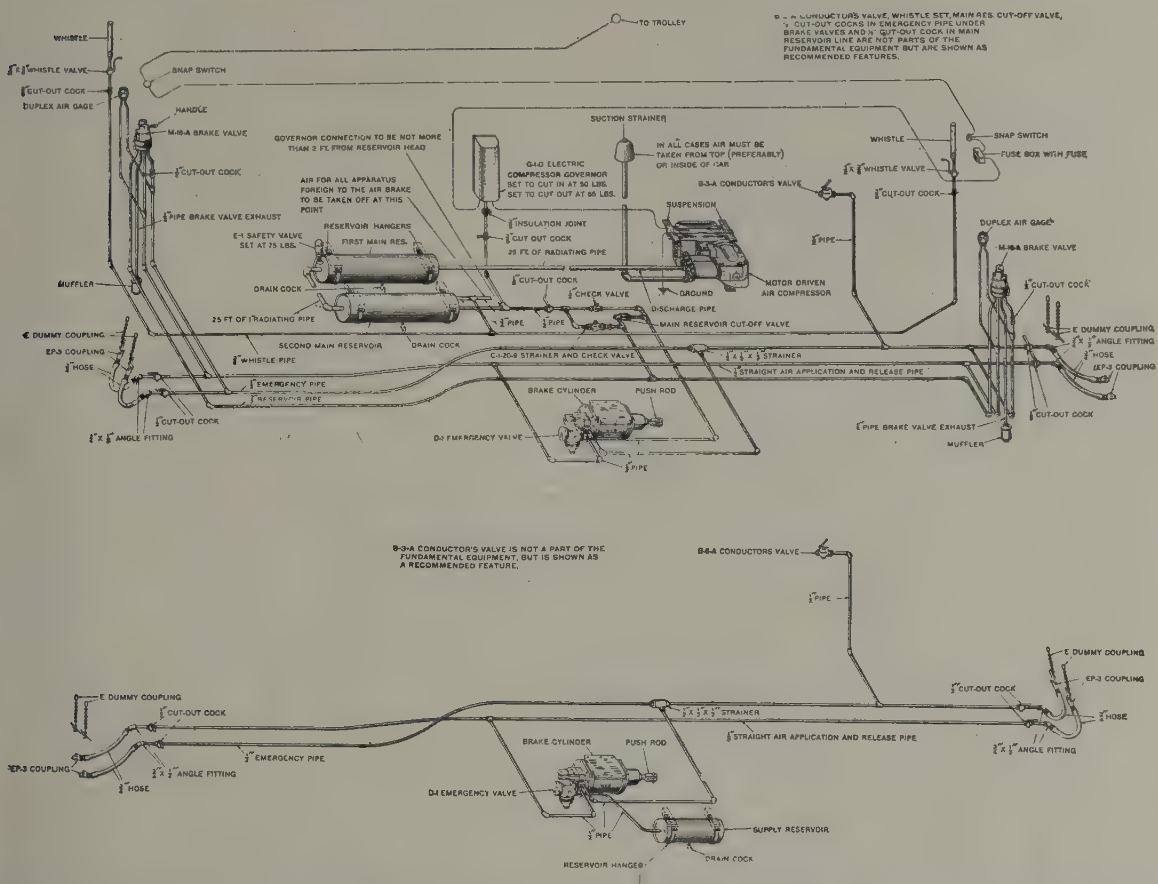


Fig. 1383—Diagram of Westinghouse Air Brake Equipment, Schedule SME with D-1 Emergency Valve. Straight Air Brake with Automatic Emergency Feature Primarily for Single Car Service. Under Some Conditions It May Be Used for Two-Car Trains, Consisting of Two Motor Cars or Motor Car and Trailer, Where the Motor Car Operates Singly Most of the Time.

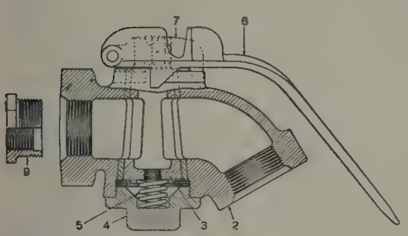


Fig. 1384—Self Locking Angle Cock.

Fig. 1385—Threaded Hose Nipple.

Parts of Angle Cock, Fig. 1384

2 *Body*
3 *Key*
4 *Cap*
5 *Spring*
6 *Handle*
7 *Handle Socket*
9 *1¼ in. by 1 in. Bushing*

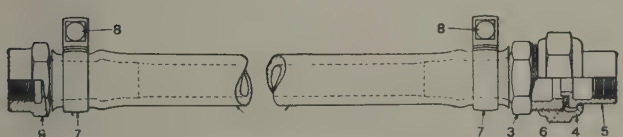
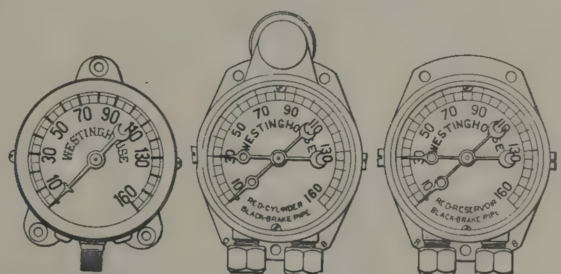


Fig. 1386—Hose and Coupling.



Single Pointer. Duplex, Illuminated. Duplex.

Fig. 1387—Air Gages.

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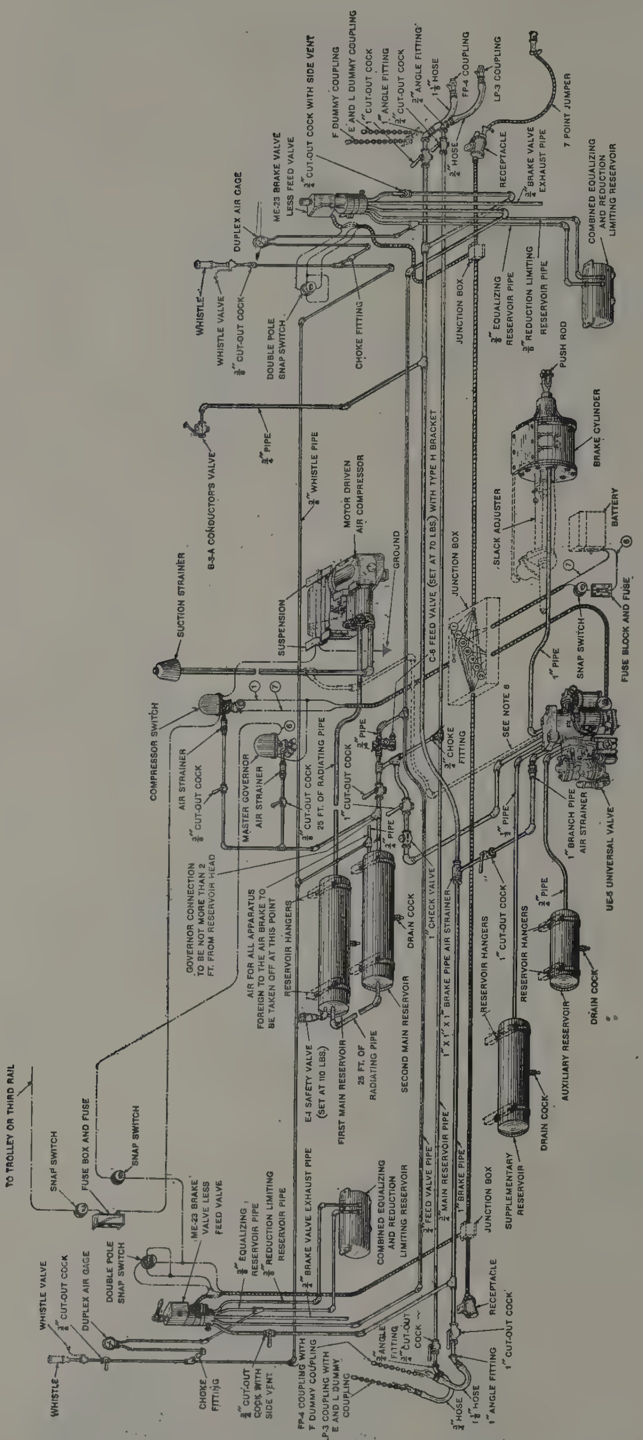

Fig. 1388—Westinghouse Universal Common Standard Brake Equipment, Schedule AMUE, for Electric Trains. Consists of a Combination of a Pneumatic Service and Emergency Brake with Electric Control of both Service and Emergency Operations of the Brakes, for Trains of Any Length.

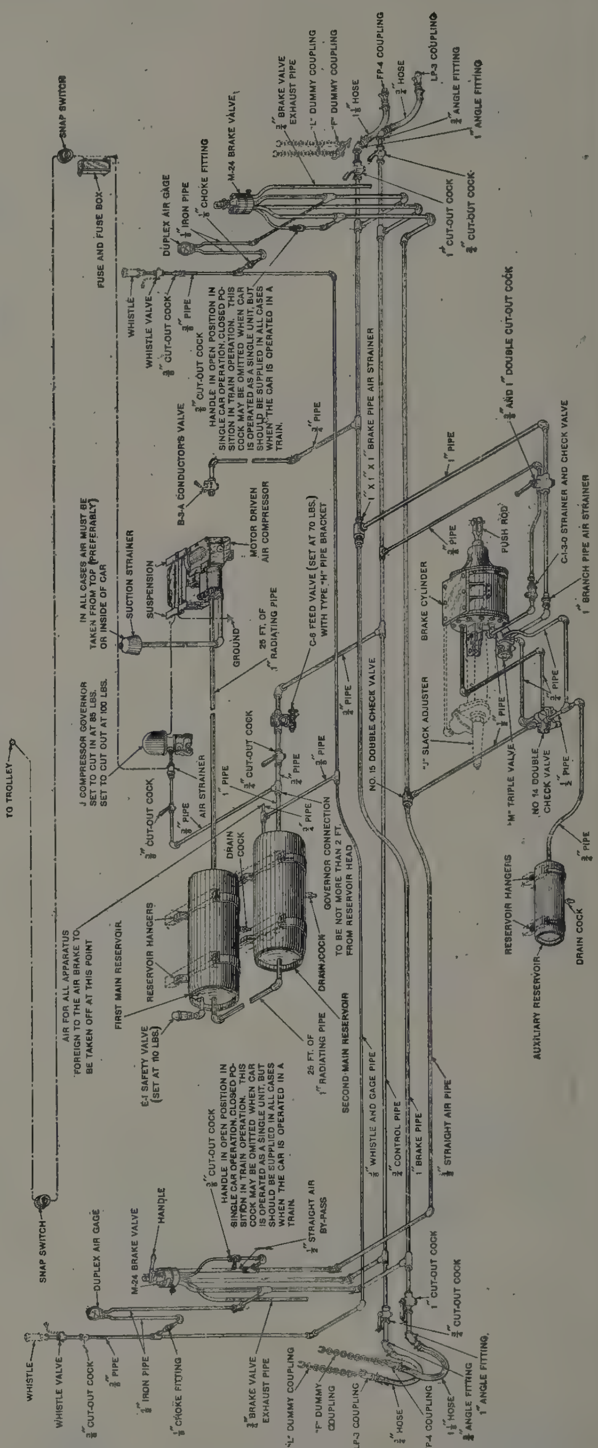

Fig. 1389—Diagram of Westinghouse Air Brake Equipment, Schedule Combined Automatic AMM and Straight Air, for Electric Trains. Plain Automatic Brake with Graduated Release on Each Car, with Provision for Straight Air Application and Release in Single Car Service. The Length of Train Should Not Exceed Three Cars with the M-24 Brake Valve. Trains of Over Three Cars in Length Require the M-24-A or M-24-C Brake Valve.

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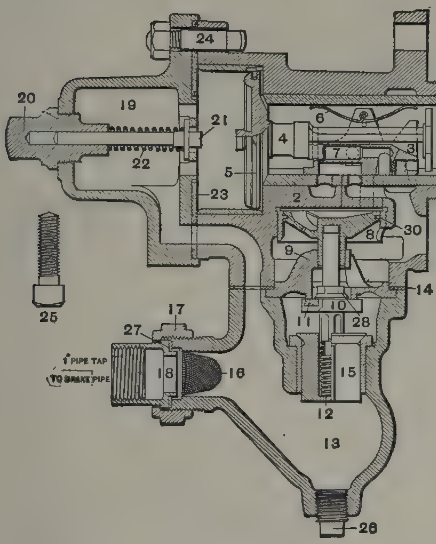

Fig. 1390—Quick Action Triple Valve, Type P-2.

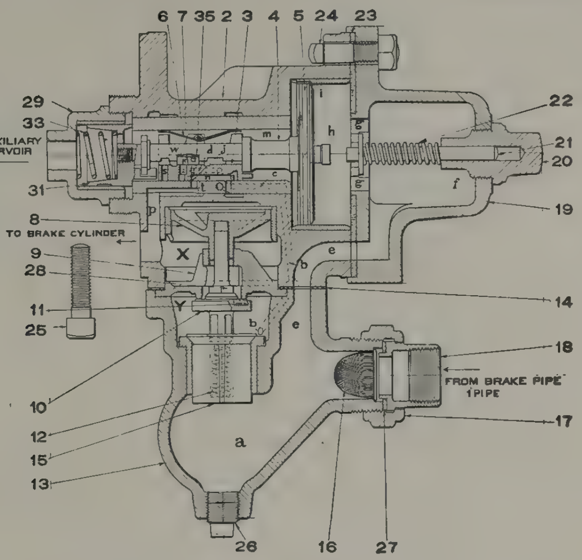

Fig. 1391—Standard Quick Action, Quick Service, Uniform Release, Uniform Recharge Freight Triple Valve, Type K-1.

Parts of Type P-2 Triple Valve, Fig. 1390.

2 *Body*
3 *Slide Valve*
4 *Main Piston*
5 *Main Piston Ring*
6 *Slide Valve Spring*
7 *Graduating Valve*
8 *Emergency Piston*
9 *Emergency Valve Seat*
10 *Emergency Valve*
11 *Rubber Seat*
12 *Check Valve Spring*
13 *Check Valve Case, Complete*
14 *Check Valve Case Gasket*
15 *Check Valve*
16 *Strainer*
17 *1 in. Union Nut*
18 *1 in. Union Swivel*
19 *Cylinder Cap*
20 *Graduating Stem Nut*
21 *Graduating Stem*
22 *Graduating Spring*
23 *Cylinder Cap Gasket*
24 *Cylinder Cap Bolt and Nut*
25 *Cap Screw*
27 *1 in. Union Gasket*
28 *Emergency Valve Nut*
30 *Emergency Piston Ring*

Parts of Type K-1 Triple Valve, Fig. 1391.

2 *Body, Complete*
3 *Slide Valve*
4 *Main Piston*
5 *Main Piston Ring*
6 *Slide Valve Spring*
7 *Graduating Valve*
8 *Emergency Piston*
9 *Emergency Valve Seat*
10 *Emergency Valve*
11 *Rubber Seat*
12 *Check Valve Spring*
13 *Check Valve Case, Complete*
14 *Check Valve Case Gasket*
15 *Check Valve*
16 *Strainer*
17 *1 in. Union Nut*
18 *1 in. Union Swivel*
19 *Cylinder Cap*
20 *Graduating Stem Nut*
21 *Graduating Stem*
22 *Graduating Spring*
23 *Cylinder Cap Gasket*
24 *Cylinder Cap Bolt and Nut*
25 *Cap Screw*
27 *1 in. Union Gasket*
28 *Emergency Valve Nut*
29 *Retarding Device Body*
31 *Retarding Stem*
33 *Retarding Spring*
35 *Graduating Valve Spring*

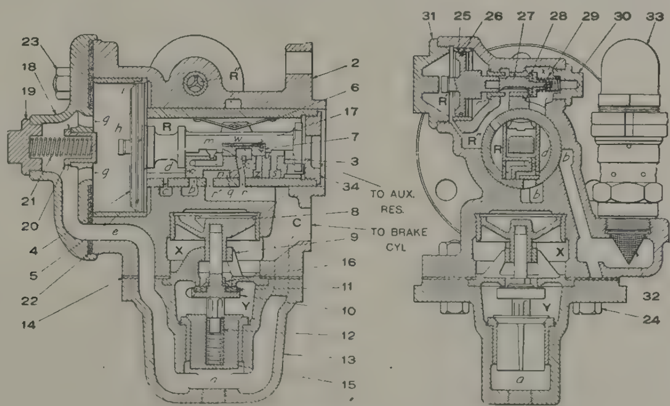

Fig. 1392—Passenger Triple Valve, Type L.

Parts of Type L Triple Valve, Fig. 1392.

2 *Body*
3 *Slide Valve*
4 *Main Piston*
5 *Main Piston Ring*
6 *Slide Valve Spring*
7 *Graduating Valve*
8 *Emergency Piston*
9 *Emergency Valve Seat*
10 *Emergency Valve*
11 *Rubber Seat for Emergency Valve*
12 *Check Valve Spring*
13 *Check Valve Case, Complete*
14 *Check Valve Case Gasket*
15 *Check Valve*
16 *Emergency Valve Nut*
17 *Graduating Valve Spring*
18 *Cylinder Cap*
19 *Graduating Spring Nut*
20 *Graduating Sleeve*
21 *Graduating Spring*
22 *Cylinder Cap Gasket*
23 *Cylinder Cap Bolt and Nut*
24 *Check Valve Case Bolt and Nut*
25 *By-Pass Piston*
26 *By-Pass Piston Ring*
27 *By-Pass Valve*
28 *Rubber Seat*
29 *By-Pass Valve Spring*
30 *By-Pass Valve Cap*
31 *By-Pass Piston Cap*
32 *Strainer*
33 *E-7 Safety Valve*
34 *End Cap*

Parts of No. 3-E Control Valve, Fig. 1393.

2 *Equalizing Body, Complete*
3 *Release Piston*
4 *Release Slide Valve*
5 *Release Slide Valve Spring*
6 *Release Graduating Valve*
7 *Release Graduating Valve Spring*
8 *Release Piston Cap Nut for Equalizing Portion*
9 *Release Piston Ring*
10 *Release Cylinder Cap*
11 *Release Cylinder Cap Gasket*
12 *Cap Screw*
13 *Release Piston Graduating Sleeve*
14 *Release Piston Graduating Spring*
15 *Release Piston Graduating Nut*
16 *Check Valve*
17 *Check Valve Cap Nut*
18 *Release Regulating Cap*
19 *Stud and Nut for Release Regulating Cap*
20 *Equalizing Piston*
21 *Equalizing Piston Ring (Large)*
22 *Equalizing Slide Valve*
23 *Equalizing Slide Valve Spring*
24 *Equalizing Graduating Valve*
25 *Equalizing Graduating Valve Spring*
26 *Large Equalizing Cylinder Cap*
27 *Large Equalizing Cylinder Cap Gasket*
28 *Cap Screw*
29 *Equalizing Piston Stop Sleeve*
30 *Lower Equalizing Piston Stop Spring*
31 *Equalizing Graduating Nut*
32 *Equalizing Piston Ring (Small)*
33 *Small Equalizing Cylinder Cap*
34 *Gasket for Small Equalizing Cylinder Cap*
35 *Cap Screw*
36 *Cap Nut for Small Equalizing Cylinder Cap*
37 *Small Equalizing Piston Bush*
38 *Service Reservoir Charging Valve*
39 *1 in. Charging Valve Piston Ring*
40 *1¼ in. Charging Valve Piston Ring*
41 *Charging Valve Seat*
42 *Charging Valve Washer*
43 *Internal Charging Valve Nut*
44 *External Charging Valve Nut*
45 *Gasket for Release Regulating Cap*
46 *Upper Equalizing Piston Stop Spring*
75 *Application Body*
76 *Piston Stem*
77 *Piston Ring (Small)*
78 *Piston Head*
79 *Piston Seal*

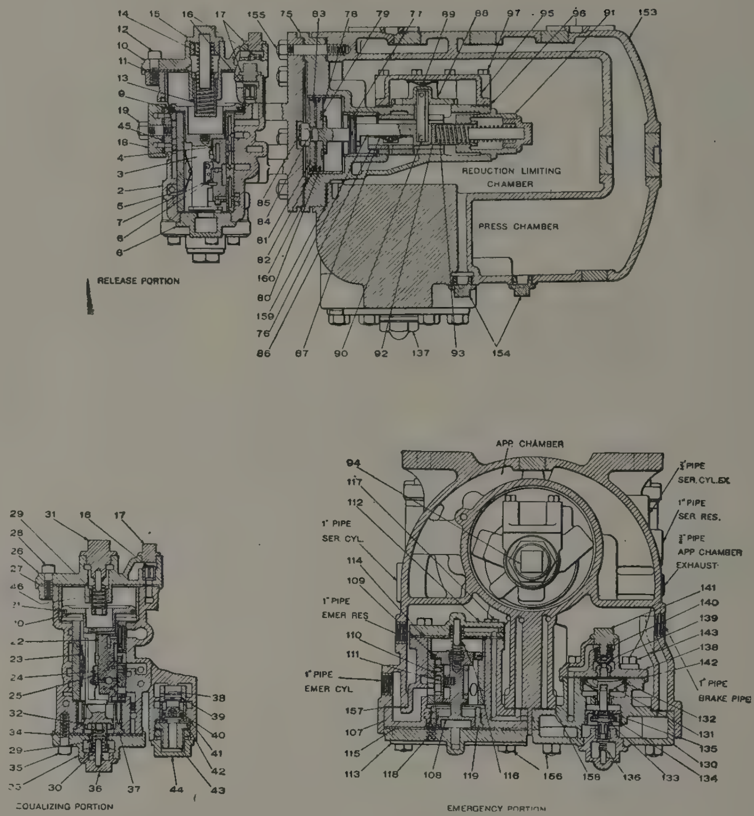

Fig. 1393—No. 3-E Control Valve.

80 *Piston Ring (Large)*
81 *Piston Follower*
82 *Piston Packing Leather*
83 *Piston Packing Leather Expander*
84 *Piston Nut*
85 *Piston Cotter*
86 *Exhaust Valve*
87 *Exhaust Valve Spring*
88 *Application Valve*
89 *Application Valve Spring*
90 *Application Piston Bolt*
91 *Spring Box*
92 *Piston Spring Sleeve*
93 *Piston Spring*
94 *Graduating Nut*
95 *Application Valve Cover*
96 *Application Valve Cover Gasket*
97 *Cap Screw for Application Valve Cover*
107 *Emergency Body*
108 *Piston*
109 *Piston Ring*
110 *Slide Valve*
111 *Slide Valve Spring*
112 *Small Cylinder Cap*
113 *Large Cylinder Cap*
114 *Small Cylinder Cap Gasket*
115 *Large Cylinder Cap Gasket*
116 *Piston Spring*
117 *Cap Screw*
118 *Oval Fillister Head Cap Screw*
119 *Emergency Piston Bush*
130 *Quick Action Body*
131 *Piston*
132 *Piston Ring*
133 *Quick Action Valve*
134 *Quick Action Valve Seat*
135 *Quick Action Valve Nut*
136 *Quick Action Valve Spring*
137 *Quick Action Valve Cap Nut*
138 *Quick Action Valve Cover*
139 *Quick Action Closing Valve*
140 *Quick Action Closing Valve Spring*
141 *Cover Cap Nut*
142 *Cover Gasket*
143 *Cap Screw for Cover*
153 *Reservoir*
154 *Cap Nut*
155 *Stud with Hexagon Nut*
156 *Stud with Hexagon Nut*
157 *Emergency Cylinder Gasket*
158 *Quick Action Cylinder Gasket*
159 *Large Reservoir Gasket*
160 *Equalizing Cylinder Gasket*

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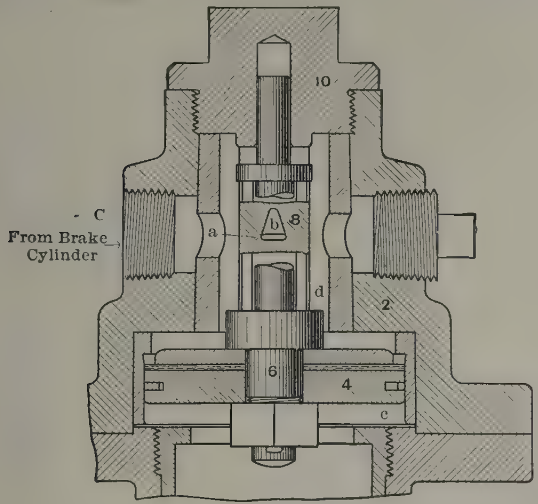
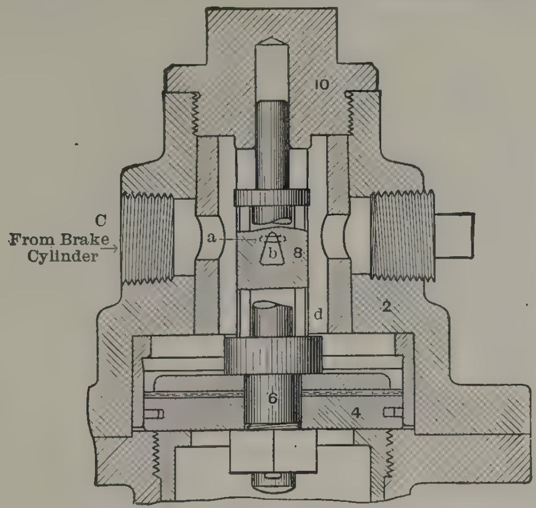


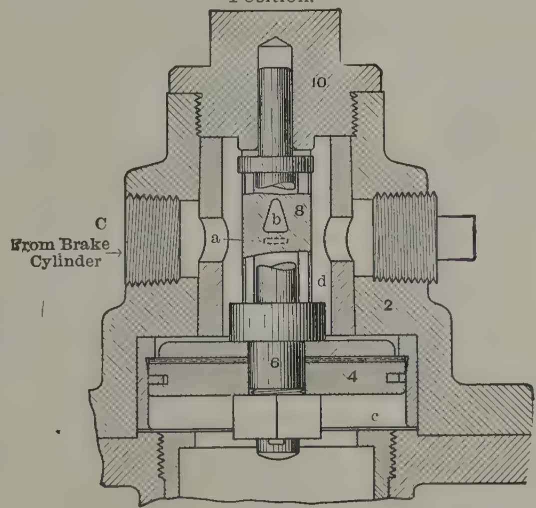
Service
Pressure Exceeding 60 Lbs. in Brake Cylinder

Fig. 1394—High Speed Reducing Valve, Service Position.



Emergency

Fig. 1395—High Speed Reducing Valve, Emergency Position.



Release

Fig. 1396—High Speed Reducing Valve, Release Position.

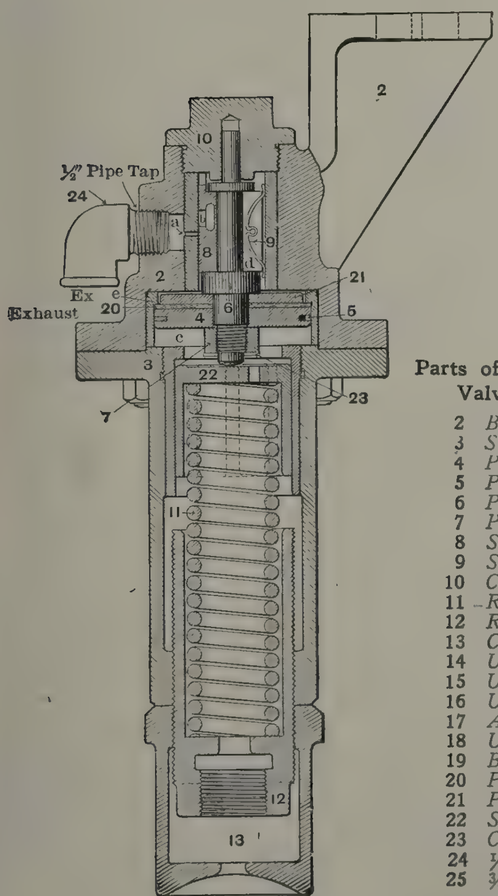


Fig. 1397—Vertical Section Through High Speed Reducing Valve.

Parts of High Speed Reducing Valve, Figs. 1394-1398.

2 *Body*
3 *Spring Box*
4 *Piston*
5 *Piston Ring*
6 *Piston Stem*
7 *Piston Stem Nut*
8 *Slide Valve*
9 *Slide Valve Spring*
10 *Cap Nut*
11 *Regulating Spring*
12 *Regulating Nut*
13 *Check Nut*
14 *Union Stud*
15 *Union Swivel*
16 *Union Nut*
17 *Air Strainer*
18 *Union Gasket*
19 *Bolt and Nut*
20 *Piston Seat*
21 *Piston Disc*
22 *Spring Abutment*
23 *Cotter*
24 *½ in. Street Elbow*
25 *¾ in. Pipe Plug*

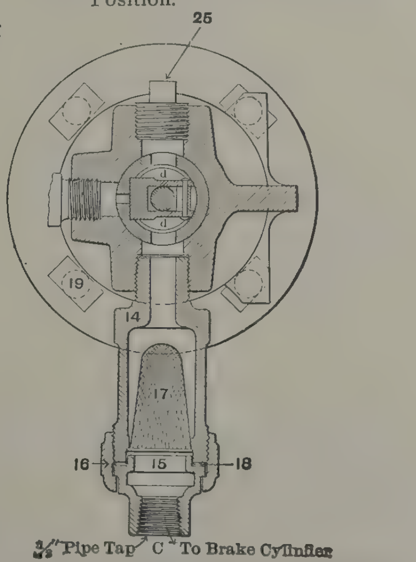


Fig. 1398—Horizontal Section Through High Speed Reducing Valve.

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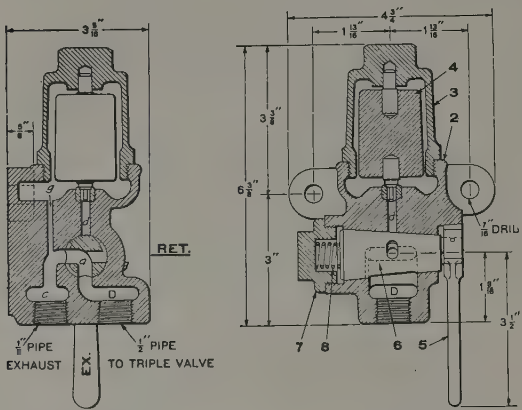

Fig. 1399—Weight Type Pressure Retaining Valve for 12 in., 14 in. and 16 in. Brake Cylinders.

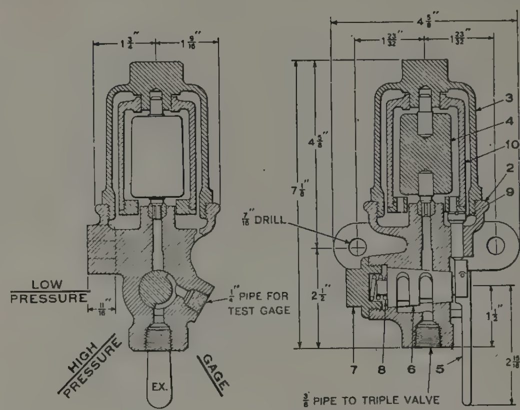

Fig. 1400—Weight Type High and Low Pressure Retaining Valve.

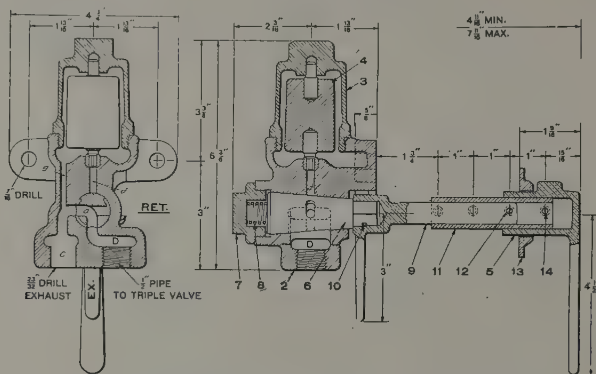

Fig. 1401—Weight Type Pressure Retaining Valve for Vestibule Cars with 12 in., 14 in. and 16 in. Cylinders.

Parts of Retaining Valve, Fig. 1401.

2 *Body*
3 *Case*
4 *Weight*
5 *Handle*
6 *Cock Key*
7 *Cock Cap*
8 *Key Spring*
9 *Extension Socket*
10 *Extension Socket Cotter*
11 *Extension Socket Sleeve*
12 *Extension Socket Sleeve Pin*
13 *Handle Plate*
14 *Handle Pin*

Parts of Retaining Valve, Fig. 1400.

2 *Body*
3 *Case*
4 *Inside Weight*
5 *Handle*
6 *Cock Key*
7 *Cock Cap*
8 *Key Spring*
9 *Weight Lifting Rod*
10 *Outside Weight*

Parts of Retaining Valve, Fig. 1399.

2 *Body*
3 *Case*
4 *Weight*
5 *Handle*
6 *Cock Key*
7 *Cock Cap*
8 *Key Spring*

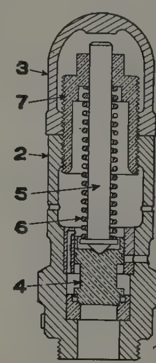

Fig. 1402 — Type E 6 Safety Valve.

Parts of Type E-6 Safety Valve, Fig. 1402.

2 *Body*
3 *Cap Nut*
4 *Valve*
5 *Valve Stem*
6 *Spring (50 lbs. to 90 lbs.)*
7 *Regulating Nut*

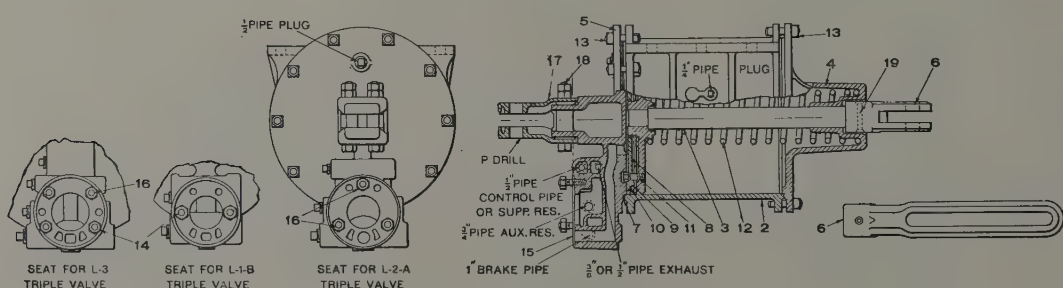

Fig. 1403—Type N Passenger Brake Cylinder.

Parts of Type N Brake Cylinder, Fig. 1403.

2 *Cylinder Body*
3 *Piston and Rod*
4 *Non-Pressure Head*
5 *Pressure Head*
6 *Crosshead*
7 *Cylinder Gasket*
8 *Follower*
9 *Packing Leather*
10 *Packing Expander*
11 *Follower Stud and Nut*
12 *Release Spring*
13 *Cylinder Head Bolt and Nut*
14 *Triple Valve Bolt and Nut*
15 *Triple Valve Gasket*
16 *Triple Valve Stud and Nut*
17 *Lever Bracket*
18 *Lever Bracket Bolt and Nuts*
19 *Crosshead Rivet*

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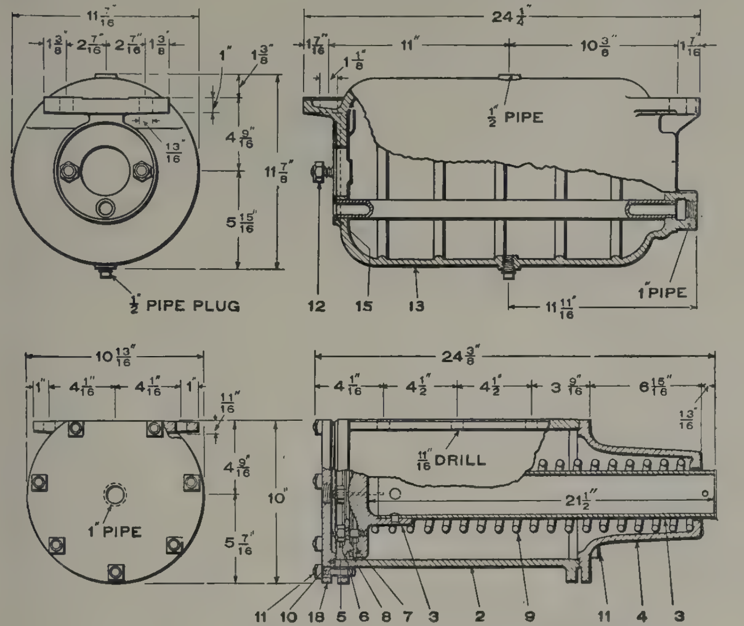

Fig. 1404—Freight Brake Cylinder and Reservoir, Detached.

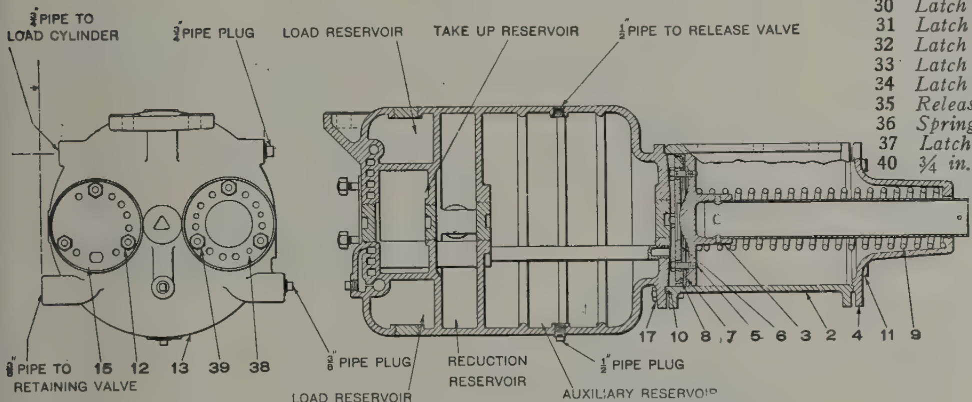

Fig. 1405—Empty Brake Cylinder, 10 in. by 12 in. and Four Compartment Reservoir Combined.

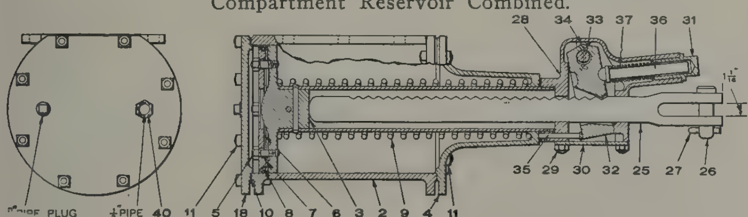

Fig. 1406—Load Brake Cylinder, 10 in. by 12 in., with Notched Push Rod and Enclosed Locking Mechanism, for Empty and Load Freight Brake Equipment.

Parts of Brake Cylinder, Fig. 1404.

2 *Cylinder Body, 8 in. by 12 in.*
3 *Piston and Rod*
4 *Non-Pressure Head*
5 *Follower Stud and Nut*
6 *Follower*
7 *Packing Leather*
8 *Packing Expander*
9 *Release Spring*
10 *Cylinder Gasket*
11 *Cylinder Head Bolt and Nut*
12 *Reservoir Stud and Nut*
13 *Detached Reservoir*
Drain Plug
15 *Triple Valve Gasket*
18 *Pressure Head*

Parts of Load Brake Cylinder, Fig. 1406.

2 *Cylinder Body*
3 *Piston and Rod*
4 *Non-Pressure Head*
5 *Follower-Stud and Nut*
6 *Follower*
7 *Packing Leather*
8 *Packing Expander*
9 *Release Spring*
10 *Cylinder Gasket*
11 *Cylinder-Head Bolt and Nut*
18 *Pressure Head*
25 *Push Rod*
26 *Push Rod Pin*
27 *Push Rod Pin Cotter*
28 *Latch Box*
29 *Stud and Nut*
30 *Latch Box Cover*
31 *Latch Box Cap Nut*
32 *Latch*
33 *Latch Pin*
34 *Latch Pin Cotter*
35 *Release Pin*
36 *Spring Guide*
37 *Latch Spring*
40 *¾ in. by ½ in. Reducing Bush*

Parts of Brake Cylinder, Fig. 1407.

2 *Cylinder Body*
3 *Piston and Rod*
4 *Non-Pressure Head*
5 *Follower-Stud and Nut*
6 *Follower*
7 *Packing Leather*
8 *Packing Expander*
9 *Release Spring*
10 *Cylinder Gasket*
11 *Cylinder-Head Bolt and Nut*
12 *Reservoir Stud and Nut*
13 *Reservoir*
15 *Triple Valve Gasket*
17 *Reservoir Cylinder Bolt and Nut*

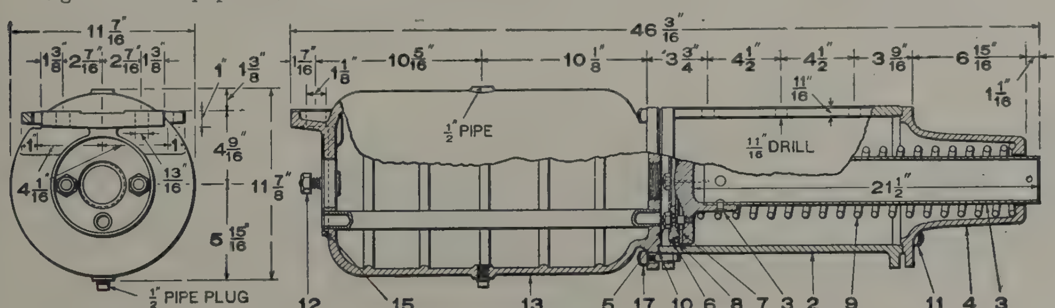

Fig. 1407—8 in. by 12 in. Freight Brake Cylinder and Auxiliary Reservoir Combined.

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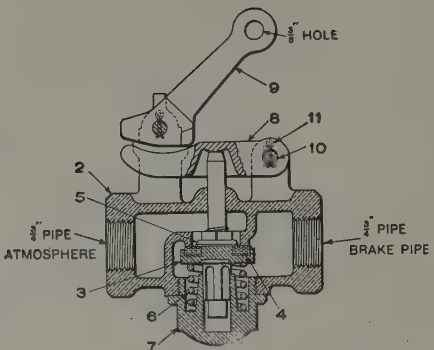

Fig. 1408—Type B-3-A Conductor's Valve.

Parts of Conductor's Valve, Fig. 1408.

2 *Body*
3 *Key*
4 *Cap*
5 *Key Spring*
6 *Key Stop*
7 *Key Escutcheon*
8 *Handle*
9 *Key Nut*
10 *Bolt and Nut*
11 *Filler Block*

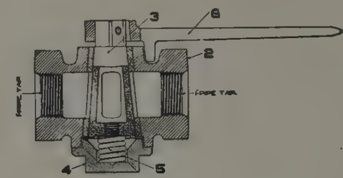

Fig. 1409—One-Inch Cut-Out Cock.

Parts of Cut-Out Cock, Fig. 1409.

2 *Body*
3 *Key*
4 *Cap*
5 *Spring*
6 *Handle*

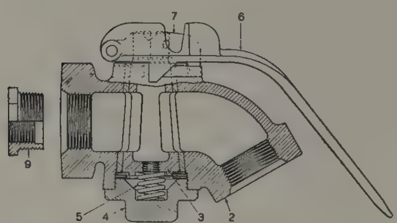

Fig. 1410—Self-Locking Angle Cock.

Parts of Angle Cock, Fig. 1410.

2 *Body*
3 *Key*
4 *Cap*
5 *Spring*
6 *Handle*
7 *Handle Socket*
9 *1¼ in. by 1 in. Bushing*

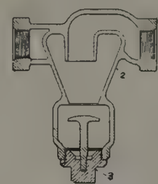

Fig. 1411—Centrifugal Dirt Collector.

Parts of Centrifugal Dirt Collector, Fig. 1411.

2 *Body*
3 *Deflector and Special Plug*

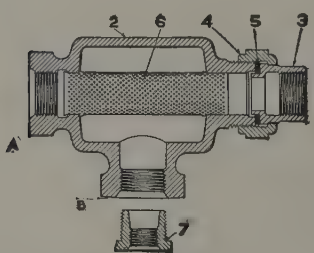

Fig. 1412—One-Inch Brake Pipe Air Strainer.

Parts of Strainer, Fig. 1412.

2 *Strainer Body*
3 *1 in. Union Swivel*
4 *1 in. Union Nut*
5 *1 in. Union Gasket*
6 *Strainer*
7 *Bushing*

Fig. 1413—Threaded Hose Nipple.

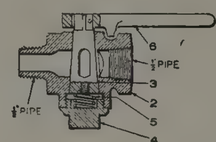

Fig. 1414—Reservoir Drain Cock, ½ in.

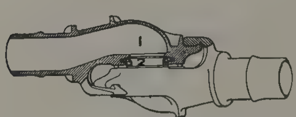

Fig. 1415—Freight Hose Coupling.

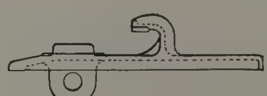

Fig. 1416—Dummy Hose Coupling.

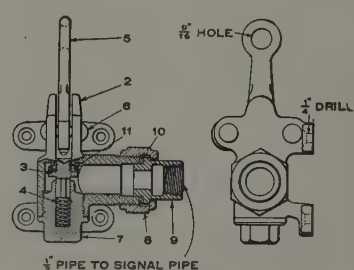

Fig. 1417—Car Discharge Valve.

Fig. 1418—Passenger Hose Coupling.

Parts of Car Discharge Valve, Fig. 1417.

3 *Body*
4 *Stem*
4 *Spring*
5 *Handle*
6 *Stop Pin*
7 *Cap*
8 *Union Nut*
9 *Union Swivel*
10 *Union Gasket*
11 *Rubber Seat*

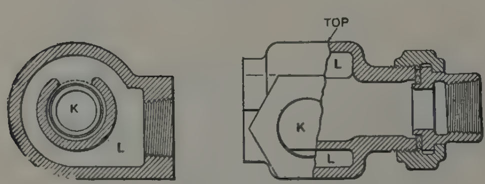

Fig. 1419—Branch Pipe Tee.

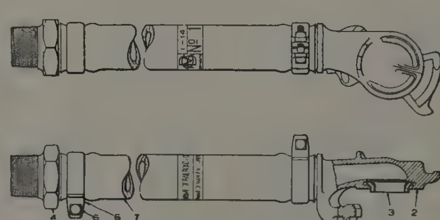

Fig. 1420—Brake Hose and Coupling.

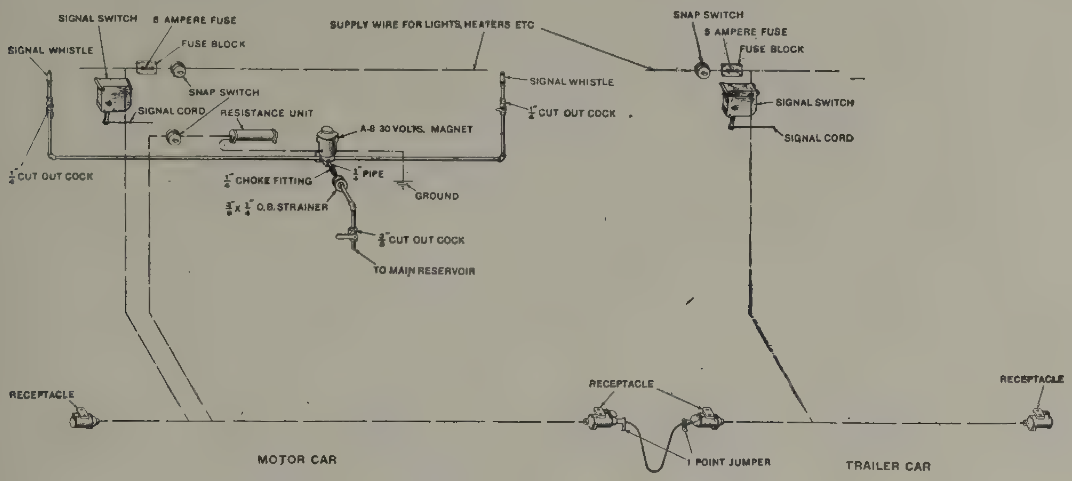

Fig. 1421—Electro-Pneumatic Train Signal for Electric Car Trains.

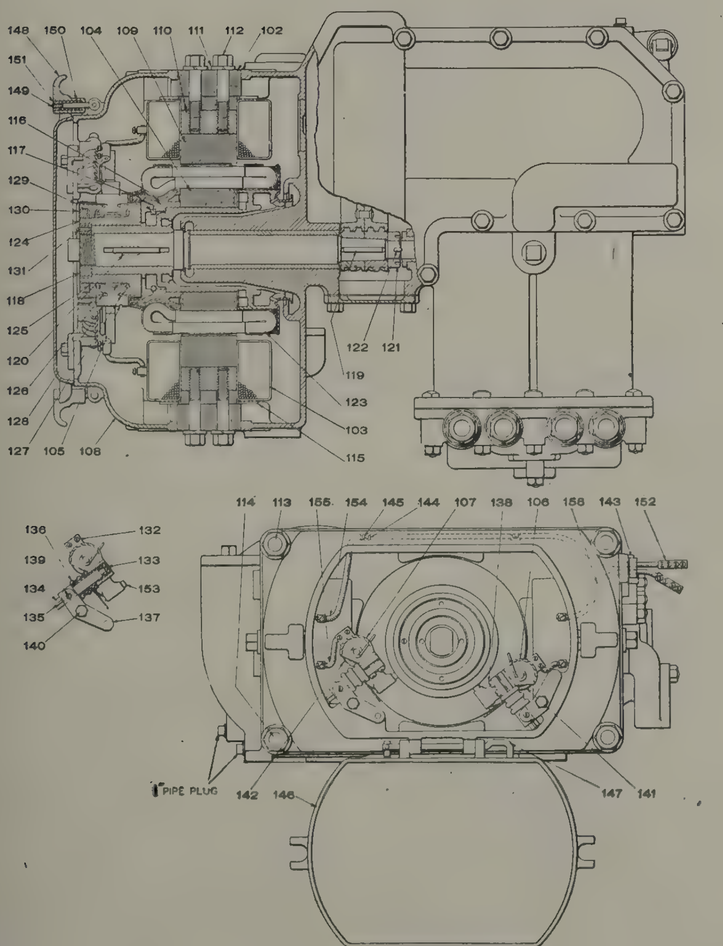

Fig. 1422—Low Height, Light Weight Motor Driven Air Compressor, Type DH "Bungalow."

Parts of Air Compressor, Figs. 1422-1423, Motor Portion.

102 *Field Yoke*
103 *Field Coils*
104 *Armature*
105 *Commutator*
106 *Right Carbon Holder*
107 *Left Carbon Holder*
108 *Front End Bell*
109 *Salient Pole*
110 *Salient Pole Nut*
111 *Lock Washer*
112 *Salient Pole Cap Screw*
113 *Hexagonal Head Bolt and Nut*
114 *Stud and Nut*
115 *Field Coil Spring*
116 *Armature Collar*
117 *Ring for Armature Collar*
118 *Armature Shaft Nut*
119 *Key for Pinion*
120 *Key for Commutator*
121 *Castle Nut*
122 *Cotter*
123 *Armature Coil*
124 *Commutator Bushing*
125 *Commutator Washer*
126 *Front "V" Ring*
127 *Rear "V" Ring*
128 *Insulating Sleeve*
129 *Taper Ring*
130 *Commutator Nut*
131 *Commutator Nut Set Screw*
132 *Lead Screw*
133 *Carbon Holder Stud Insulation*
134 *Carbon Holder Stud*
135 *Carbon Holder Stud Key*
136 *Carbon Holder Stud Sleeve*
137 *Carbon Holder Clamp*
138 *Screw*
139 *Set Screw*
140 *Cap Screw*
141 *Right Carbon Holder Spring*
142 *Left Carbon Holder Spring*
143 *Insulating Plug*
144 *Cleat for Lead*
145 *Cleat Screw*
146 *Commutator Door*
147 *Hinge Pin*
148 *Latch*
149 *Latch Eye Bolt*
150 *Latch Spring*
151 *Latch Nut*
152 *Connector for Lead*
153 *Carbon*
154 *Field Coil Lead*
155 *Lead*
156 *Field Coil Lead*

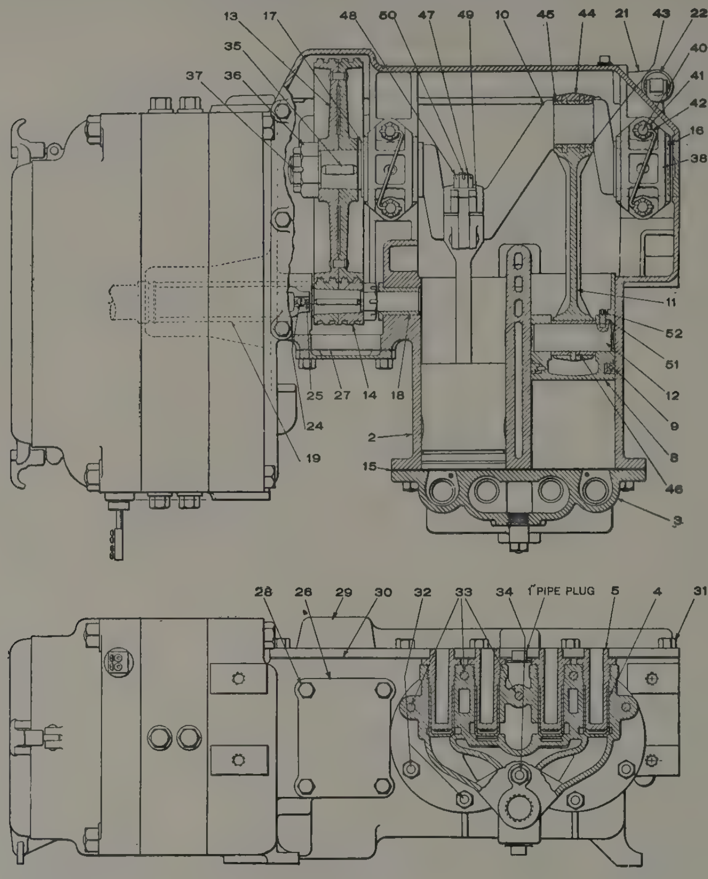

Fig. 1423—Type DH "Bungalow" Motor Driven Air Compressor.

Parts of Air Compressor, Figs. 1422-1423. Compressor Portion.

2 *Cylinder and Crank Case*
3 *Cylinder Cover*
4 *Inlet Valve*
5 *Inlet Valve Chamber Cap*
6 *Discharge Valve*
7 *Discharge Valve Chamber Cap*
8 *Piston*
9 *Piston Ring*
10 *Crank Shaft*
11 *Connecting Rod*
12 *Wrist Pin*
13 *Gear*
14 *Pinion*
15 *Cylinder Cover Gasket*
16 *Rear Crank Shaft Bearing*
17 *Front Crank Shaft Bearing*
18 *Small Motor Bearing*
19 *Inside Motor Bearing*
20 *Outside Motor Bearing*
21 *Oil Filling Elbow*
22 *Oil Filling Plug*
23 *Outside Bearing Set Screw*
24 *Inside Bearing Set Screw*
25 *Cotter*
26 *Hand Hole Cover*
27 *Hand Hole Cover Gasket*
28 *Hand Hole Cover Cap Screw*
29 *Crank Case Top Cover*
30 *Crank Case Top Cover Gasket*
31 *Crank Case Top Cover Cap Screw*
32 *Cylinder Cover Bolt and Nut*
33 *Cylinder Cover Bolt and Nut*
34 *Cylinder Cover Bolt and Nut*
35 *Crank Shaft Key*
36 *Crank Shaft Castle Nut*
37 *Cotter*
38 *Bearing Cap (Rear End)*
39 *Bearing Cap (Front End)*
40 *Bearing Cap Bolt*
41 *Castle Nut*
42 *Cotter*
43 *Connecting Rod Bush*
44 *Connecting Rod Cap*
45 *Connecting Rod Cap Bush*
46 *Wrist Pin Bush*
47 *Eye Bolt*
48 *Castle Nut*
49 *Alignment Washer*
50 *Cotter*
51 *Wrist Pin Set Screw*
52 *Cotter*

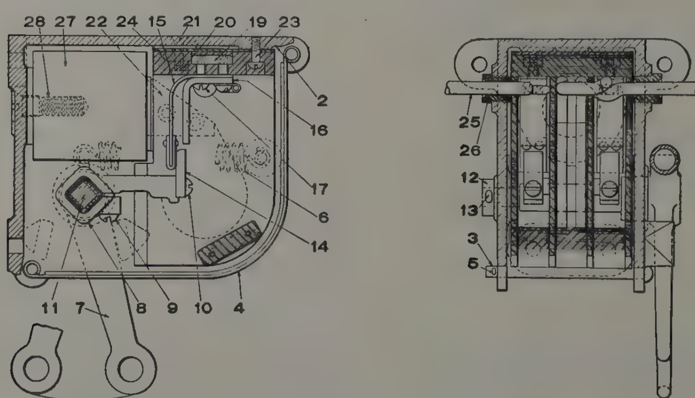

Fig. 1424—Conductor's Switch.

Parts of Conductor's Switch, Fig. 1424.

2 *Frame*
3 *Pin*
4 *Cover*
5 *Cotter*
6 *Extension Spring*
7 *Handle*
8 *Spider*
9 *Screw*
10 *Screw*
11 *Shaft*
12 *Collar*
13 *Cotter*
14 *Contact*
15 *Contact Finger*
16 *Finger Stop*
17 *Screw*
19 *Double Nut*
20 *Special Nut*
21 *Fillister Head Screw*
22 *Arc Shield*
22 *Arc Shield for Conductor's Switch*
23 *Round Head Screw*
24 *Back Insulation*
25 *Lead*
26 *Insulating Bushing*
27 *Blowout Coil*
28 *Cap Screw*

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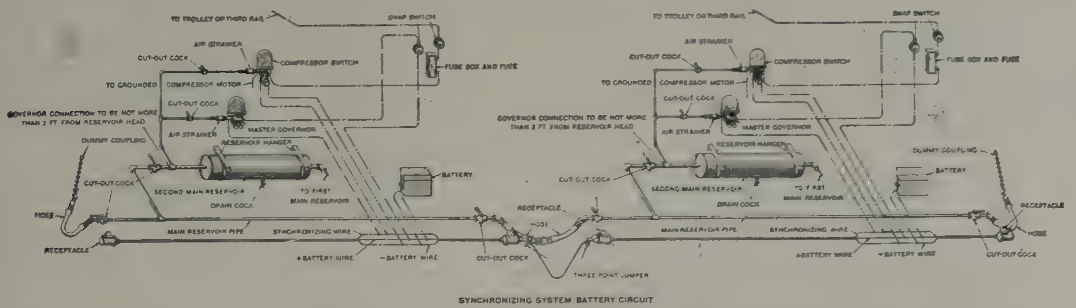

Fig. 1425—Wiring Diagram of Westinghouse Governor Synchronizing System; Battery Circuit.

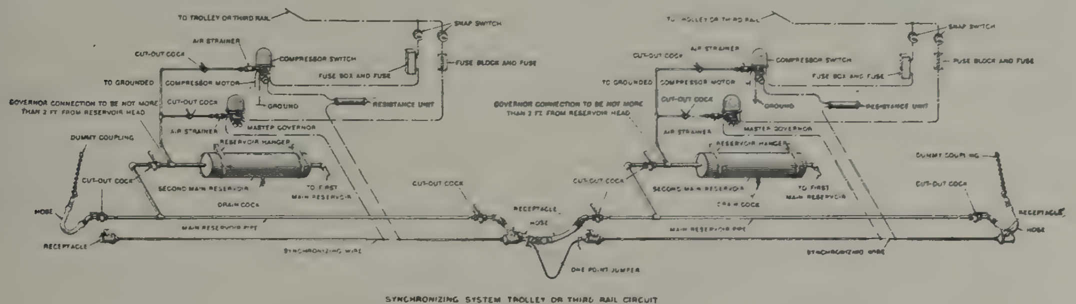

Fig. 1426—Wiring Diagram of Westinghouse Governor Synchronizing System; Trolley Circuit.

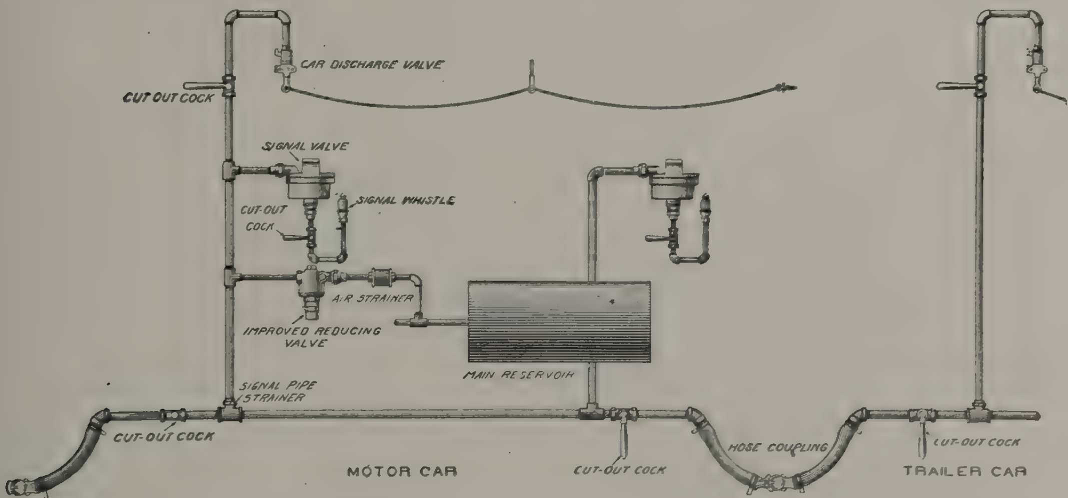

Fig. 1427—Diagram of Train Air Signal for Electric Trains.

Parts of Air Compressor, Fig. 1428.

2 *Cylinder and Crank Case*
3 *Cylinder Cover*
4 *Bolt and Nut*
5 *Bolt and Nut*
6 *Bolt and Nut*
7 *Front Crank Case Cover*
8 *Cap Screw*
9 *Gear Case*
10 *Stud and Nut*
11 *Gear Case Cover*
12 *Gear Case Cover Bolt and Nut*
13 *Cap Screw*
14 *Cap Screw*
15 *Bolt*
16 *Gear Case Cover Cap*
17 *Cap Screw*
19 *Tapped Crank Case Top Cover*
19 *Solid Crank Case Top Cover*
20 *Cap Screw*
21 *Cap Screw*
22 *Crank Case Oil Fitting*
23 *Cap Screw*
24 *Crank Shaft*
25 *Crank Shaft Key*
26 *Crank Shaft Nut*
27 *Crank Shaft Jam Nut*
28 *Gear*
29 *Connecting Rod*
30 *Connecting Rod Cap*
31 *Connecting Rod Eye Bolt*
32 *Nut*
33 *Jam Nut*
34 *Cotter*
35 *Connecting Rod Bush*
36 *Wrist Pin with Special Dowel*
37 *Wrist Pin Set Screw*
38 *Piston*
39 *Piston Packing Ring*
40 *Inlet Valve*
41 *Inlet Valve Chamber Cap*
42 *Discharge Valve*
43 *Discharge Valve Chamber Cap*
49 *Cylinder Cover Gasket*
50 *Front Crank Case Cover Gasket*

Westinghouse Air Brake Company.

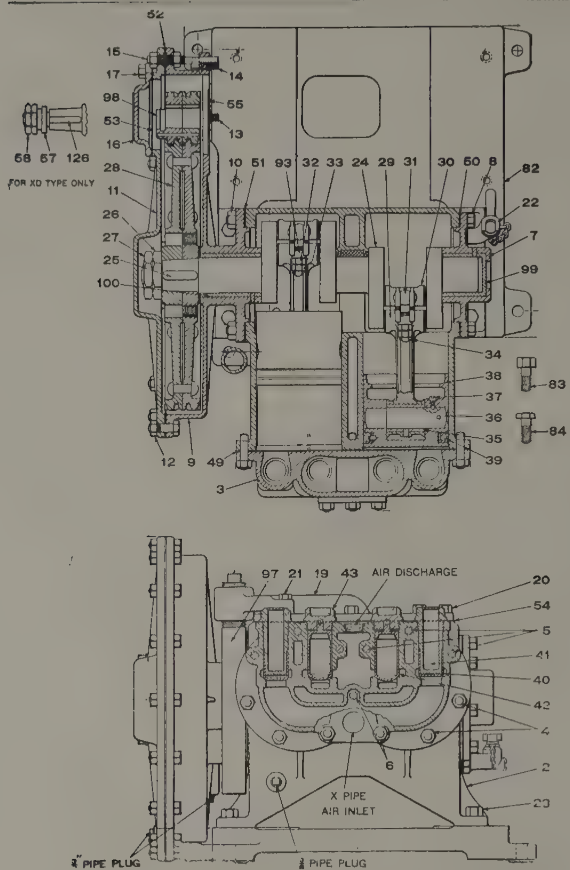

Fig. 1428—Compressor Portion of Type D-EG Motor Driven Air Compressor for Electric Cars.

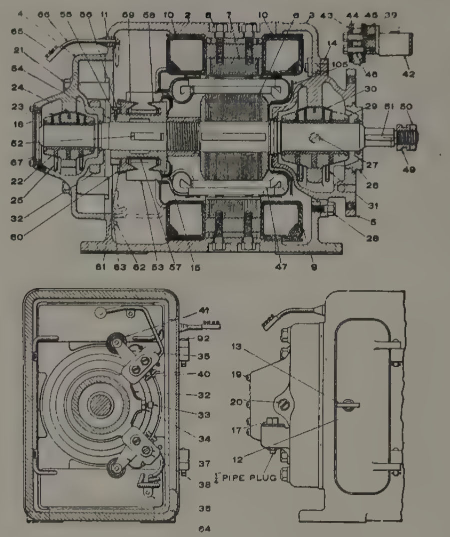

Fig. 1429—Motor Portion of Motor Driven Air Compressor for Electric Cars.

Parts of Air Compressor, Fig. 1428 (Continued).

51 *Gear Case and Crank Case Gasket*
52 *Gear Case Cover Gasket*
53 *Gear Case Cover Cap Gasket*
54 *Crank Case Top Cover Gasket*
55 *Motor Gasket*
82 *Bed Plate*
83 *Cap Screw*
84 *Special Cap Screw*
85 *Suction Plate*
86 *Suction Plate Gasket*
87 *Bolt and Nut*
93 *Washer*
97 *Pipe*
98 *Pinion for Motor Shaft*
99 *Shaft Bearing Bush (Front End)*
100 *Shaft Bearing Bush (Rear End)*

Parts of Motor, Fig. 1429.

2 *Field Yoke*
3 *End Bell*
4 *Front Bearing Housing*
5 *Rear Bearing Housing*
6 *Armature*
7 *Field Pole*
8 *Field Pole Screw*
9 *Field Coil*
10 *Field Coil Washer*
11 *Short Insulating Bushing for Leads*
11 *Long Insulating Bushing for Leads*
12 *Commutator Door*
13 *Commutator Door Latch*
14 *Stud and Nut*
15 *Armature Coil Support*
17 *Oil Filling Elbow Cap Nut*
18 *Front Bearing Housing Dust Plate*
19 *Screw for Dust Plate*
20 *Front Bearing Housing Headless Screw*
21 *Cap Screw*
22 *Front Bearing*
23 *Cleat for Front Bearing*
24 *Cleat Screw*
25 *Front Bearing Oil Ring*
26 *Nut*
27 *Rear Bearing Housing Headless Screw*
28 *Cap Screw*
29 *Rear Bearing*
30 *Cleat for Rear Bearing*
31 *Rear Bearing Oil Ring*
32 *Rocker Arm*
33 *Set Screw*
34 *Jam Nut*
35 *Upper Carbon Holder*
36 *Lower Carbon Holder*
37 *Cap Screw*
38 *Washer*
39 *Double Nut*
40 *Screw*
41 *Carbon Holder Spring*
42 *Carbon*
43 *Insulating Washer Fibre*
44 *Insulating Washer Fullerboard*
45 *Insulating Washer Mica*
46 *Insulating Tube for Rocker Arm*
47 *Armature Coil*
49 *Nut for Removing Pinion*
50 *Motor Shaft Jam Nut*
51 *Key for Pinion*
52 *Key for Commutator*
53 *Commutator*
54 *Commutator Bushing*
55 *Commutator Nut*
56 *Set Screw*
57 *Insulating Bush*
58 *Inner Insulating V Ring for Commutator*
59 *Outer Insulating V Ring for Commutator*
60 *Taper Ring for Commutator*
61 *Washer*
62 *Screw*
63 *Nut Lock*
64 *Cleat for Holding Leads*
65 *Connector for Leads*
66 *Carbon Holder Lead*
67 *Dust Plate Gasket*
92 *Hinge Pin for Commutator Door*
105 *Oil Deflector*

Parts of Brake Valve, Fig. 1430.

2 *Rotary Valve Seat*
3 *Body*
4 *Type A Pipe Bracket*
5 *Rotary Valve*
6 *Rotary Valve Key*
7 *Rotary Valve Spring*
8 *Key Washer*
9 *Oil Screw*
10 *Malleable Iron Handle*
18 *Fil. Head Screw*
19 *Upper Gasket*
20 *Lower Gasket*
21 *Bolt and Nut*
22 *Oil Plug*
23 *Holding Stud*
24 *Holding Nut*
25 *Feed Valve Stud and Nut*
26 *Feed Valve Gasket*
27 *C-6 Feed Valve*
33 *Cover*
34 *Thumb Nut*
35 *Eye Bolt*
50 *Bottom Case (Bushed)*
51 *Equalizing Piston and Valve*
52 *Piston Ring*
53 *Equalizing Piston Valve*
54 *Cap Nut*
55 *Piston Washer*
56 *Equalizing Piston Spring*
57 *Middle Gasket*
58 *Tee for Gage and Equalizing Reservoir*
59 *Union Nut*
60 *Union Swivel*
73 *Spider*
76 *Washer*
80 *Limiting Valve Body*
81 *Limiting Valve Piston*
82 *Limiting Valve Piston Ring*
83 *Limiting Valve Slide Valve*
84 *Limiting Valve Slide Valve Spring*
85 *Limiting Valve Cap Nut*
86 *Limiting Valve Cover Gasket*
87 *Limiting Valve Cover*
88 *Limiting Valve Gasket*
89 *Cap Screw*
90 *Cap Screws*
92 *Pawl*
93 *Pawl Spring*
94 *Cap Nut*
95 *Quadrant*
96 *Feather Key*
97 *Finger Board*
98 *Finger Board Screw*
99 *Finger Base*
100 *Finger Base Screw*
101 *Finger*
102 *Screw*
104 *Clip for Finger Base Lead*
105 *Cottered Rivet Pin*

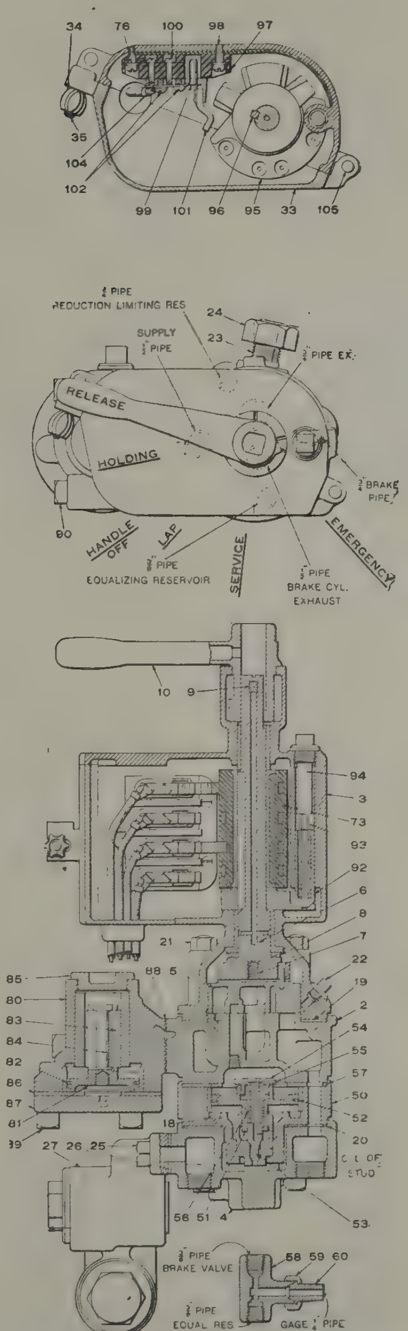

Fig. 1430—Motorman's Electro-Pneumatic Brake Valve, Type ME-23.

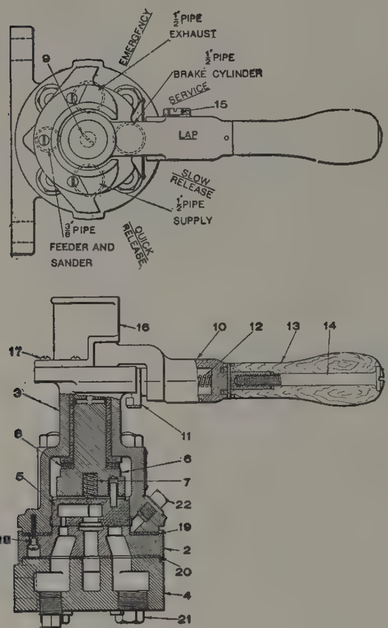

Fig. 1431—Motorman's Straight Air Brake Valve, Type SX-2.

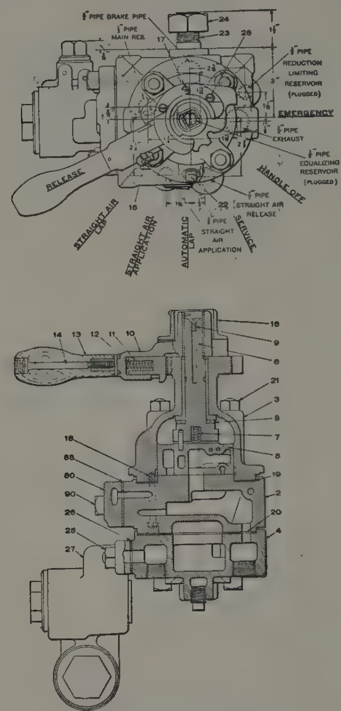

Fig. 1432—Motorman's Automatic Brake Valve, Type M-24.

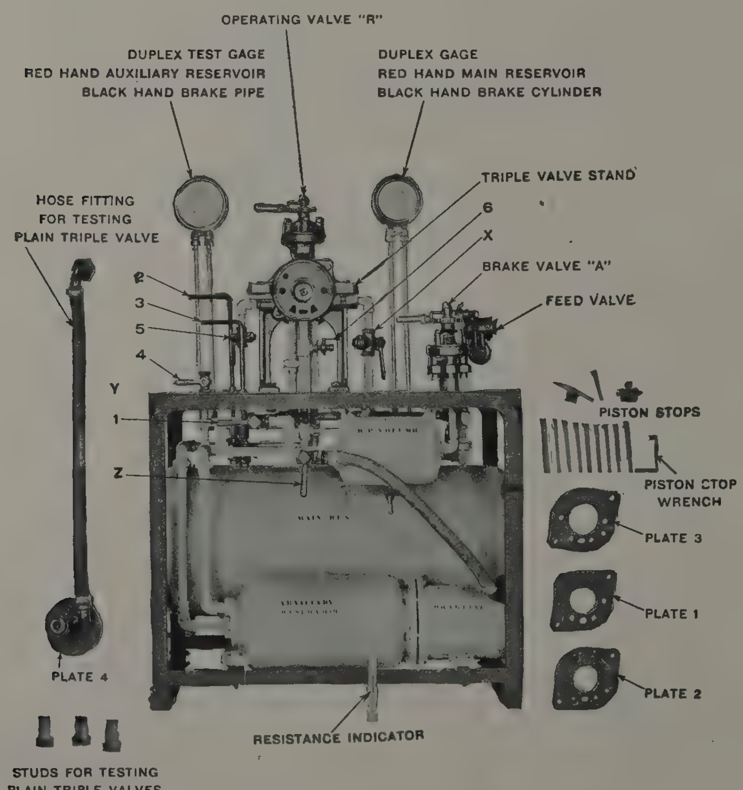

Fig. 1433—Westinghouse No. 3-T Triple Valve Test Rack.

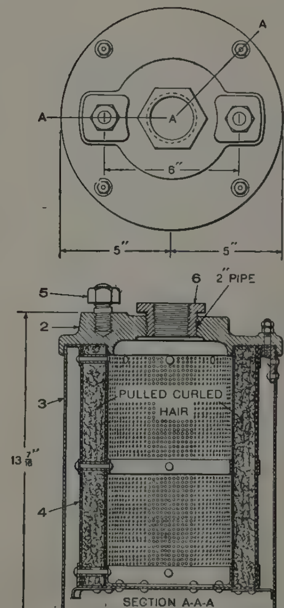

Fig. 1434—Special "Fifty-Four" Air Strainer.

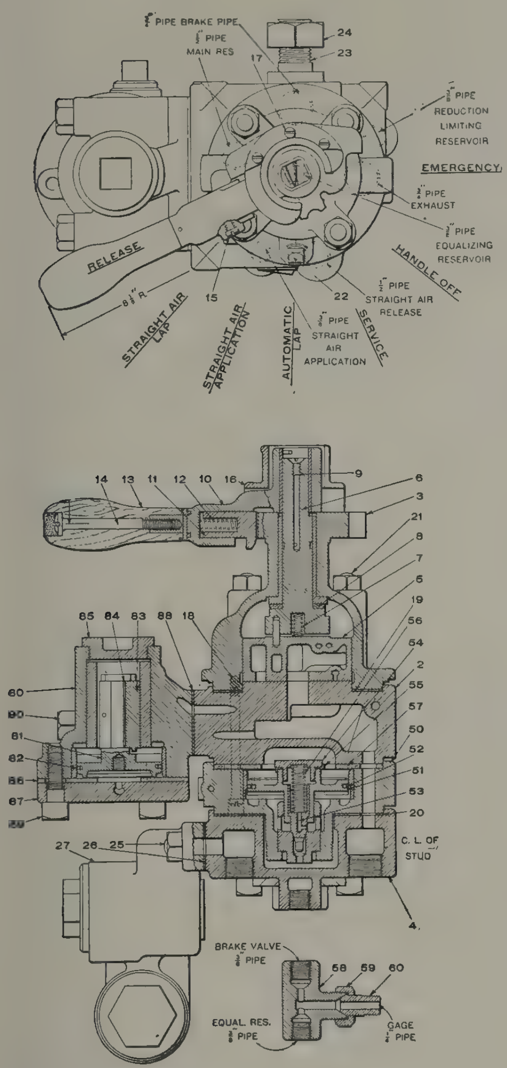

Fig. 1435—Motorman's Automatic Brake Valve, Type M-24-A.

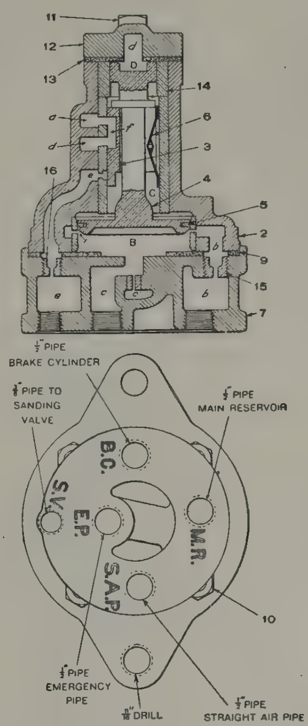

Fig. 1436—Brake Valve Head.

Parts of Brake Valve, Fig. 1435.

2 *Rotary Valve Seat*
3 *Body*
4 *Pipe and Feed Valve Bracket*
5 *Rotary Valve*
6 *Rotary Valve Key*
7 *Rotary Valve Spring*
8 *Key Washer*
9 *Oil Screw*
10 *Piston Spring Tip*
11 *Latch*
12 *Latch Spring*
13 *Hand Grip*
14 *Grip Screw*
15 *Latch Screw*
16 *Handle Guard*
17 *Handle Guard Screw*
18 *Fillister Head Screw*
19 *Upper Gasket*
20 *Lower Gasket*
21 *Bolt and Nut*
22 *Oil Plug*
23 *Holding Stud*
24 *Holding Nut*
25 *Feed Valve Stud and Nut*
26 *Feed Valve Gasket*
27 *C-6 Feed Valve, Complete*
50 *Bottom Case (Bushed)*
51 *Equalizing Piston and Valve*
52 *Piston Ring*
53 *Equalizing Piston Valve*
54 *Cap Nut*
55 *Piston Washer*
56 *Equalizing Piston Spring*
57 *Middle Gasket*
58 *Tee for Gage and Equalizing Reservoir*
59 *Union Nut*
60 *Union Swivel*
80 *Limiting Valve Body*
81 *Limiting Valve Piston*
82 *Limiting Valve Piston Ring*
83 *Limiting Valve Slide Valve*
84 *Limiting Valve Slide Valve Spring*
85 *Limiting Valve Cap Nut*
86 *Limiting Valve Cover Gasket*
87 *Limiting Valve Cover*
88 *Limiting Valve Gasket*
89 *Limiting Valve Cover Cap Screw*
90 *Limiting Valve Cap Screw*

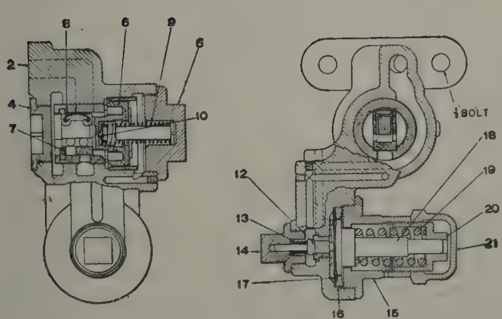

Fig. 1437—C-6 Single Pressure Feed Valve.

Parts of Feed Valve, Fig. 1437.

2 *Valve Body*
4 *Flush Nut*
5 *Cap Nut*
6 *Piston*
7 *Supply Valve*
8 *Supply Valve Spring*
9 *Piston Spring*
10 *Piston Spring Tip*
12 *Regulating Valve*
13 *Regulating Valve Spring*
14 *Regulating Valve Cap Nut*
15 *Spring Box*
16 *Diaphragm Ring*
17 *Diaphragm*
18 *Diaphragm Spindle*
19 *Regulating Spring*
20 *Regulating Nut*
21 *Check Nut*

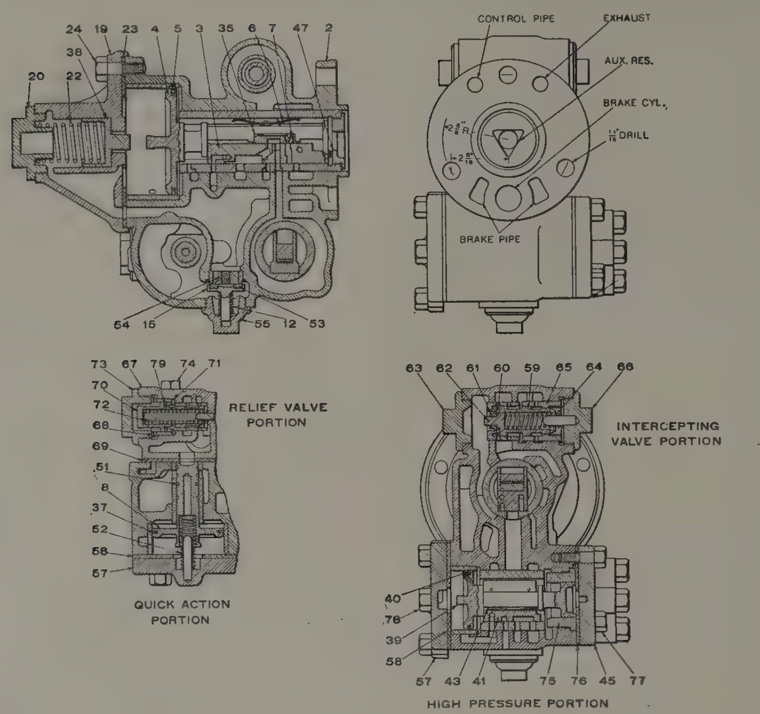

Fig. 1438—Type L-2-G Triple Valve.

Parts of Triple Valve, Fig. 1438.

2 *Body*
3 *Main Slide Valve*
4 *Main Piston*
5 *Main Piston Ring*
6 *Main Slide Valve Spring*
7 *Graduating Valve*
8 *Quick Action Piston*
12 *Check Valve Spring*
15 *Check Valve*
19 *Main Cylinder Cap*
19 *Cylinder Cap*
20 *Graduating Spring Nut*
21 *Graduating Stem*
22 *Graduating Spring*
23 *Main Cylinder Cap Gasket*
24 *Cap Screw (for Main Cylinder Cap)*
35 *Graduating Valve Spring*
37 *Quick-Action Piston Ring (Large)*
38 *Graduating Sleeve*
39 *High-Pressure Piston*
40 *High-Pressure Piston Ring*
41 *High-Pressure Slide Valve*
43 *High-Pressure Slide Valve Spring*
45 *High-Pressure Cover (Small)*
47 *End Cap*
51 *Quick-Action Piston Ring (Small)*
52 *Quick Action Piston Spring*
53 *Check Valve Seat*
54 *Check Valve Nut*
55 *Check Valve Cap Nut*
56 *Graduating Spring (Small)*
57 *Quick-Action Piston Cover*
58 *Quick-Action Piston Cover Gasket*
59 *Intercepting Valve*
60 *Intercepting Valve Seat*
61 *Intercepting Valve Nut*
62 *Steel Cotter*
63 *Intercepting Valve Cap Nut*
64 *Intercepting Valve Spring*
65 *Intercepting Valve Bush (Small)*
66 *Intercepting Valve Cap Nut and Spring Guide*
67 *Relief Valve Body (Bushed)*
68 *Relief Valve Bush*
69 *Relief Valve Gasket*
70 *Piston Relief Valve*
71 *Piston Relief Valve Seat*
72 *Piston Relief Valve Spring*
73 *Piston Relief Valve Cap Nut*
74 *Cap Screw*
75 *High-Pressure Piston Bush (Small)*
76 *High-Pressure Piston Cover Gasket (Small)*
77 *Cap Screw*
78 *Cap Screw*
79 *Relief Valve Piston Ring*

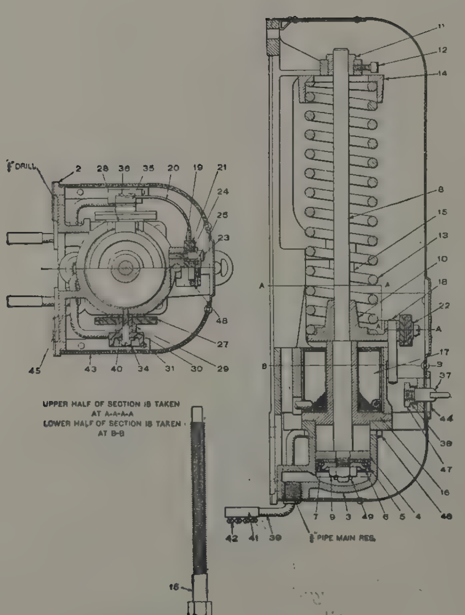

Fig. 1439—Electric Compressor Governor, Type G-1-B.

Parts of Compressor Governor, Fig. 1439.

2 *Base*
3 *Cylinder*
4 *Piston*
5 *Piston Packing*
6 *Piston Follower*
7 *Packing Leather Expander*
8 *Piston Rod*
9 *Piston Nut*
10 *Armature*
11 *Piston Rod Guide*
12 *Set Screw*
13 *Regulating Spring*
14 *Spring Yoke*
15 *Adjusting Bolt*
16 *Magnet Core*
17 *Magnet Coil*
18 *Pin for Armature*
19 *Circuit Closer Insulator*
20 *Circuit Closer*
21 *Circuit Closer Insulator*
22 *Washer*
23 *Fillister Head Screw*
24 *Insulating Bushing*
25 *Lock Screw*
27 *Arc Shield*
28 *Arc Shield Cushion*
29 *Fixed Contact*
30 *Controller Clip*
31 *Contact Screw Insulator*
34 *Contact Screw*
35 *Tip for Circuit Closer*
36 *Button Head Screw*
37 *Latch*
38 *Spring for Latch*
39 *Lead*
40 *Washer*
41 *Connector*
42 *Round Head Screw*
43 *Cover*
44 *Latch Plate*
45 *Insulating Bush*
46 *Fillister Head Screw*
47 *Round Nut for Latch*
48 *Cotter*
49 *Cotter*

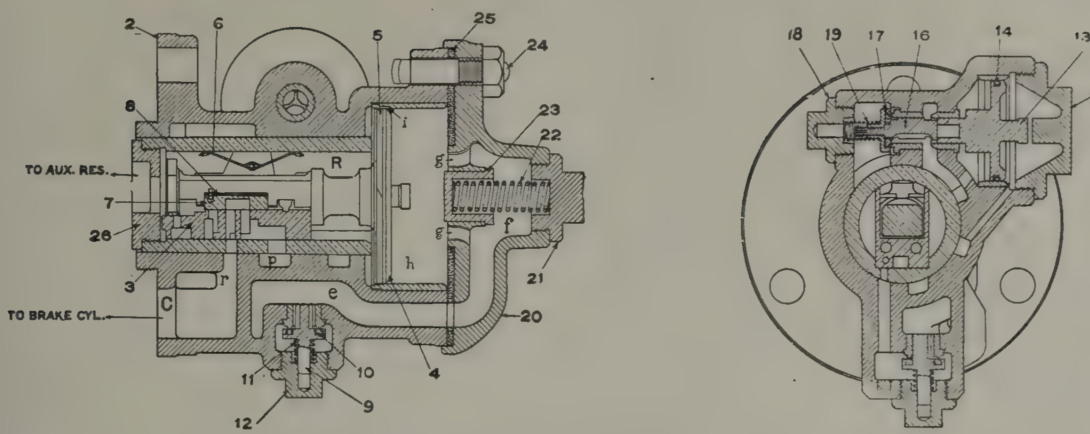

Fig. 1440—Type M-2-A Triple Valve.

Parts of Type M-2-A Triple Valve, Fig. 1440.

2 *Body*
3 *Slide Valve*
4 *Main Piston*
5 *Main Piston Ring*
6 *Slide Valve Spring*
7 *Graduating Valve*
8 *Graduating Valve Spring*
9 *Check Valve*
10 *Rubber Seat for Check Valve*
11 *Check Valve Spring*
12 *Check Valve Cap*
13 *By-Pass Piston*
14 *By-Pass Piston Ring*
15 *By-Pass Piston Cap*
16 *By-Pass Valve*
17 *Rubber Seat for By-Pass Valve*
18 *By-Pass Valve Cap*
19 *By-Pass Valve Spring*
20 *Cylinder Cap*
21 *Graduating Spring Nut*
22 *Graduating Spring*
23 *Graduating Sleeve*
24 *Bolt and Nut*
25 *Cylinder Cap Gasket*
26 *End Cap*

Parts of Compressor Governor, Type J, Fig. 1442.

2 *Frame*
3 *Guide Pin*
4 *Finger Board Insulation*
5 *Finger*
6 *Adjusting Screw Jam Nut*
7 *Finger Adjusting Screw*
8 *Finger Base*
9 *Screw for Securing Finger to Finger Base*
10 *Finger Clamp*
11 *Finger Board Screw*
12 *Switch Cover*
13 *Eye Bolt Thumb Nut*
14 *Cover Eye Bolt*
15 *Eye Bolt Rivet*
16 *Switch Piston and Rod*
17 *Piston Spring*
18 *Piston Spring Seat*
19 *Piston Seat*
20 *Switch Piston Ring*
21 *Piston Washer*
23 *Piston Washer Screw*
24 *Large Ring for Double Piston*
25 *Double Piston with Rings*
26 *Regulating Valve Cap*
27 *Regulating Valve Spring*
28 *Regulating Valve for Cutting Out*
36 *Piston Rod Cotter*
37 *Piston Rod Nut*
38 *Piston Rod Brass Washer*
39 *and* 40 *Piston Rod Fibre Washer*
41 *Square Fibre Bush*
42 *Contact Screw*
43 *Switch Spider*
44 *Switch Spider Contact*
45 *Piston Rod Fibre Washer*
46 *Piston Rod Brass Washer*
47 *Lead Screw*
48 *Finger Board*
50 *Porcelain Bush for Leads*
52 *Frame Gasket*
53 *Valve Case*
54 *Cylinder Head and Diaphragm Cover*
55 *Cylinder Gasket*
56 *Small Ring for Double Piston*
57 *Piston Bush*
58 *Diaphragm Cap Nut*
59 *Diaphragm Ring*
60 *Diaphragm*
61 *Diaphragm Spindle*
62 *Regulating Spring*
63 *Regulating Nut*
64 *Regulating Check Nut*
65 *Regulating Valve for Cutting In*
66 *Regulating Valve Spring*
67 *Diaphragm Spindle*
68 *Regulating Nut*
69 *Regulating Check Nut*
70 *Regulating Spring*
71 *Diaphragm*
72 *Diaphragm Ring*
73 *Diaphragm Cap Nut*
74 *Cylinder Gasket*
75 *Cylinder Head and Diaphragm Cover*
76 *Slide Valve*
77 *Slide Valve Spring*
78 *Pipe Plug*
80 *Short Cap Screw for Cylinder Head*
81 *Long Cap Screw for Cylinder Head*
107 *Tee-Head Bolt with Nut for Securing Switch to Controlling Mechanism*

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Parts of Type E-6 Safety Valve, Fig. 1441.

2 *Body*
3 *Cap Nut*
4 *Valve*
5 *Valve Stem*
6 *Spring (50 lbs. to 90 lbs.)*
7 *Regulating Nut*

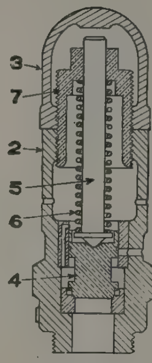

Fig. 1441—Type E-6 Safety Valve.

Parts of Application and Release Magnets, Fig. 1443.

501 *Pipe Bracket*
502 *Magnet Bracket Body*
503 *Cap Nut and Valve Stop*
504 *Cylinder Supply Valve*
505 *Seat for Cylinder Supply Valve*
506 *Cap Nut with Choke*
507 *Magnet Bracket Gasket*
508 *Spring (15 lbs. Differential)*
509 *Pipe Bracket Gasket*
510 *Tee-Head Bolt and Nut*

Parts Common to Application and Release Magnets.

511 *Magnet Cap*
512 *Top Cover*
513 *Leather Gasket*
514 *Cotter*
515 *Plunger*
516 *Special Washer*
517 *Terminal Insulator*
518 *Terminal*
519 *Brass Washer*
520 *Nut*
521 *and* 522 *Rubber Gasket*
523 *Lead Washer*
524 *Magnet Valve Spring*
525 *Magnet Valve Cap*

Application Magnet.

526 *Magnet Core*
527 *Back Strap*
528 *Magnet Coil*
529 *Armature Stem*
530 *Magnet Valve*
531 *Cover*

Release Magnet.

540 *Magnet Core*
541 *Back Strap*
542 *Magnet Coil*
543 *Armature Stem*
544 *Magnet Valve*
545 *Spring Guide*

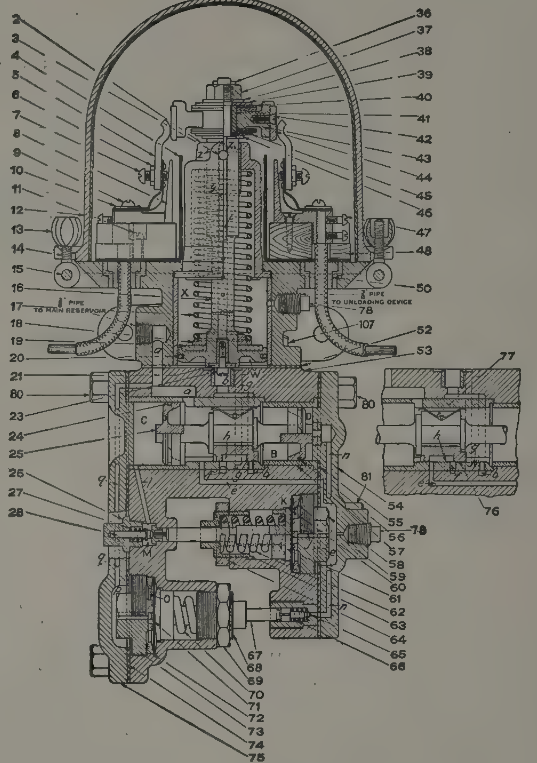

Fig. 1442—Type J Electric Compressor Governor.

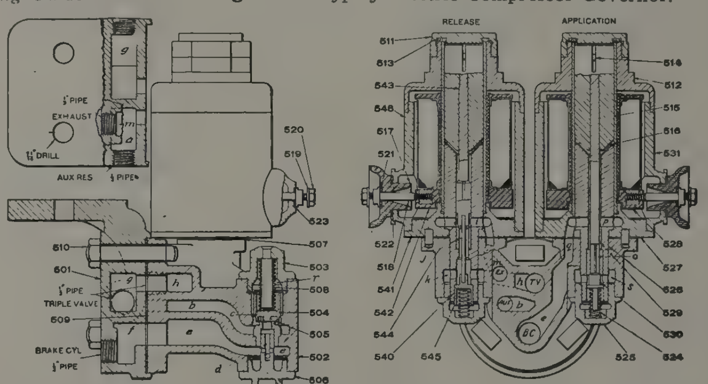

Fig. 1443—Application and Release Magnets for Interborough Rapid Transit Company.

Parts of Type R Brake Cylinder, Fig. 1444.

2 *Cylinder Body*
3 *Piston and Rod*
4 *Non-Pressure Head*
5 *Pressure Head*
6 *Follower*
7 *Packing Leather*
8 *Packing Expander*
9 *Release Spring*
10 *Follower-Stud and Nut*
11 *Pressure-Head Bolt and Nut*
12 *Non-Pressure-Head Bolt and Nut*
13 *Cylinder Gasket*
14 *Push Rod with Pin and Cotter*
15 *Push Rod Pin with Cotter*
16 *Detachable Lever Bracket*
17 *Lever Bracket Bolt and Nuts*
18 *¼ in. Pipe Plug*
19 *Exhaust Pipe Plug*
20 *½ in. Pipe Plug*
21 *¾ in. Pipe Plug*
22 *1 in. Pipe Plug*
23 *Triple Valve Gasket*
24 *Triple Valve Stud and Nut*
25 *Triple Valve Bolt and Nut*

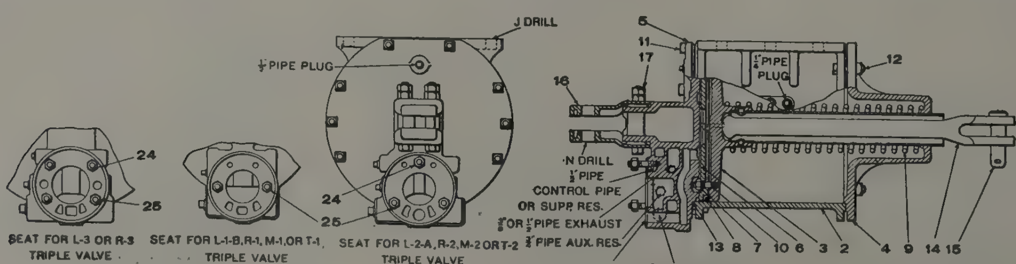

Fig. 1444—Traction Brake Cylinder, Type R.

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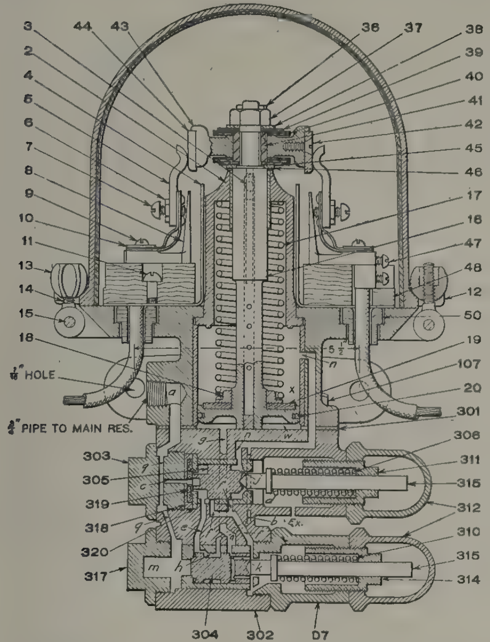


Fig. 1445—Electric Compressor Governor.

Parts of Signal Valve, Fig. 1446.

2 *Diaphragm Case*
3 *Diaphragm Cap*
4 *Union Swivel*
5 *Union Nut*
6 *Union Gasket*
7 *Eye Bolt and Nut*
8 *Diaphragm Valve Nut*
9 *Eye Bolt Rivet*
10 *Lower Diaphragm Plate and Valve Stem*
11 *Upper Diaphragm Plate*
12 *Diaphragm*
13 *Union Nut*
14 *Union Gasket*
15 *Union Swivel*
16 *Lower Cap Nut*
17 *Pin for Diaphragm Valve Nut*

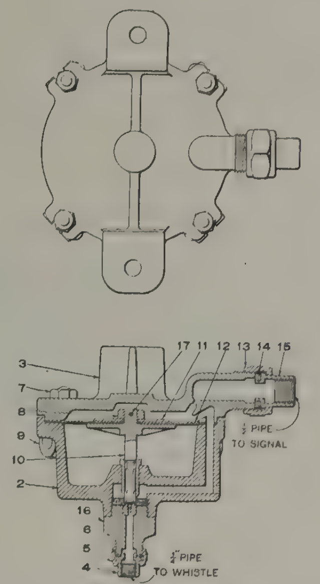


Fig. 1446—Signal Valve.

Parts of Signal Reducing Valve, Fig. 1448.

2 *Body, Bushed*
3 *Spring Box*
4 *Supply Valve*
5 *Supply Valve Cap Nut*
6 *Supply Valve Spring*
7 *Piston (includes 8)*
8 *Piston Ring*
9 *Piston Nut*
10 *Piston Rod*
11 *Large Diaphragm*
11 *Small Diaphragm*
12 *Diaphragm Ring*
13 *Regulating Spring*
14 *Regulating Nut*
15 *Check Nut*
16 *Cock Cap Nut*
17 *Cock Spring*
18 *3/8-in. Union Nut*
19 *3/8-in. Union Swivel*
20 *3/8-in. Union Gasket*
21 *Cock Key*
22 *Choke Plug*
23 *Cotter*

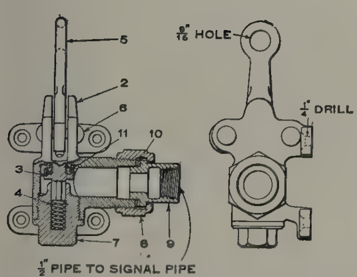


Fig. 1447—Car Discharge Valve.

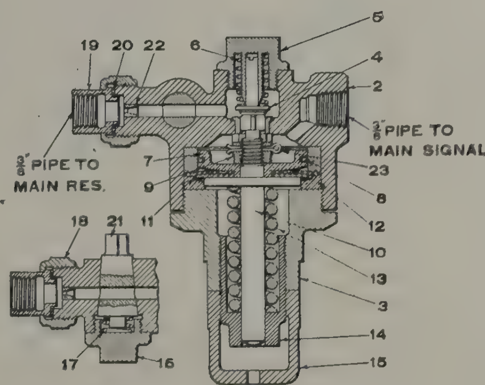
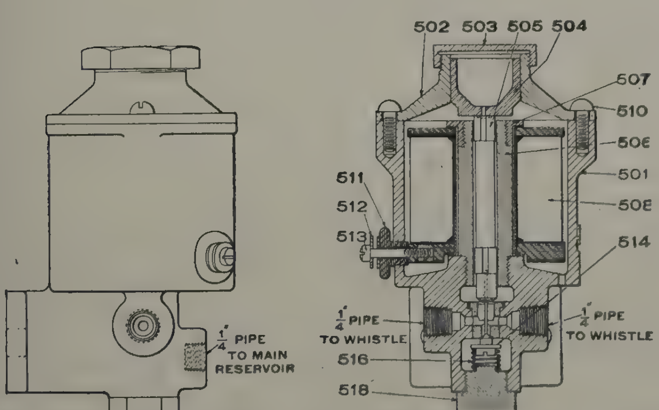


Fig. 1448—Signal Reducing Valve.



Parts of Magnet and Bracket, Fig. 1449.

501 *Body*
502 *Cover*
503 *Cap*
504 *Armature*
505 *Armature Stem*
506 *Magnet Core*
507 *Magnet Core Pole*
508 *Magnet Coil*
510 *Cap Screw*
511 *Insulator*
512 *Brass Washer*
513 *Contact Screw*
514 *Valve*
516 *Spring*
518 *Cap Nut*

Fig. 1449—Type A Combined Magnet and Bracket for Electro-Pneumatic Signal System.

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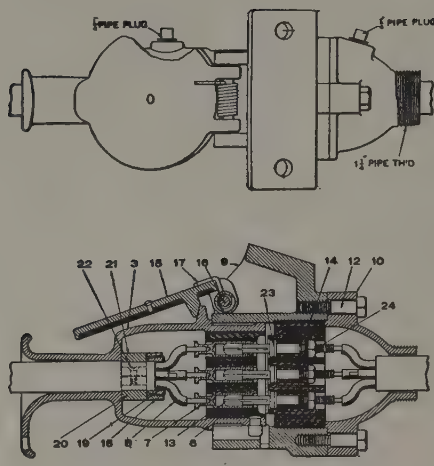

Fig. 1450—Five-Point Plug Connector.

Parts of Plug Connector, Fig. 1450.

3 *Plug Body*
6 *Jumper Contact*
7 *Jumper Contact*
8 *Jumper Cable*
9 *Receptacle Body*
10 *Receptacle Cover*
12 *Cap Screw*
13 *Receptacle Contact*
14 *Receptacle Socket*
15 *Receptacle Door*
16 *Hinge Pin*
17 *Door Spring*
18 *Conical Clamp (Outside Ring)*
19 *Conical Clamp (Inside Ring)*
20 *Cable Clamp (Lower Half)*
21 *Cable Clamp (Upper Half)*
22 *Machine Screw*
23 *Contact Washer*
24 *Contact Nut*


Fig. 1451—Signal Whistle.

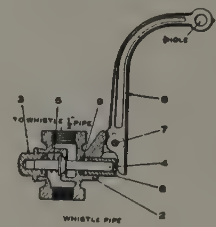

Fig. 1452—Whistle Valve.

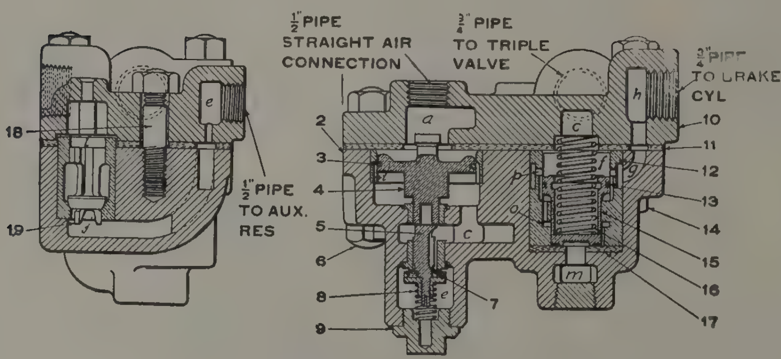

Fig. 1453—No. 14 Double Check Valve.

Parts of Double Check Valve, Fig. 1453.

2 *Body*
3 *Supply Valve Piston Ring*
4 *Supply Valve Piston*
5 *Auxiliary Reservoir Check Valve*
6 *Tee Head Bolt*
8 *Auxiliary Reservoir Check Valve Spring*
9 *Auxiliary Reservoir Check Valve Cap Nut*
10 *Pipe Bracket*
11 *Pipe Bracket Gasket*
12 *Double Piston Bush*
13 *Double Piston Ring*
14 *Tee Head Bolt*
15 *Double Piston*
16 *Double Piston Spring*
17 *Double Piston Seat*
18 *Stud*
19 *Exhaust Check Valve*

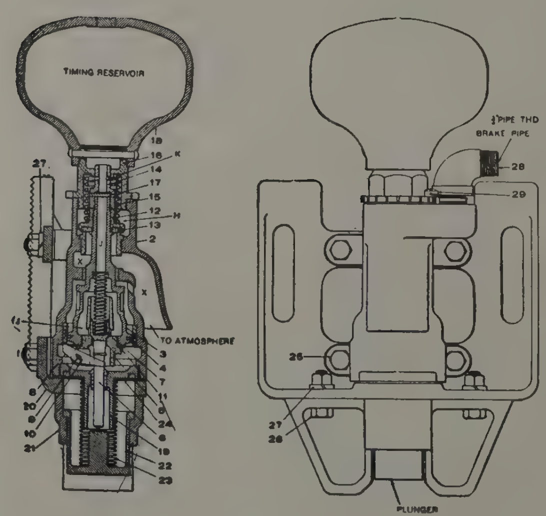

Fig. 1454—Automatic Train Stop with Timing Feature.

Parts of Automatic Train Stop, Fig. 1454.

2 *Body*
3 *Piston*
4 *Piston Ring*
5 *Pilot Valve Seat*
6 *Pilot Valve*
7 *Pilot Valve Spring*
8 *Locking Lever*
9 *Locking Lever Pin*
10 *Locking Lever Cotter*
11 *Lock Washer*
12 *Valve*
13 *Valve Seat*
14 *Lock Nut with Timing Valve*
15 *Piston Valve Spring*
16 *Top Cap*
17 *Lock Nut Pin*
18 *Reservoir*
19 *Cap and Pilot Valve Guide*
20 *Adjusting Bracket*
21 *Plow*
22 *Plunger*
23 *Plunger Spring*
24 *Adjusting Bracket Gasket*
25 *Bolt and Nut*
26 *Bolt and Nut*
27 *Lock Washer*
28 *Street Elbow*
29 *Fillister Head Cap Screw*

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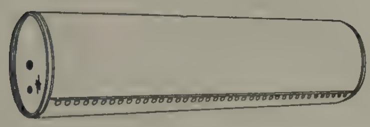
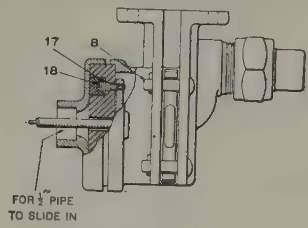


Fig. 1454-A—Main Reservoir.



Parts of Car Discharge Valve, Fig. 1455

2 *Valve Body*
3 *Valve Stem*
4 *Valve Seat*
5 *Valve Spring*
6 *Cap Nut*
7 *Handle*
8 *Rivet*
10 *Union*
11 *Union Nut*
12 *Union Swivel*
13 *Contact Base*
14 *Lower Contact*
15 *Upper Contact*
16 *Terminal*
17 *Brass Washer*
18 *Machine Screw*
19 *Machine Screw*
20 *Contact Pin*
21 *Cover for Contact Base*
22 *Machine Screws*
23 *Lead*

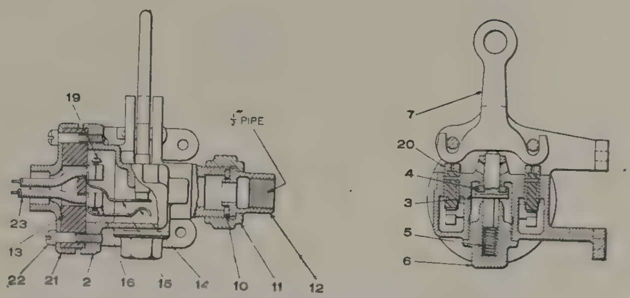


Fig. 1455—Electro-Pneumatic Car Discharge Valve.

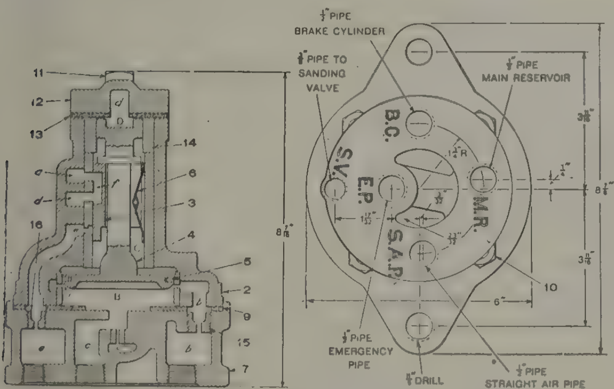


Fig. 1456—Type H-2 Emergency Valve.

Parts of Emergency Valve, Fig. 1456

2 *Body (Bushed)*
3 *Slide Valve*
4 *Double Piston*
5 *Piston Ring*
6 *Slide Valve Spring*
7 *Floor Bracket*
9 *Floor Bracket Gasket.*
10 *Bolt and Nut*
11 *Cap Screw*
12 *Small Piston Cap*
13 *Small Piston Cap Gasket*
14 *Small Piston Bush*
15 *Choke Plug*
16 *Choke Plug*

Parts of Cut-Out Cock, Fig. 1457

2 *Body*
3 *Key*
4 *Cap*
5 *Spring*
6 *Handle*

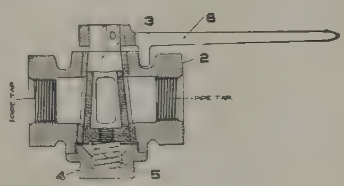


Fig. 1457—One-Inch Cut-Out Cock.

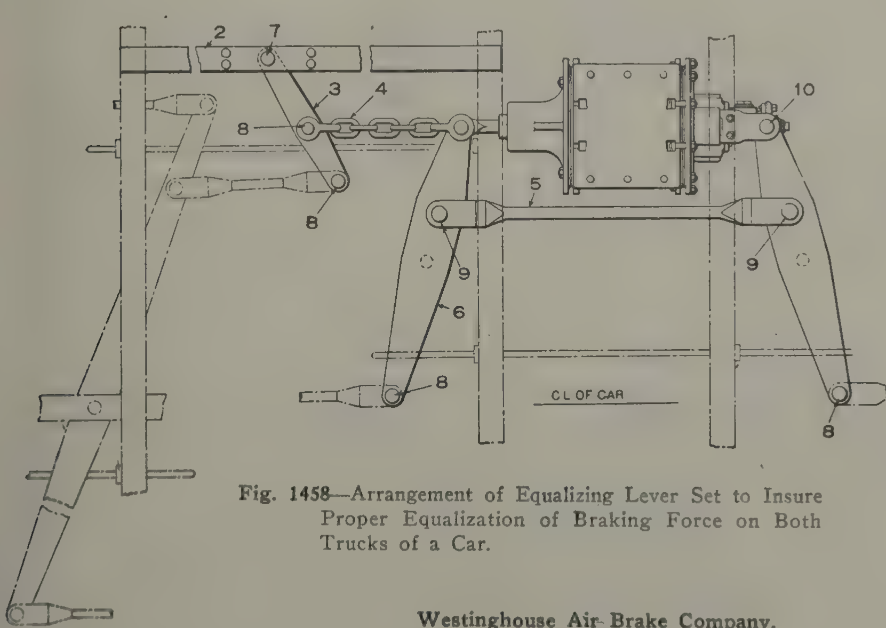


Fig. 1458—Arrangement of Equalizing Lever Set to Insure Proper Equalization of Braking Force on Both Trucks of a Car.

Parts of Equalizing Lever Set, Fig. 1458

2 *Multiplying Lever Fulcrum Bracket*
3 *Multiplying Lever*
4 *Connecting Chain*
5 *Cylinder Lever Rod*
6 *Cylinder Lever*
7 *Pin for Fulcrum Bracket*
8, 9 and 10 *Pins*

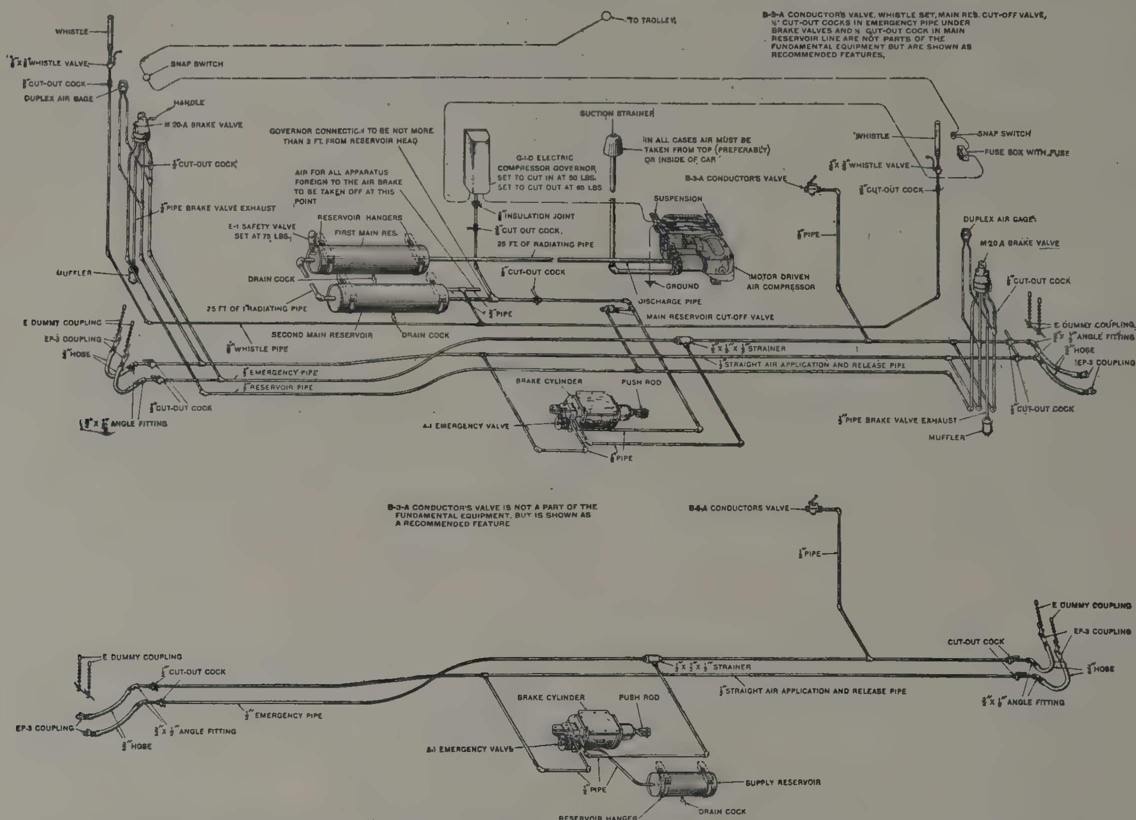


Fig. 1459—Diagram of Westinghouse Air Brake Equipment, Schedule SME with A-1 Emergency Valve. Straight Air Brake with an Automatic Emergency Feature, Primarily for Single Car Service. Under some Conditions it may be Used for Two-Car Trains, Consisting of Motor Car and Trailer.

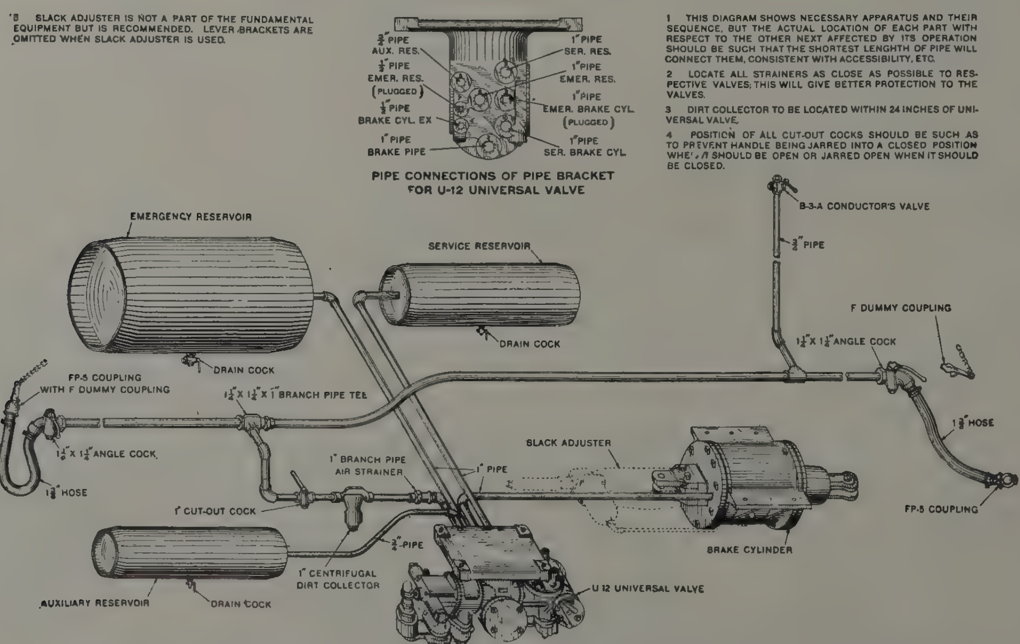


Fig. 1460—Piping Diagram of Universal Common Standard Brake Equipment, Schedule UC.

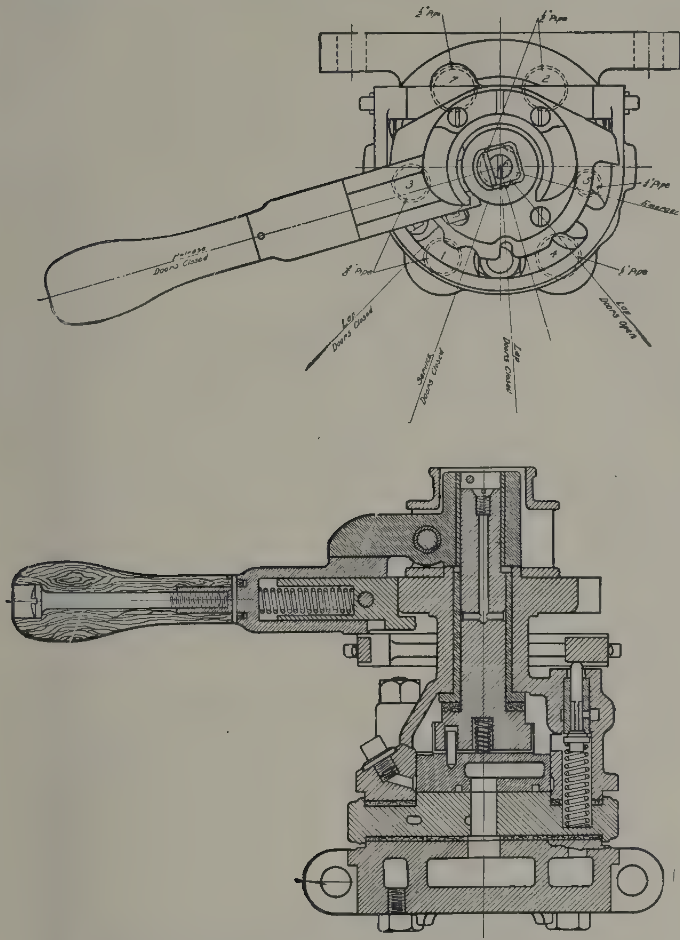


Fig. 1461—M-28 Brake Valve with Sanding Feature.

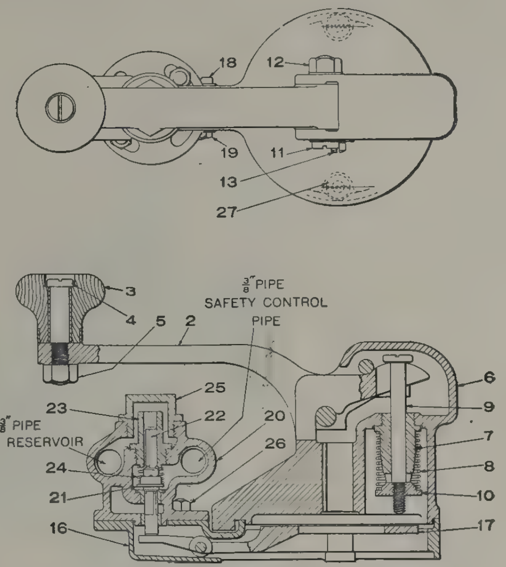


Fig. 1462—Controller Handle and Controller Pilot Valve.

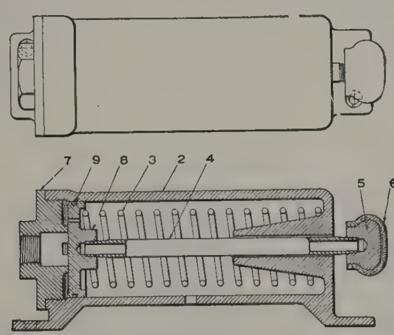


Fig. 1463—Circuit Breaker Cylinder.

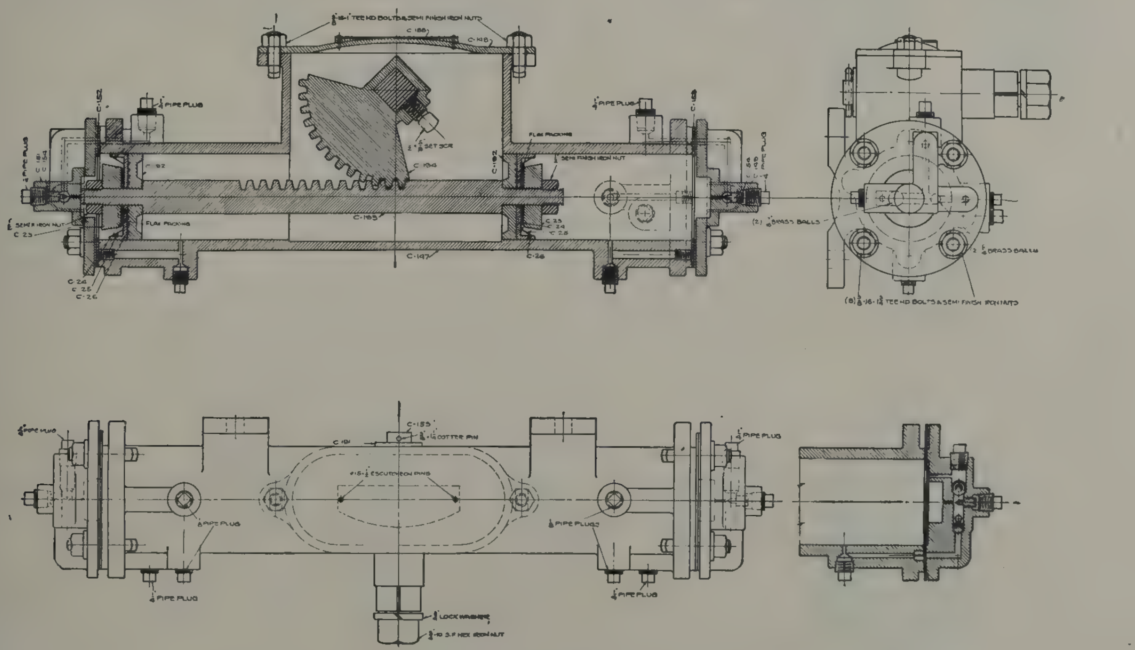


Fig. 1464—Door and Step Controller.

Safety Car Control, Safety Car Devices Company—Westinghouse.

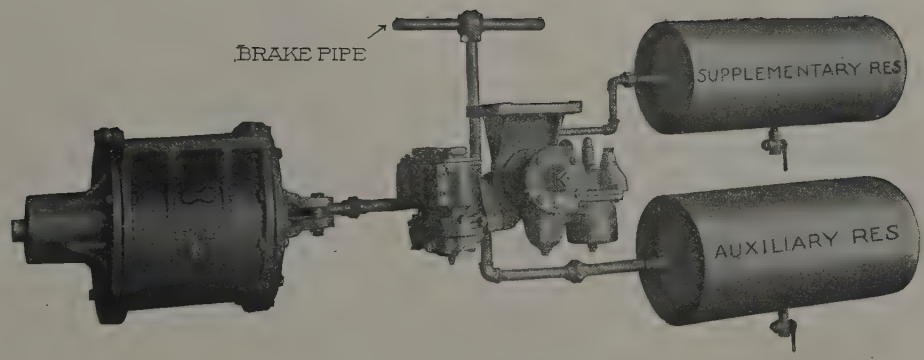
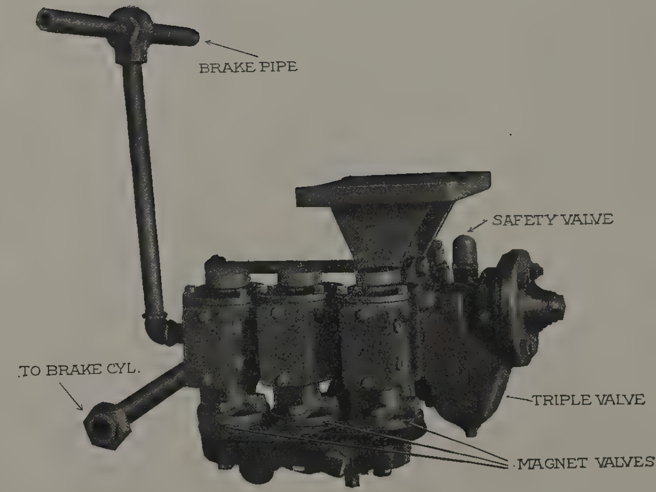


Fig. 1465—PS Electro-Pneumatic Brake Equipment.



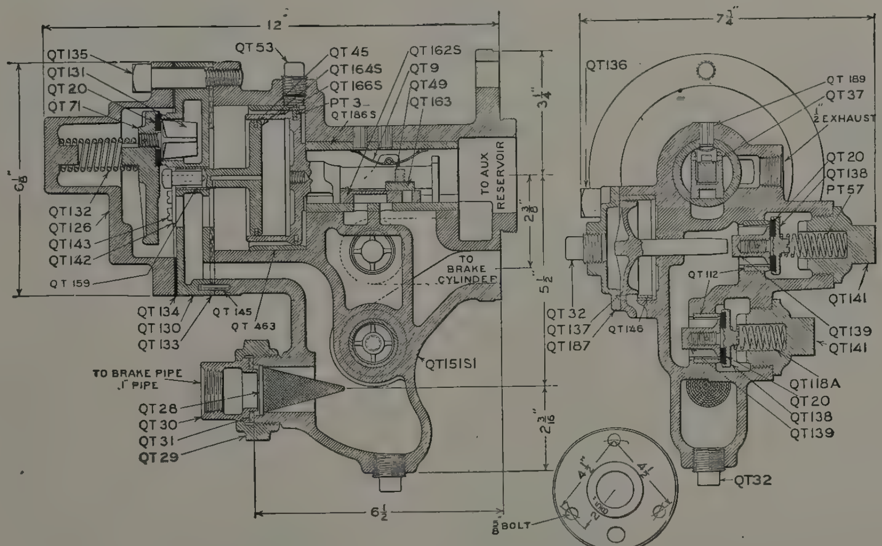


Fig. 1466—Quick Action Triple Valve, Style S1B, for 12 in., 14 in. and 16 in. Passenger Brake Cylinders.

Parts of Triple Valve, Fig. 1466.

QT 3	*Main Piston Spring*	QT 133	*Main Cylinder Gasket*
QT 9	*Exhaust Valve Spring*	QT 134	*Front Cap Gasket*
QT 20	*Rubber Valve Seat*	QT 135	*Front Cap Bolt*
QT 28	*Strainer*	QT 136	*Side Cap Bolt*
QT 29	*Union Nut*	QT 137	*Quick Action Valve Piston*
QT 30	*Union Swivel*	QT 138	*Check Valve*
QT 31	*Union Gasket*	QT 139	*Check Valve Guide*
QT 32	*Pipe Plug*	QT 141	*Check Valve Cap*
QT 37	*Exhaust Valve Pin*	QT 142	*Piston Stop*
QT 45	*Vent Valve Piston Ring*	QT 143	*Piston Stop Screw*
QT 49	*Graduating Valve Spring*	QT 151SI	*Triple Valve Body*
QT 53	*Pipe Plug*	QT 161S	*Exhaust Valve*
QT 69	*Triple Valve Gasket*	QT 163	*Graduating Valve*
QT 71	*Vent Valve*	QT 164S	*Vent Valve Piston*
QT 118A	*Check Valve Spring*	QT 166S	*Main Piston*
QT 126	*Front Cap*	QT 187	*Side Cap*
QT 130	*Vent Valve Seat*	PT 57	*Quick Action Valve Spring*
QT 131	*Vent Valve Guide*	QT 63S	*Bushing*
QT 132	*Vent Valve Spring*	QT 186S	*Bushing*

New York Air Brake Company.

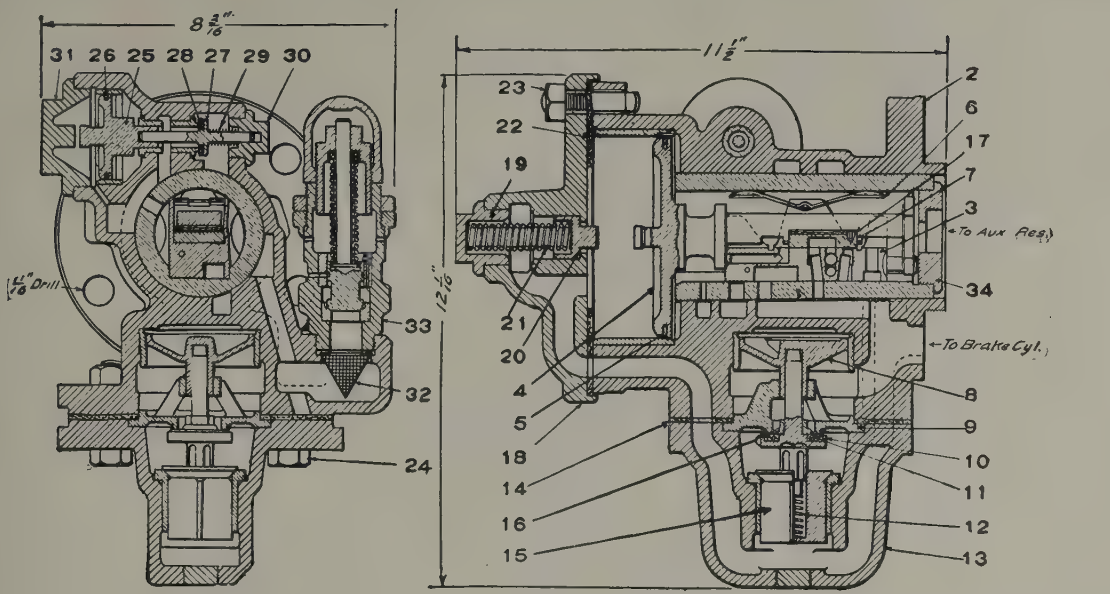


Fig. 1467—Quick Action Pipeless Triple Valve, L-3. Used with 16 and 18 in. Passenger Brake Cylinders.

Parts of Triple Valve, Fig. 1467.

2 *Body*
3 *Slide Valve*
4 *Main Piston*
5 *Main Piston Ring*
6 *Slide Valve Spring*
7 *Graduating Valve*
8 *Emergency Piston*
9 *Emergency Valve Seat*
10 *Emergency Valve*
11 *Rubber Seat for Emergency Valve*
12 *Check Valve Spring*
13 *Check Valve Case*
14 *Check Valve Case Gasket*
15 *Check Valve*
16 *Emergency Valve Nut*
17 *Graduating Valve Spring*
18 *Cylinder Cap*
19 *Graduating Spring Nut*
20 *Graduating Sleeve*
21 *Graduating Spring*
22 *Cylinder Cap Gasket*
23 *Bolt and Nut*
24 *Bolt and Nut*
25 *By-Pass Piston*
26 *By-Pass Piston Ring*
27 *By-Pass Valve*
29 *By-Pass Valve Spring*
30 *By-Pass Valve Cap*
31 *By-Pass Piston Cap*
32 *Strainer*
33 *E-7 Safety Valve*
34 *End Cap*

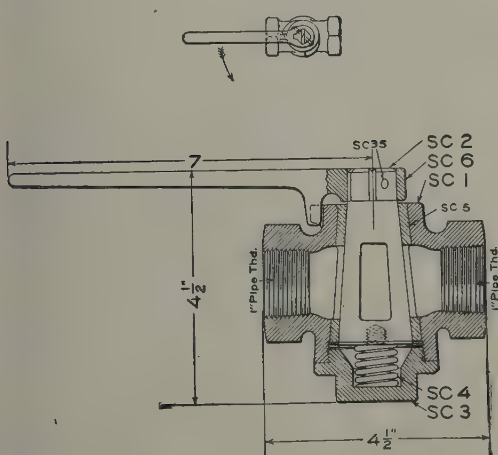


Fig. 1468—One-Inch Cut Out Cock.

Parts of One-Inch Cut Out Cock, Fig. 1468.

SC 1 *Body*
SC 2 *Plug*
SC 3 *Cap*
SC 4 *Spring*
SC 6 *Handle*
SC 35 *Handle Pin*

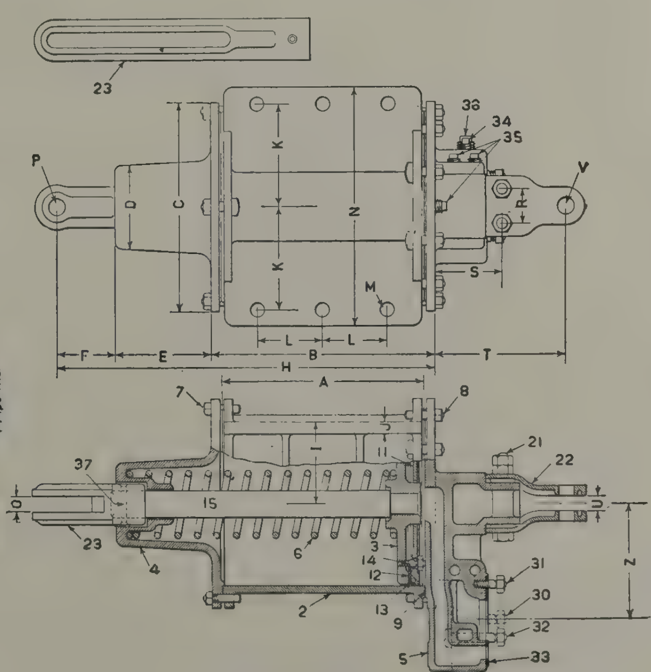


Fig. 1469—Passenger Train Car Cylinder, Style M, for Pipeless Triple Valve.

New York Air Brake Company.

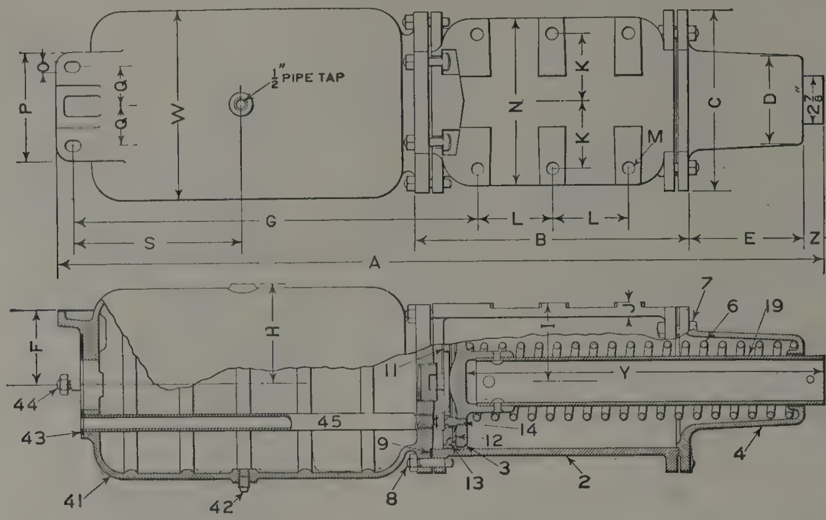


Fig. 1470—Combined Brake Cylinder and Reservoir for Freight Cars.

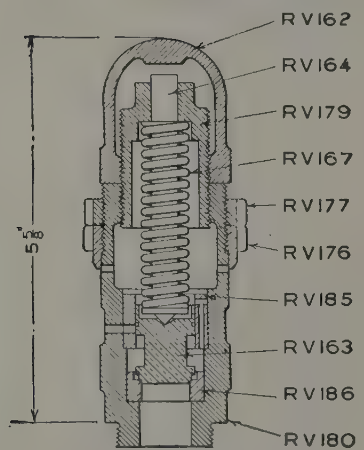


Fig. 1471—Safety Valve.

Parts of Safety Valve, Fig. 1471.

RV 162 *Cap Nut*
RV 163 *Valve*
RV 164 *Valve Stem*
RV 166 *Spring*
RV 176 *Exhaust Regulating Ring*
RV 177 *Lock Ring*
RV 179 *Regulating Nut*
RV 180 *Body*

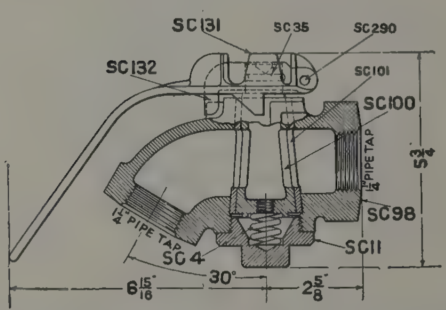


Fig. 1472—Angle Cock with Self-Locking Handle.

Parts of Angle Cock, Fig. 1472.

SC 4 *Spring*
SC 11 *Cap*
SC 35 *Socket Pin*
SC 98 *Body*
SC 100 *Plug*
SC 131 *Handle*
SC 132 *Handle Socket*
SC 290 *Handle Pin*

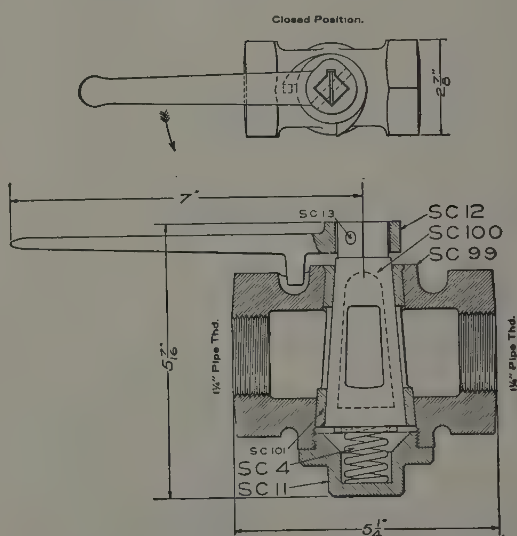


Fig. 1473—1¼-in. Cut Out Cock.

Parts of 1¼-in. Cut Out Cock, Fig. 1473.

SC 4 *Spring*
SC 11 *Cap*
SC 12 *Handle*
SC 13 *Handle Pin*
SC 99 *Body*
SC 100 *Plug*

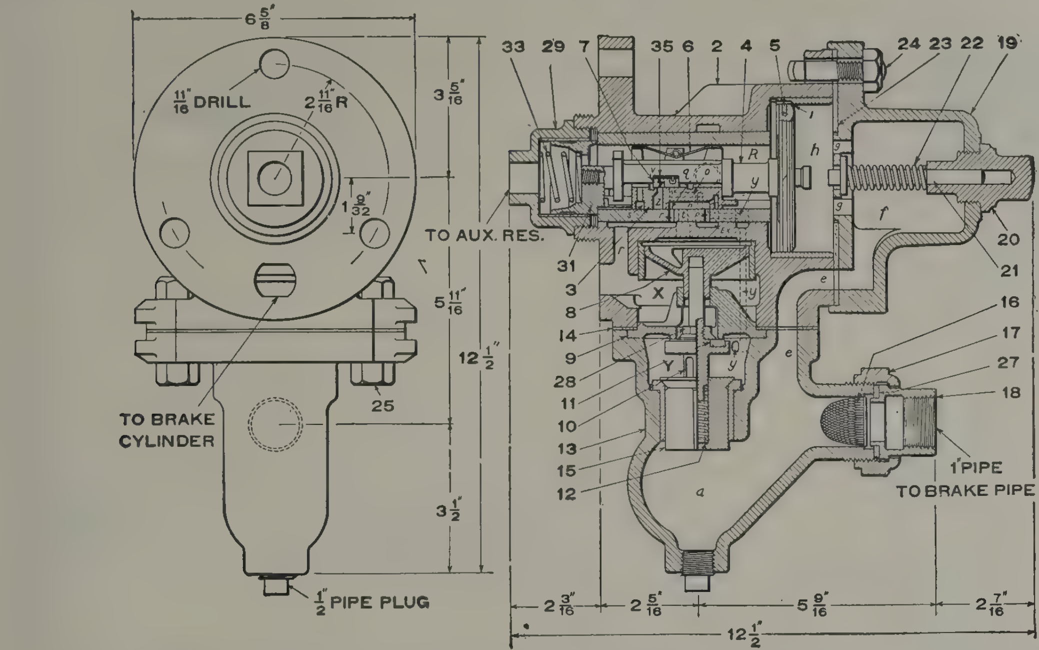


Fig. 1474—Quick Action Triple Valve, Style K-2, with Quick Service, Uniform Release and Uniform Recharge, for 10 in. Freight Brake Cylinders.

Parts of Triple Valve, Fig. 1474.

2 *Body*
3 *Slide Valve*
4 *Main Piston*
5 *Main Piston Ring*
6 *Slide Valve Spring*
7 *Graduating Valve*
8 *Emergency Piston*
9 *Emergency Valve Seat*
10 *Emergency Valve*
11 *Rubber Seat*
12 *Check Valve Spring*
13 *Check Valve Case*
14 *Check Valve Case Gasket*
15 *Check Valve*
16 *Strainer*
17 *Union Nut*
18 *Union Swivel*
19 *Cylinder Cap*
20 *Graduating Stem Nut*
21 *Graduating Stem*
22 *Graduating Spring*
23 *Cylinder Cap Gasket*
24 *Bolt and Nut*
25 *Bolt and Nut*
27 *Union Gasket*
28 *Emergency Valve Nut*
29 *Retarding Device Body*
31 *Retarding Stem*
33 *Retarding Spring*
35 *Graduating Valve Spring*

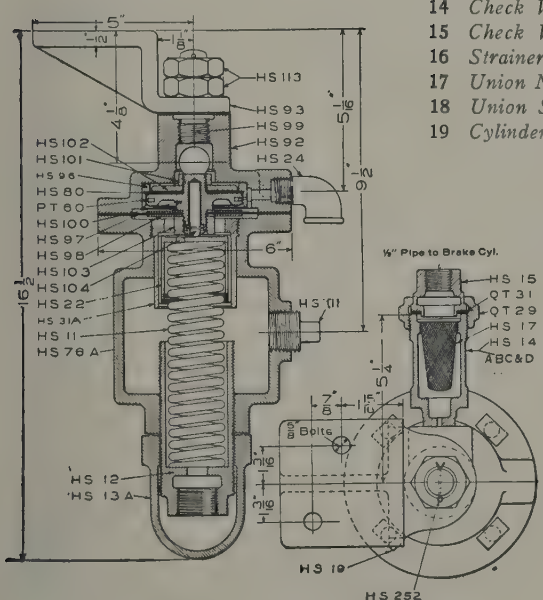


Fig. 1475—Compensating Valve, Style B1.

Parts of Compensating Valve, Fig. 1475

HS 11 *Regulating Spring*
HS 12 *Regulating Nut*
HS 13A *Check Nut*
HS 14A *Union Stud*
HS 15 *Union Swivel*
HS 17 *Union Strainer*
HS 19 *Tee Head Bolt*
HS 22 *Spring Abutment*
HS 24 *Street Elbow*
HS 76A *Spring Box*
HS 80 *Leather Washer*
HS 92 *Body*
HS 93 *Bracket*
HS 97 *Diaphragm*
HS 98 *Diaphragm Washer*
HS 99 *Bracket Stud*
HS 100 *Piston*
HS 101 *Top Piston Nut*
HS 102 *Piston Disc*
HS 103 *Bottom Piston Nut*
HS 104 *Rider Pin*
HS 111 *Plug*
HS 113 *Holding Nut*
HS 252 *Cotter*
PT 60 *Packing Ring*
QT 29 *Union Nut*
QT 31 *Union Gasket*
HS 31A *Spring Box Bush*
HS 96 *Piston Bush*

New York Air Brake Company.

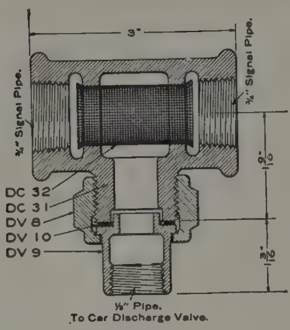


Fig. 1476—Signal Pipe Strainer.

Parts of Strainer, Fig. 1476.

DC 31	*Body*
DC 32	*Strainer*
DV 8	*Union Nut*
DV 9	*Union Swivel*
DV 10	*Union Gasket*

Parts of Strainer, Fig. 1477.

QT 28	*Strainer*
QT 29	*Union Nut*
QT 30	*Union Swivel*
QT 31	*Union Gasket*
QT 472	*Body*

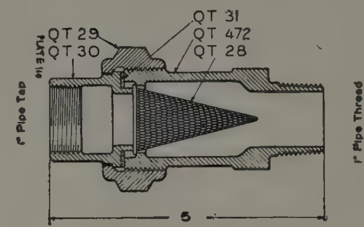


Fig. 1477—Branch Pipe Strainer.

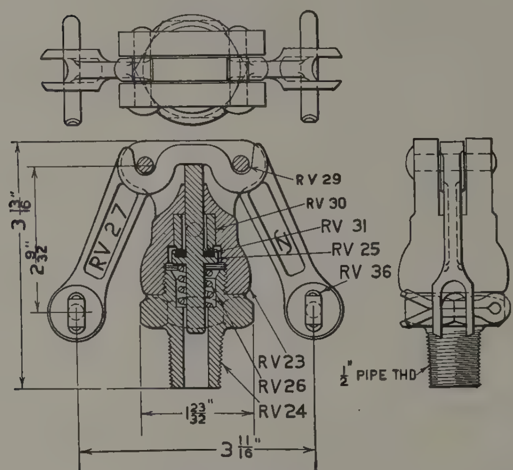


Fig. 1478—Release Valve.

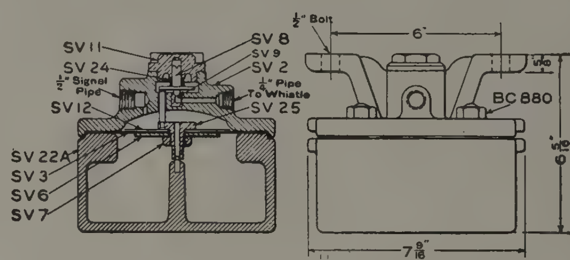


Fig. 1479—Signal Valve, Style BA.

Parts of Release Valve, Fig. 1478.

RV 23	*Cylinder*	RV 27	*Handle*
RV 24	*Stud*	RV 29	*Rivet*
RV 25	*Vent Valve*	RV 31	*Rubber Valve Seat*
RV 26	*Spring*	RV 36	*Handle Cotter*

Parts of Signal Valve, Fig. 1479.

SV 2	*Upper Case*
SV 3	*Diaphragm*
SV 6	*Lower Diaphragm Plate*
SV 7	*Nut*
SV 8	*Valve*
SV 11	*Cap*
SV 12	*Upper Diaphragm Washer*
SV 22A	*Lower Case*
SV 24	*Spring*
SV 25	*Diaphragm Stem*
BC 880	*Stud and Nut*

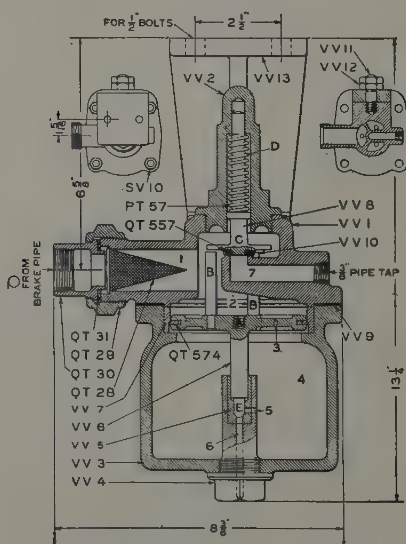


Fig. 1480—Vent Valve, Style A.

Parts of Vent Valve, Fig. 1480.

VV 1	*Upper Case*
VV 2	*Upper Case Cap Nut*
VV 3	*Lower Case*
VV 4	*Post*
VV 6	*Piston*
VV 8	*Valve*
VV 9	*Lower Case Gasket*
VV 10	*Lifting Pins*
VV 12	*Holding Nut*
VV 13	*Bracket*
PT 57	*Valve Spring*
QT 28	*Strainer*
QT 29	*Union Nut*
QT 30	*Union Swivel*
QT 31	*Union Gasket*
QT 574	*Valve Seat*
QT 557	*Piston Ring*
SV 10	*Tee Head Bolt and Nut*

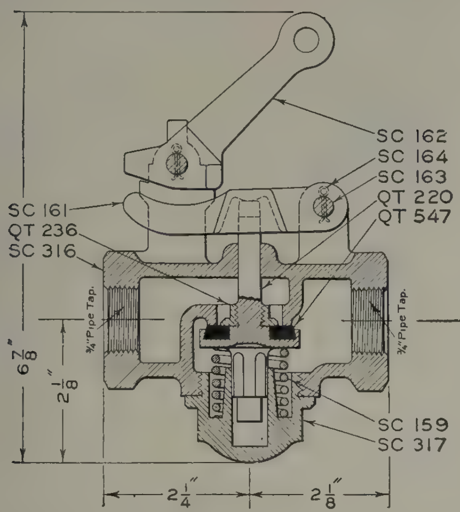


Fig. 1481—Conductor's Valve, Style B-3-A.

Parts of Conductor's Valve, Fig. 1481

SC 159	*Spring*	SC 161	*Valve Lever*
SC 317	*Cap*	SC 162	*Lever*
SC 316	*Body*	QT 236	*Nut*
QT 220	*Vent Valve*	QT 547	*Seat*

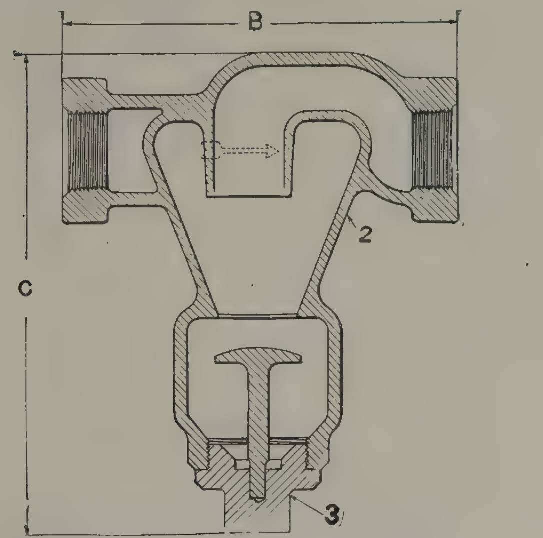


Fig. 1482—Centrifugal Dirt Collector.

Parts of Single Pressure Retaining Valve, Fig. 1484.

2 *Body*
3 *Cap Nut*
4 *Valve*
5 *Handle*
6 *Plug*
7 *Cap*
8 *Plug Spring*
20 *Valve Spring*

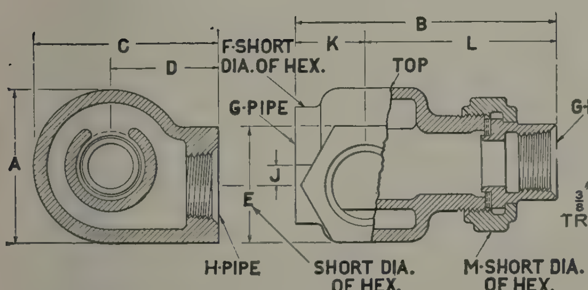


Fig. 1483—Branch Pipe Tee with Side Outlet.

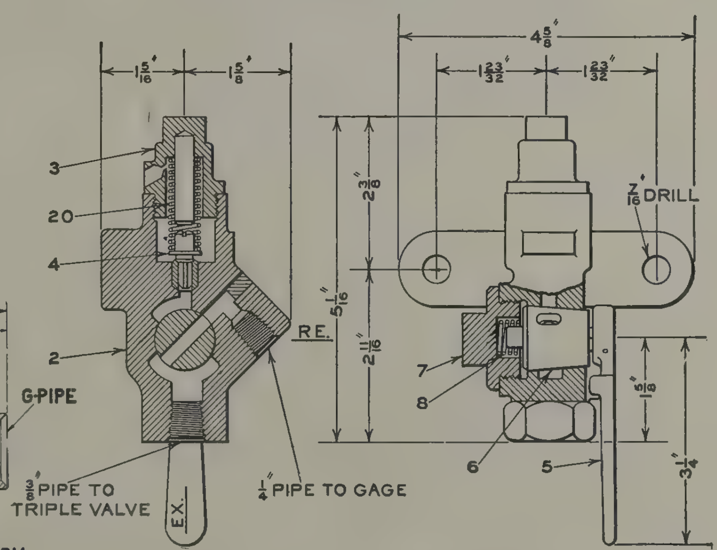


Fig. 1484—Single-Pressure Retaining Valve, Spring Type.

Fig. 1485.

Parts of Strainer, Fig. 1486.

DC 69A	*Body*	DV 8	*Union Nut*
DC 72	*Strainer*	DV 9	*Union Swivel*
DC 76	*Cap*	DV 10	*Union Gasket*
DC 77	*Curled Hair* (½ oz.)		

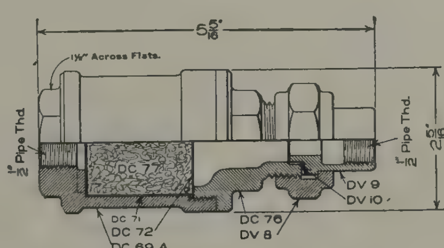


Fig. 1486—Reducing Valve Strainer.

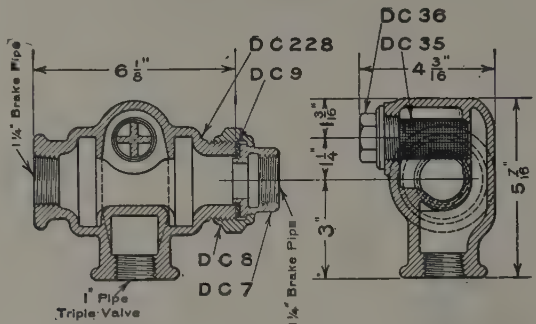


Fig. 1487—Brake Pipe Strainer.

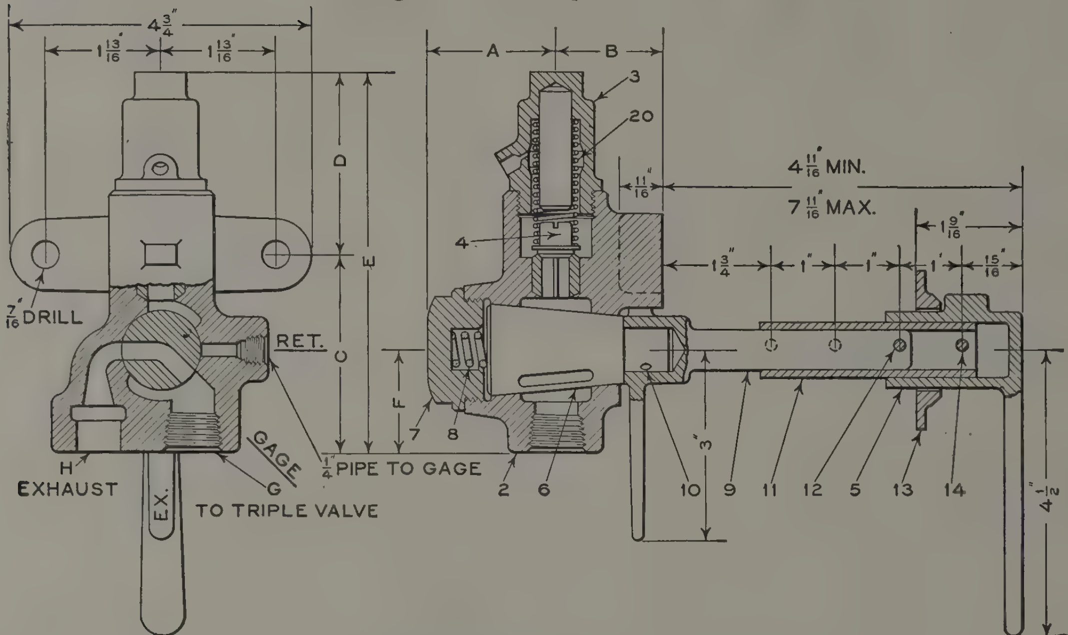


Fig. 1488—Pressure Retaining Valve for Passenger Cars, Spring Type. New York Air Brake Company.

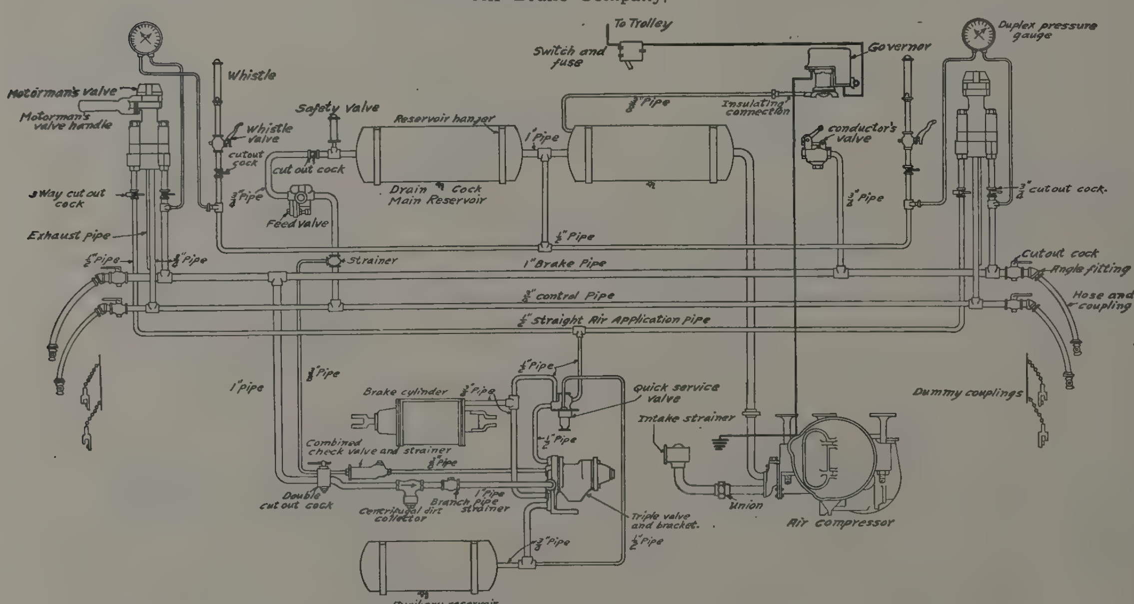


Fig. 1489—Combined Straight and Automatic Variable Release Air Brake Equipment for Motor Car. General Electric Company.

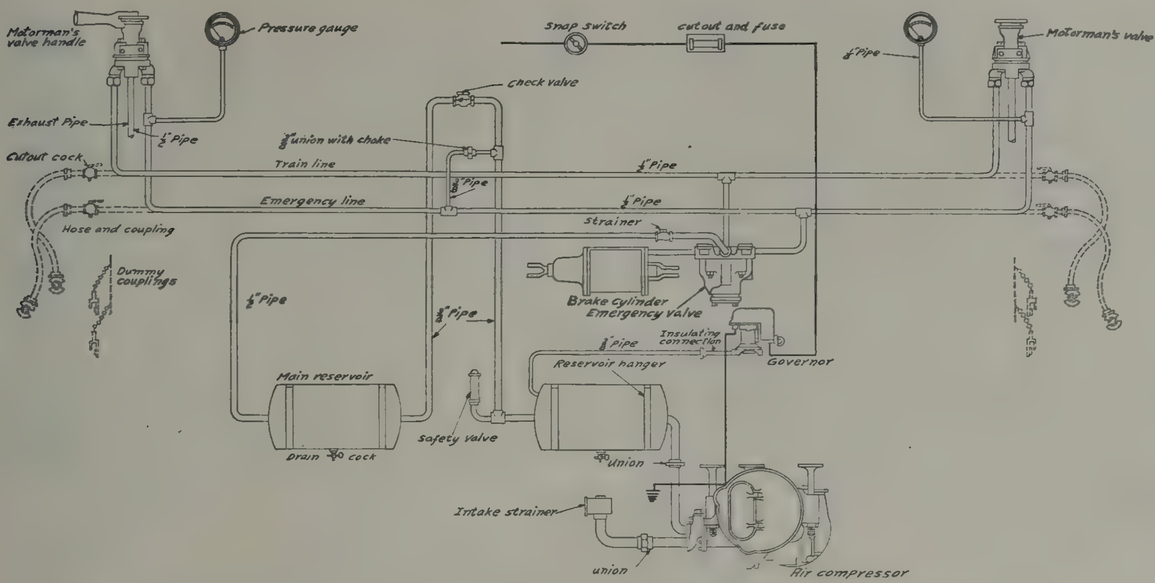


Fig. 1490—Straight Air Brake Equipment with Emergency Feature for Motor Car.

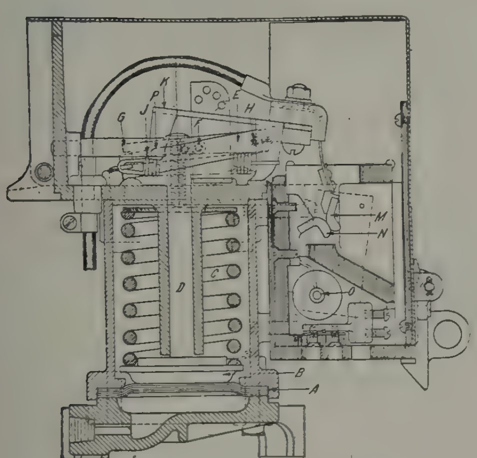


Fig. 1491—Section Through Air Compressor Governor.

Fig. 1492—Type CP-27-B Air Compressor.

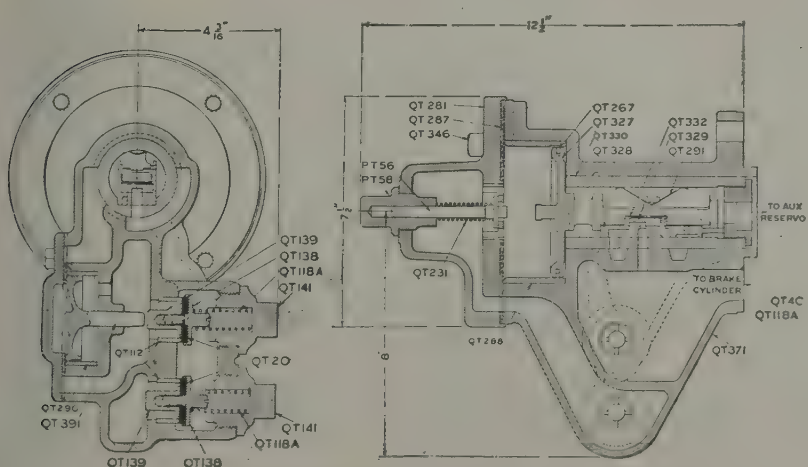
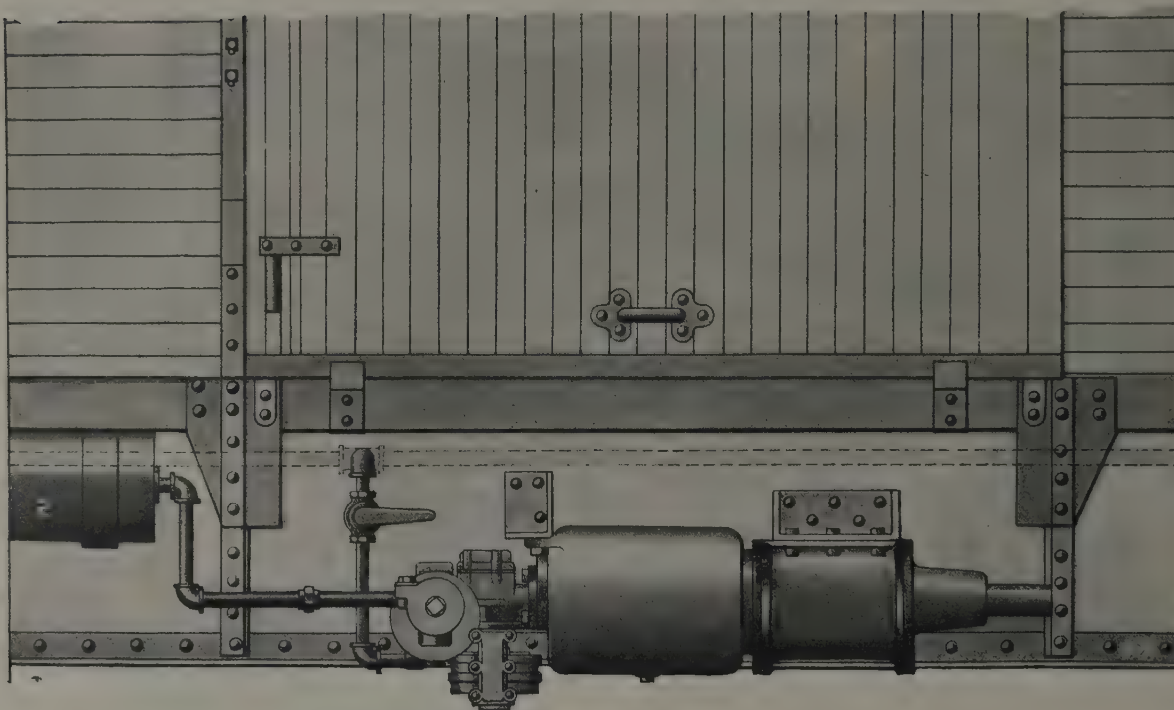


Fig. 1493—Triple Valve for Variable Release Equipment.

General Electric Company.

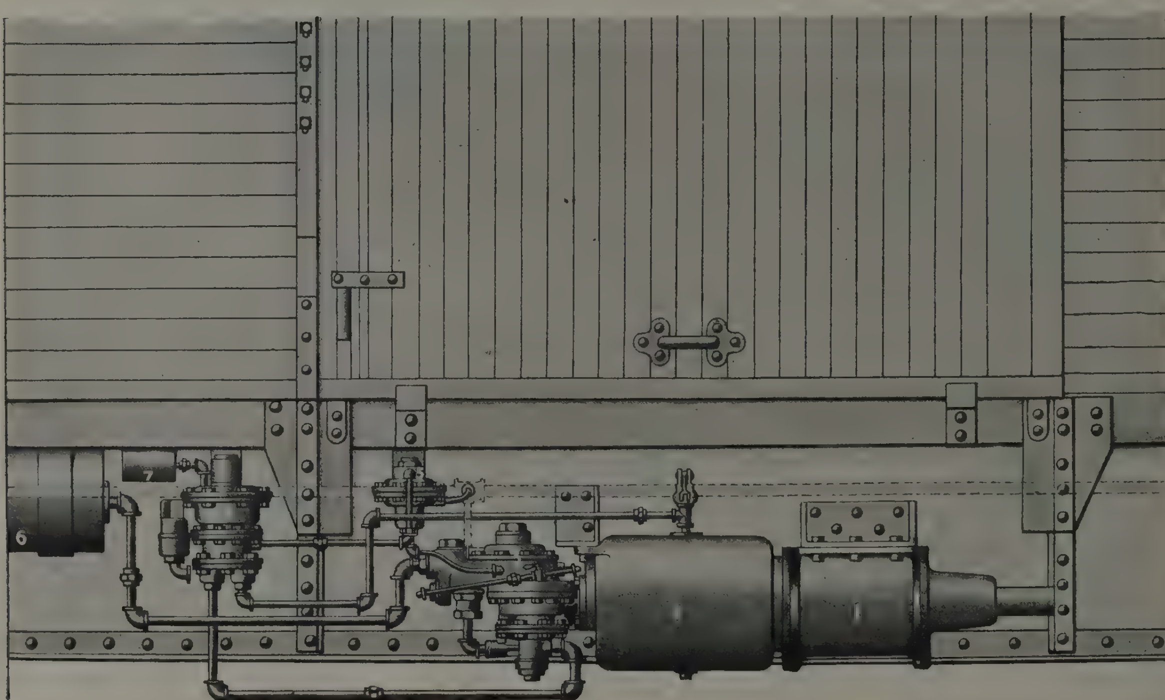
Parts of Triple Valve, Fig. 1493.

QT 290	*Bush*
QT 391	*Piston Stem*
QT 112	*Check Valve Seat*
QT 139	*Check Valve Guide*
QT 138	*Check Valve*
QT 118A	*Check Valve Spring*
QT 141	*Check Valve Cap*
QT 20	*Rubber Seat*
PT 56	*Graduating Stem*
PT 58	*Graduating Stem Cap Nut*
QT 281	*Front Cap*
QT 287	*Front Cap Gasket*
QT 346	*Front Cap Bolt*
QT 231	*Graduating Stem Spring*
QT 288	*Bush*
QT 267	*Piston Ring*
QT 327	*Main Piston*
QT 330	*Exhaust Valve Bush*
QT 328	*Exhaust Valve*
QT 332	*Graduating Valve Spring*
QT 329	*Graduating Valve*
QT 291	*Exhaust Valve Spring*
QT 371	*Body*



1—*Triple Valve.* 2—*Service Reservoir.*

Fig. 1494—Type S-2 Triple for Automatic Straight Air Brake.



1—*Brake Cylinder*
2—*Auxiliary Reservoir*
3—*Service Section*
4—*Emergency Section*
5—*Changeover Valve*
6—*Service Reservoir*
7—*Quick Action Reservoir*

Fig. 1495—Type Three Unit Triple for Automatic Straight Air Brake.

Automatic Straight Air Brake Company.

Fig. 1496—Durbin Automatic Train Pipe Connector Applied to Passenger Train Cars.
Durbin Automatic Train Pipe Connector Company.

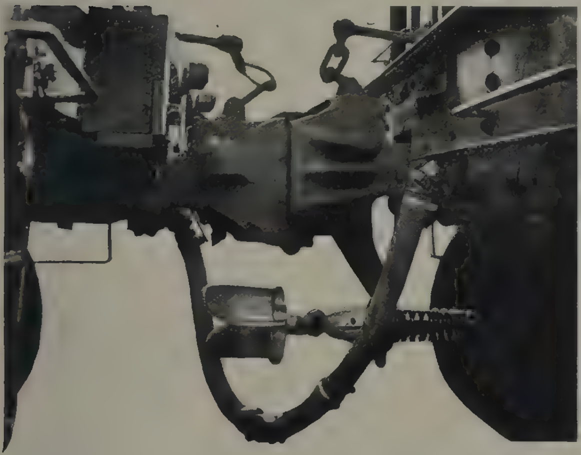


Fig. 1497—Robinson Automatic Connector, Cut Out When Car Is Coupled to a Car Without Automatic Connectors. Robinson Connector Company.

Fig. 1498—Robinson Automatic Connector Applied to Freight Cars. Robinson Connector Company.

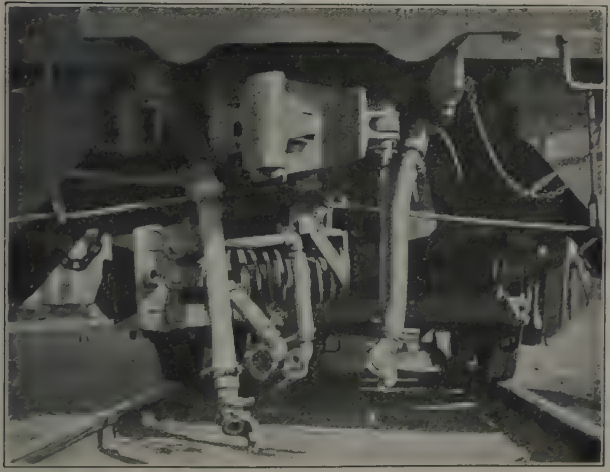


Fig. 1499—Connector Turned and Locked in Non-Operative Position.

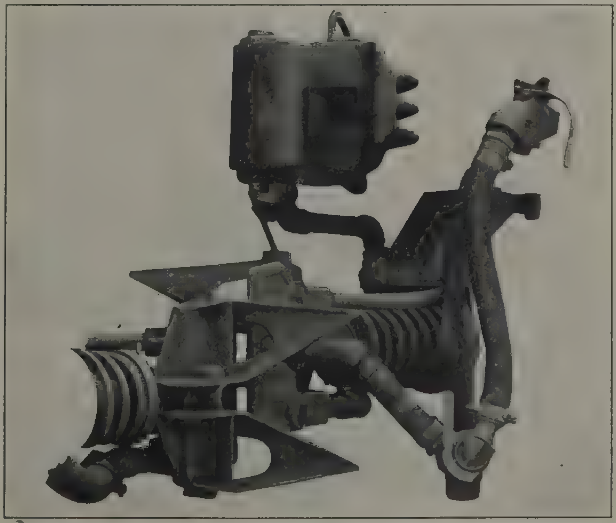


Fig. 1500—Coupling With One Connector 4½ in. Low and 3 in. Off Center.

Union Automatic Train Pipe Connector. Union Automatic Connector Corporation.

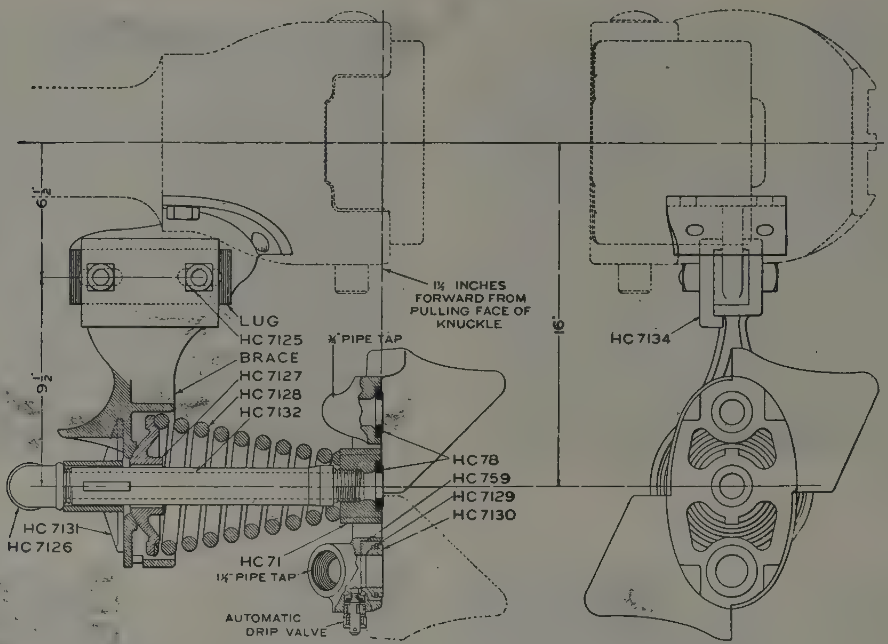


Fig. 1501—Passenger Connector for Air Brake, Signal and Steam Heat Pipes. New York Air Brake Company.

(See List of Parts on Page 731.)

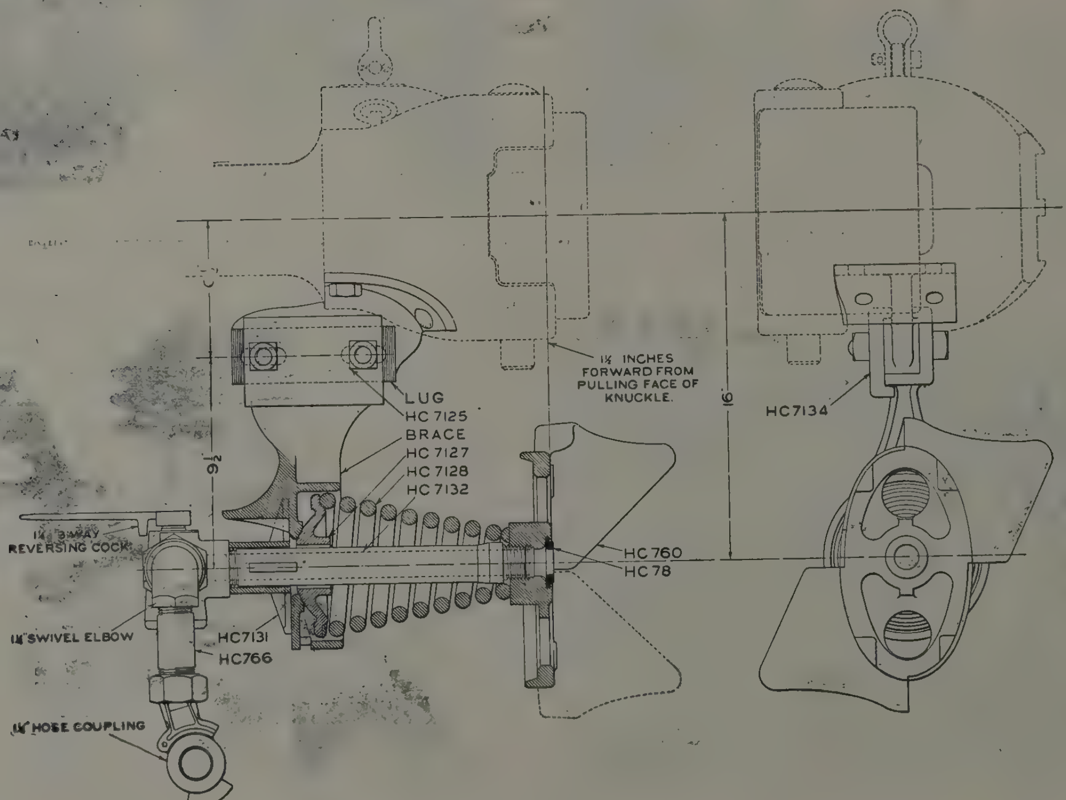


Fig. 1502—Freight Connector for Air Brake Pipes. New York Air Brake Company.

(See Lists of Parts on Page 731.)

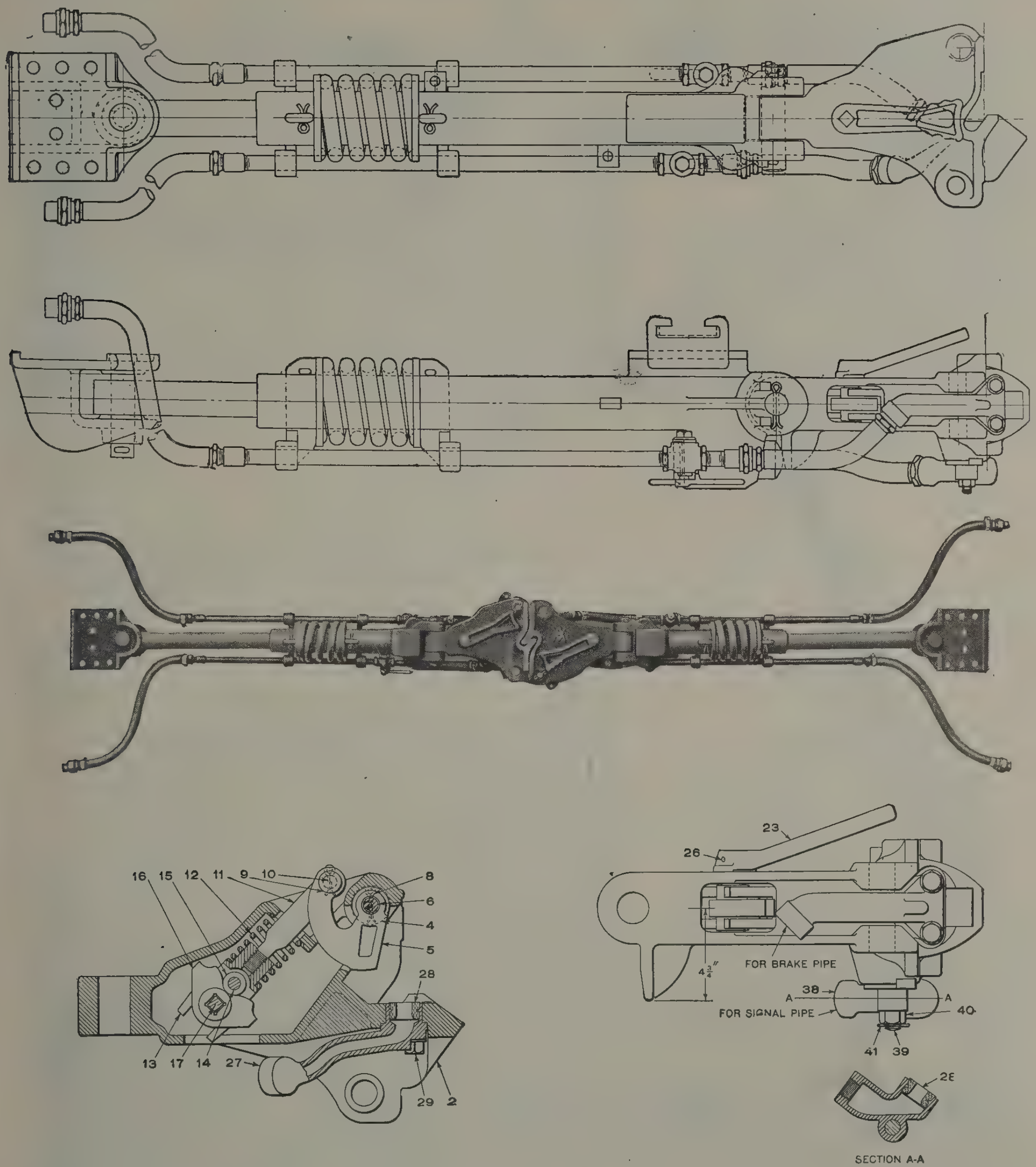


Fig. 1503—Westinghouse Automatic Car and Air Coupler, Type C-3-A, with Draft Gear, Anchor **Castings, Etc.**

Westinghouse Air Brake Company.

Parts of New York Passenger Connector, Fig. 1501.

3 HC 7	*Automatic Drip Valve*	**HC 7129**	*Steam Heat Retainer*
HC 71	*Head*	**HC 7130**	*Steam Heat Seat*
HC 78	*Packing Ring*	**HC 7131**	*Fingers*
HC 7125	*Bolt*	**HC 7132**	*Center Pipe*
HC 7126	*1¼ in. Elbow*	**HC 7134**	*Side Plate*
HC 7127	*Spring Seat*	**HC 759**	*Bush*
HC 7128	*Spring*		

Parts of New York Freight Connector, Fig. 1502.

4 HC 7	*1¼ in. Swivel Elbow*	**HC 766**	*1¼ in. by 5 in. Nipple*
16 HC	*1⅜ in. Coupling*	**HC 7125**	*Bolt*
25 SC	*1¼ in. Three-Way Reversing Cock*	**HC 7127**	*Spring Seat*
		HC 7128	*Spring*
		HC 7131	*Fingers*
HC 78	*Gasket*	**HC 7132**	*Center Pipe*
HC 760	*Head*	**HC 7134**	*Side Plate*

Fig. 1504—Sprague Flexible Steel Armored Air Brake, Signal and Tank, Hose and Nipples. Sprague Electric Works.

Fig. 1505—J-M Air Brake Cylinder Packing Cup. H. W. Johns-Manville Company.

Fig. 1506—Universal Hose Protector. McCord & Company.

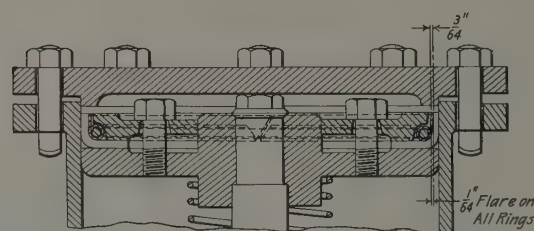
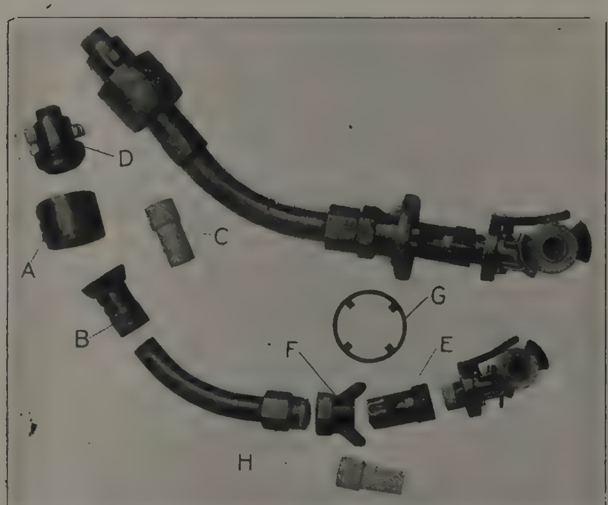


Fig. 1507—J-M Slip Type Expander Ring for Air Brake Cylinder Packing Leathers. H. W. Johns-Manville Company.



A *Joint Body*	D *Packer*	G *Universal Ring*
B *Sleeve*	E *Universal Joint*	H *Universal Bushing*
C *Rubber Gasket*	F *Universal Joint*	

Fig. 1508—Metal Air Hose and Coupling. The Dodge Metal Hose Coupling.

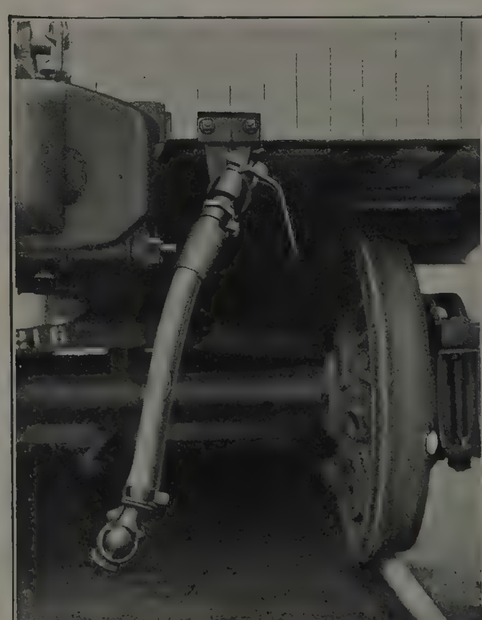
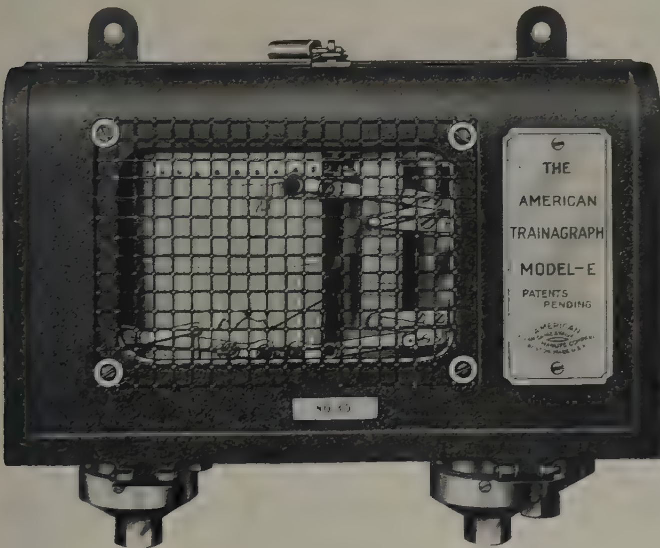


Fig. 1509—Monogram Pipe Bracket and Nipple End Hose Protector. Guilford S. Wood.



Closed

Fig. 1510—Testing and Recording "Trainagraph." American Steam Gage & Valve Mfg. Co.

Parts of Fig. 1512

A *Whistle*
B *Whistle Push Button*
C *Train Pipe Exhaust*

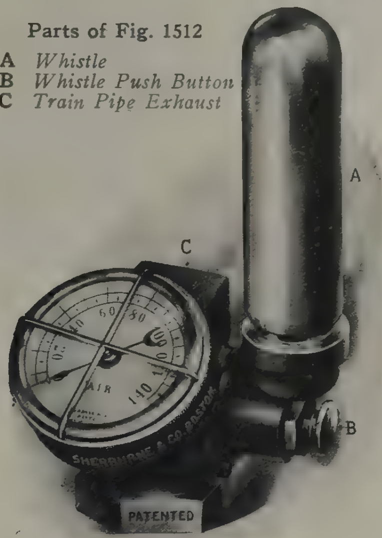


Fig. 1512—Brakeman's Back-up Air Brake and Signal Cock, with Gage. Sherburne & Company.

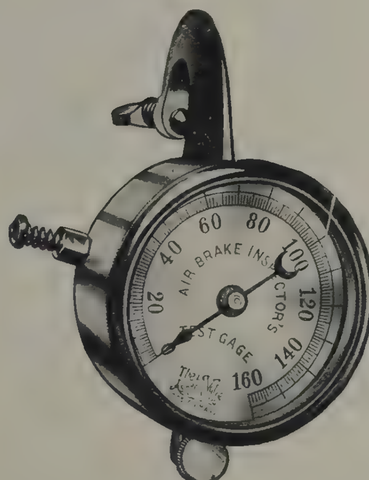
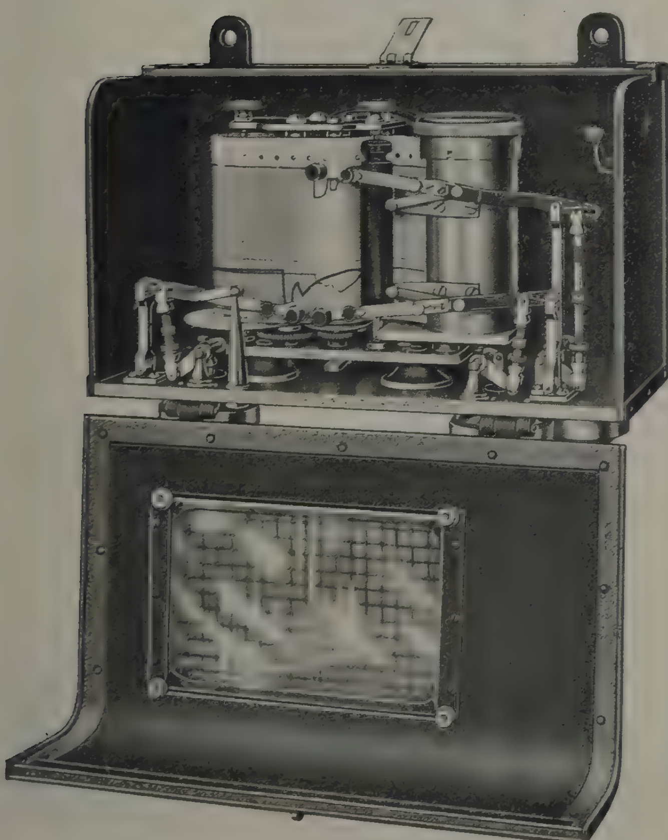


Fig. 1513—No. 68 Air Brake Inspector's Test Gage. The Ashton Valve Company.



Open

Fig. 1511—Testing and Recording "Trainagraph." American Steam Gage & Valve Mfg. Co.

Fig. 1514—Air Gage for Caboose The Ashton Valve Company.

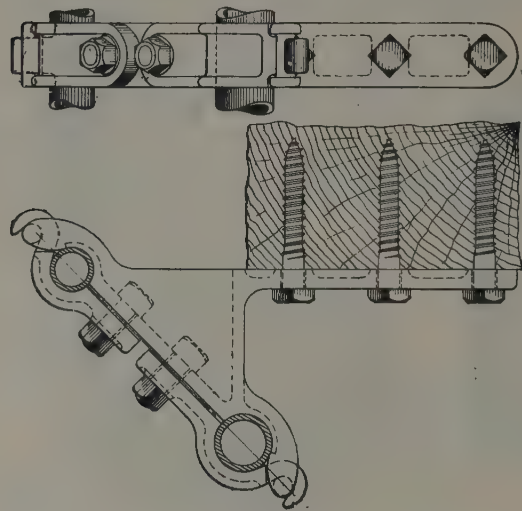


Fig. 1515—Acme Pipe Clamp for Use on Side of a Longitudinal Sill.

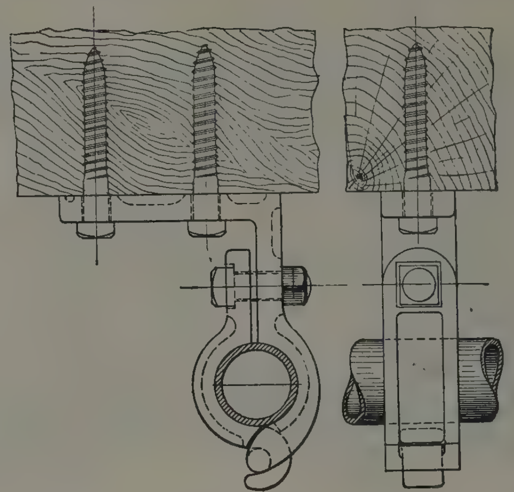


Fig. 1516—Acme Pipe Clamp for Use on Bottom of End Sill.

Western Railway Equipment Company.

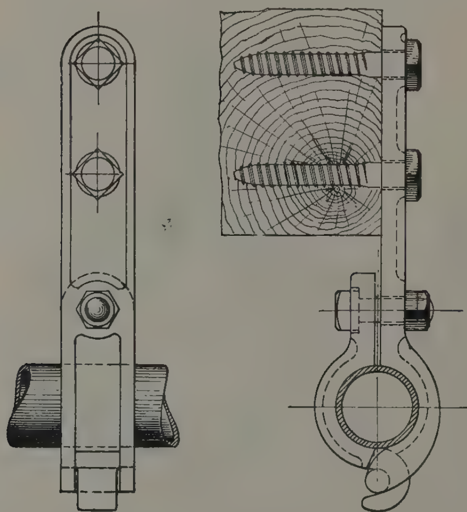


Fig. 1517—Acme Pipe Clamp for Side of Longitudinal Sill. Western Railway Equipment Company.

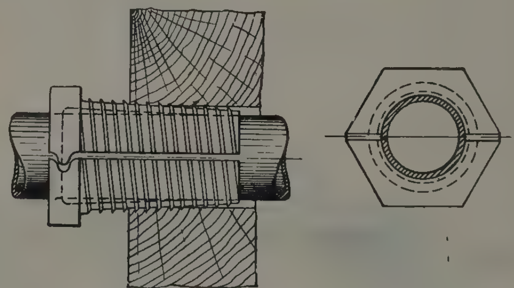


Fig. 1518—Acme Pipe Clamp for Use in Needle Beam. Western Railway Equipment Company.

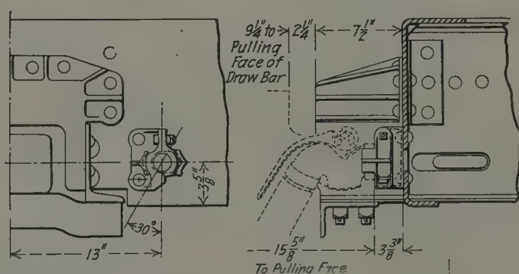


Fig. 1519—Security Angle Cock Bracket Applied to Dump Car. D. R. Niederlander.

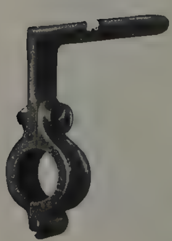


Fig. 1520. Pipe Clamp.

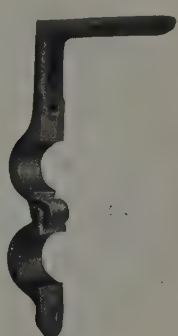


Fig. 1521. Pipe Clamp.

National Malleable Castings Company.

Fig. 1522. Pipe Hanger.

Fig. 1523. Hose Clamp.

National Malleable Castings Company.

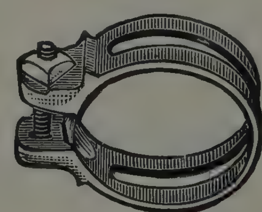


Fig. 1524—Yerdon Hose Band.

William Yerdon.

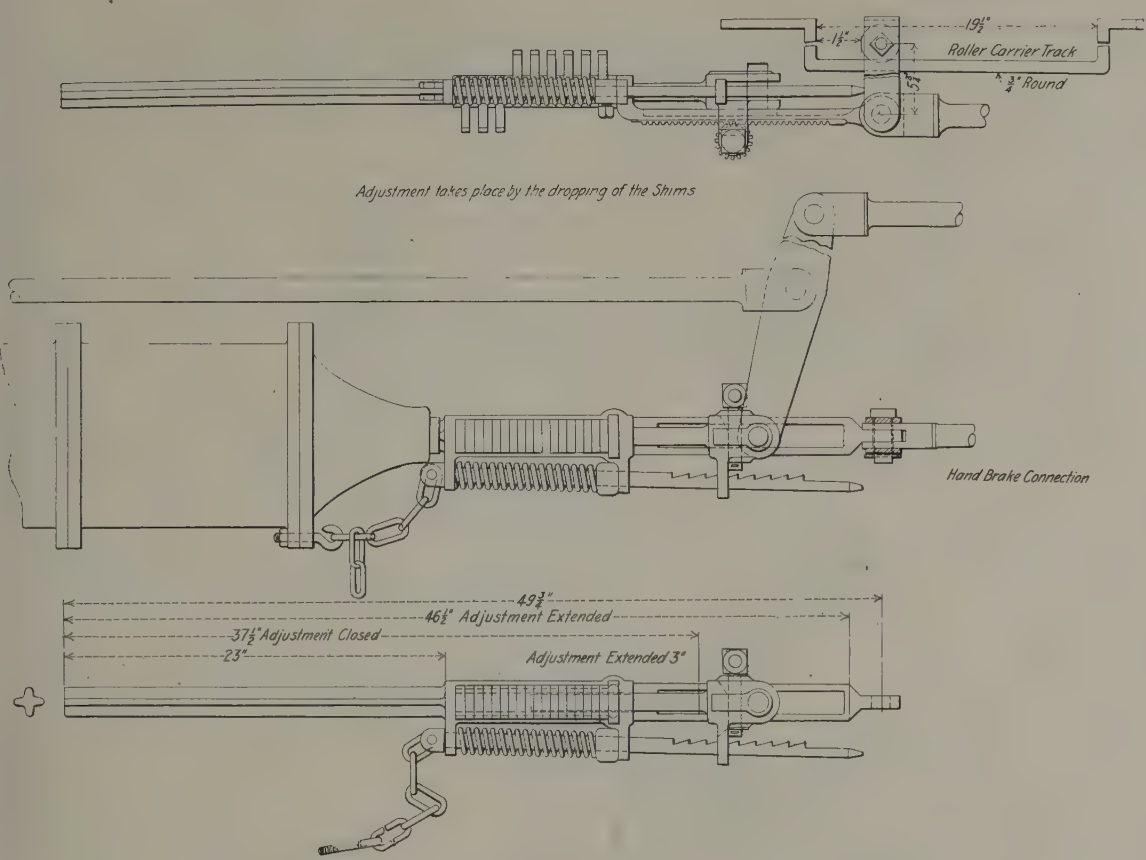


Fig. 1525—J-M Automatic Take-Up. H. W. Johns-Manville Company.

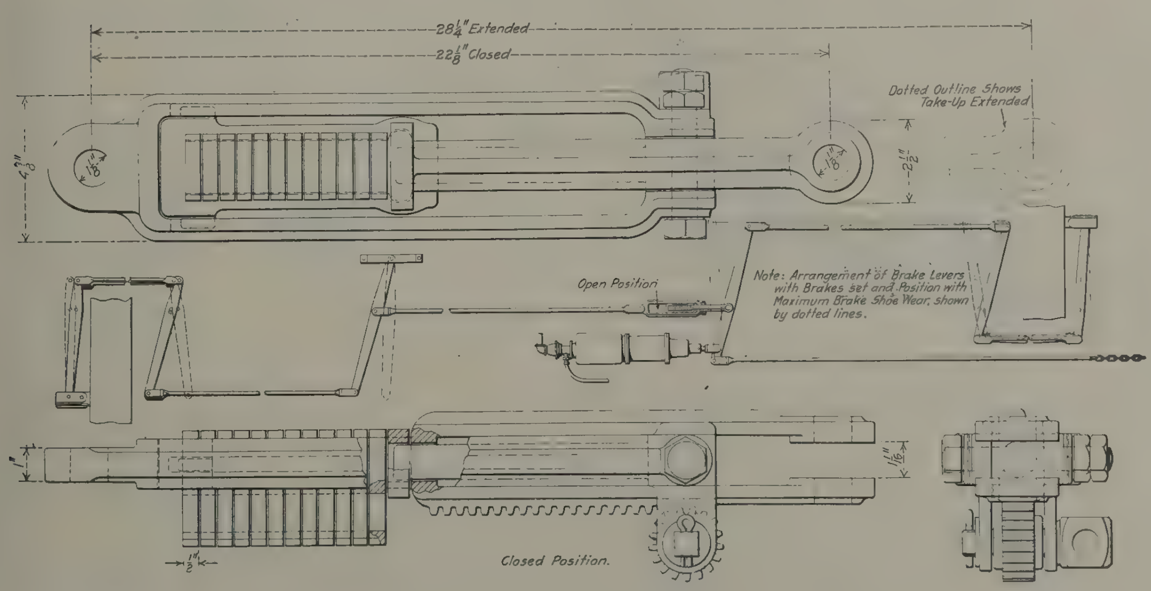


Fig. 1526—J-M Manual Take-Up. H. W. Johns-Manville Company.

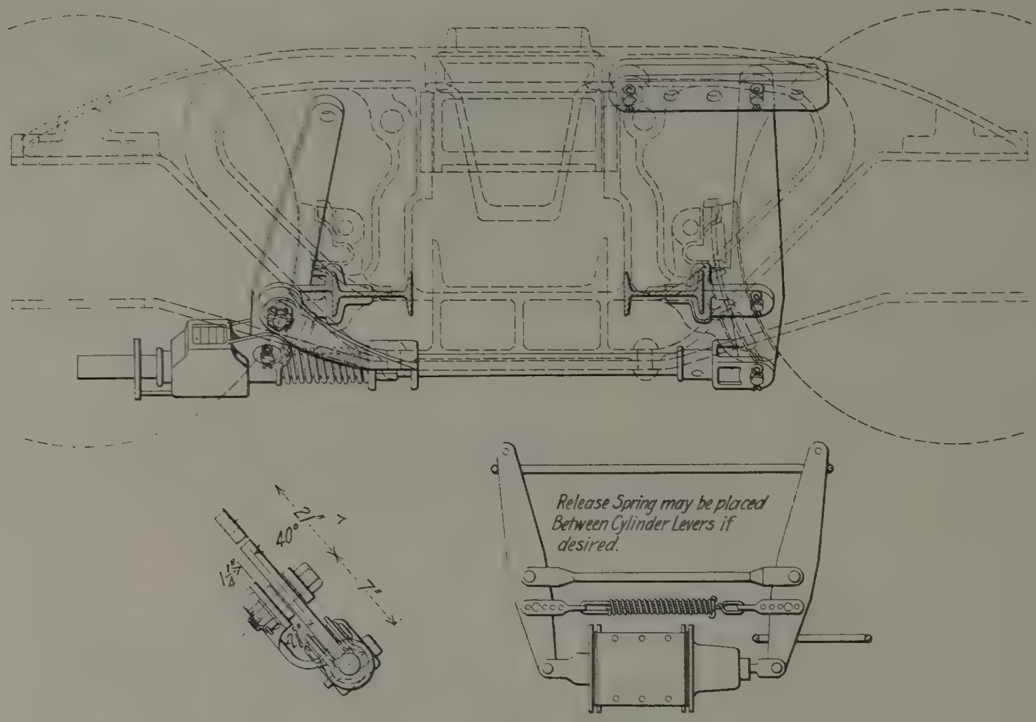


Fig. 1527—Universal Automatic Slack Adjuster, Truck Lever Type.
Gould Coupler Company.

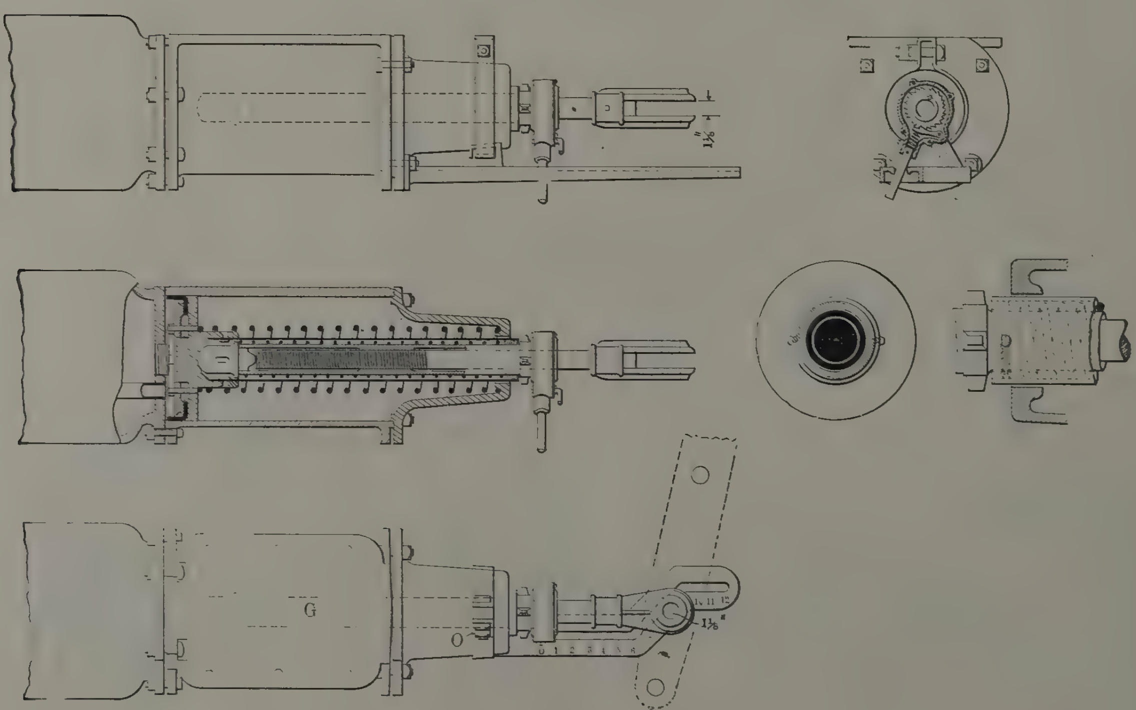


Fig. 1528—Creco Combined Slack Adjuster and Brake Release for Freight Cars.
Chicago Railway Equipment Company.

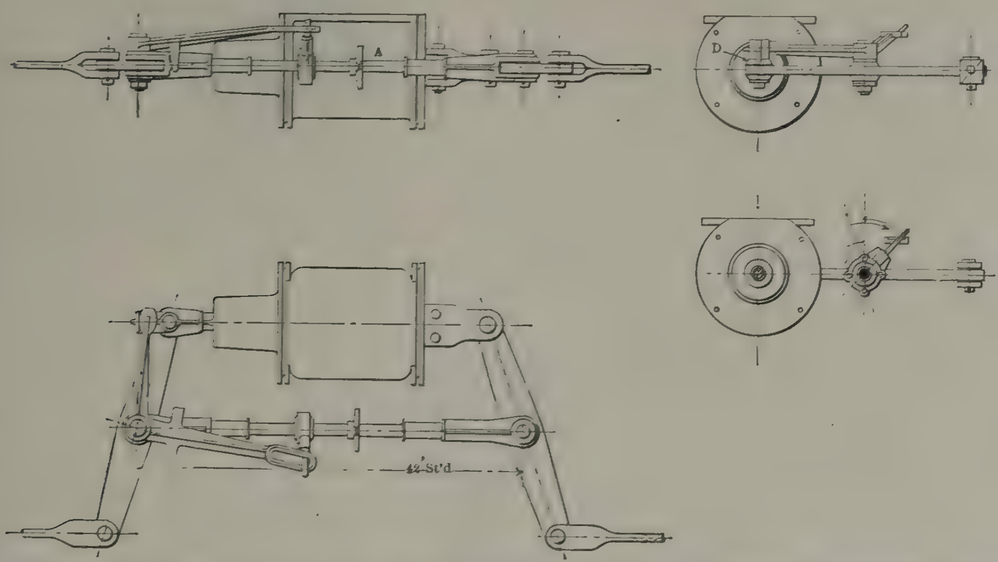


Fig. 1529—Creco Slack Adjuster for Passenger Train Cars. Chicago Railway Equipment Company.

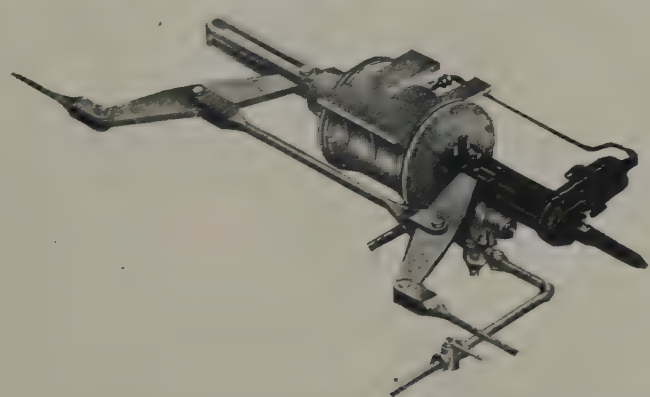


Fig. 1530—American Automatic Slack Adjuster Applied to Brake Cylinder. American Brake Company.

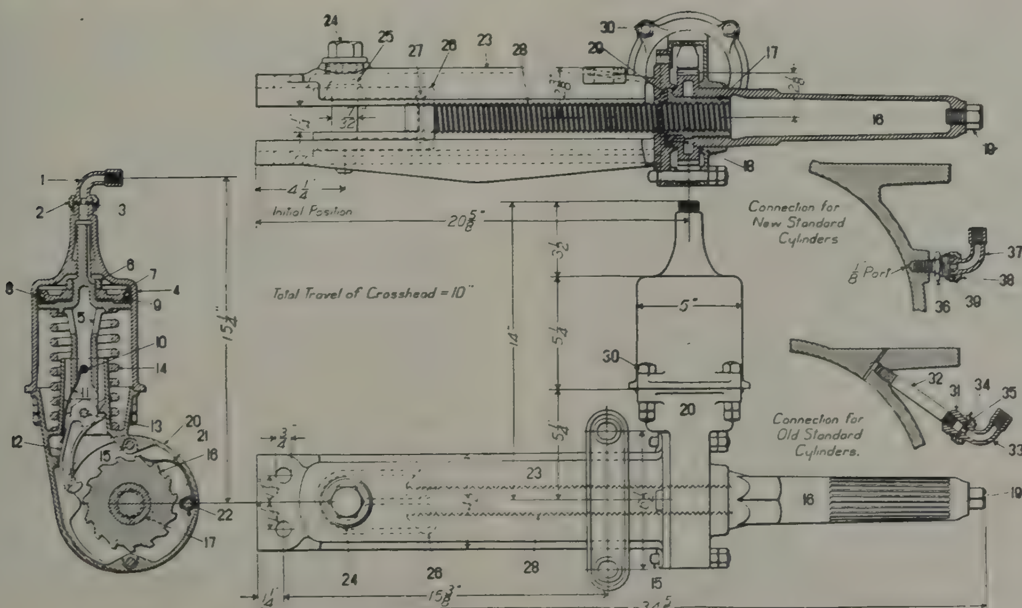


Fig. 1531—American Automatic Slack Adjuster. American Brake Company.

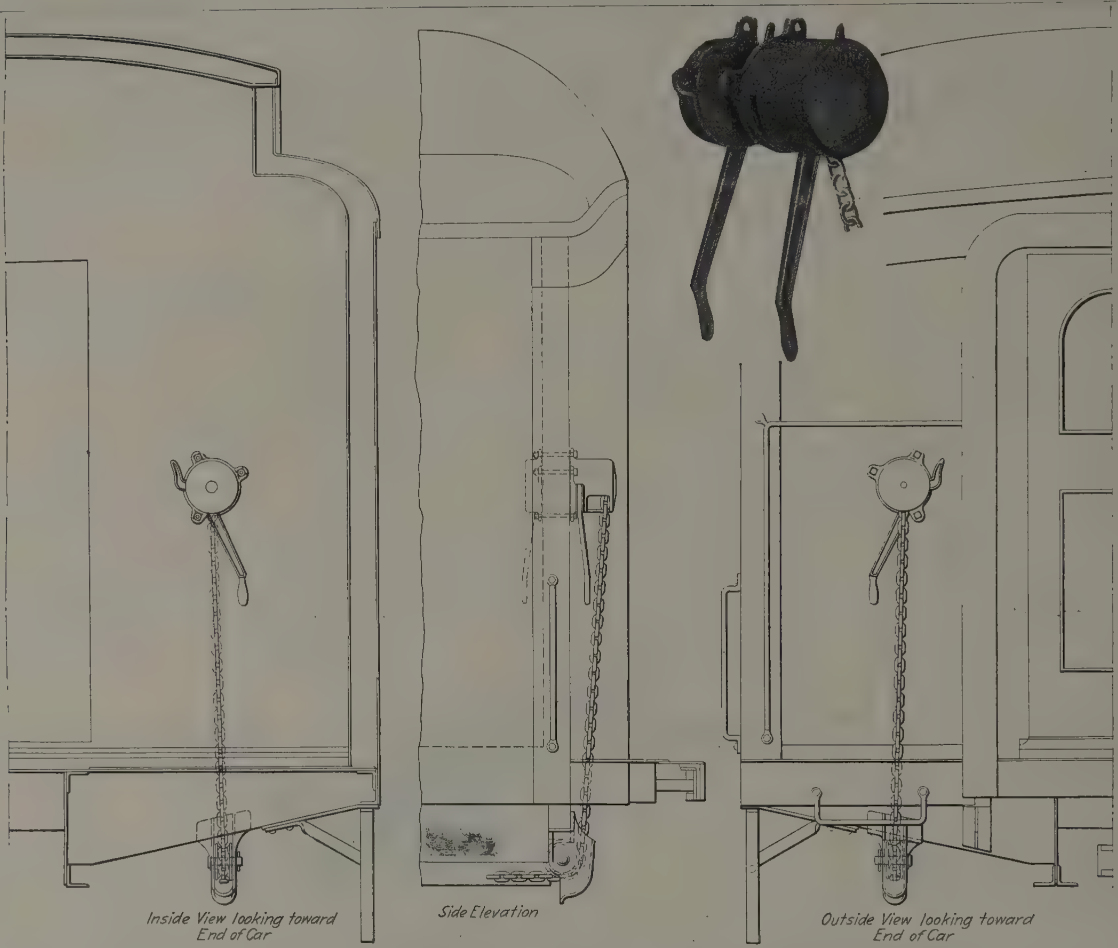


Fig. 1532—Ideal Safety Hand Brake Applied to Baggage and Mail Car. W. H. Miner.

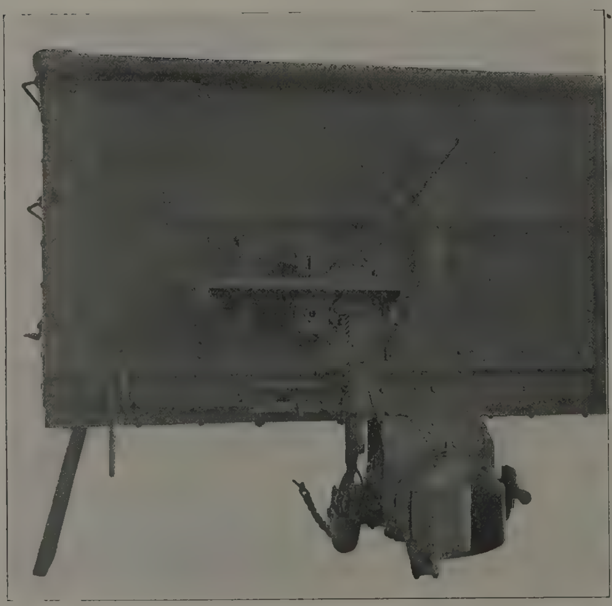


Fig. 1533—High Power, Quick Action Lever Hand Brake.

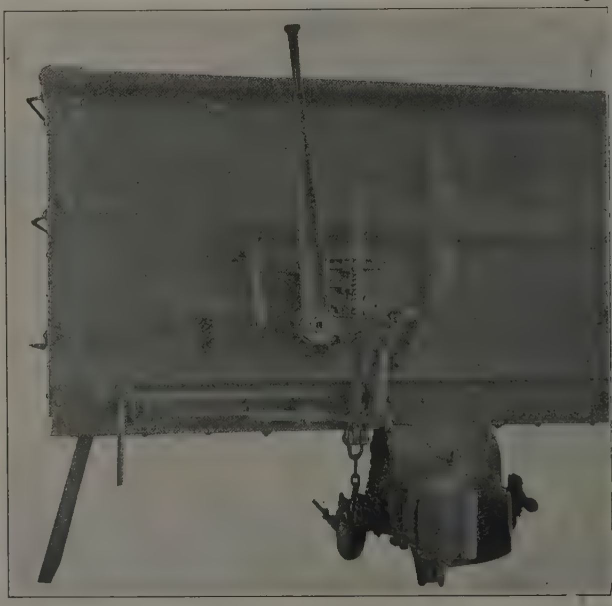


Fig. 1534—Hand Brake Shown in Fig. 1533 with Casing Removed.

The Bettendorf Company.

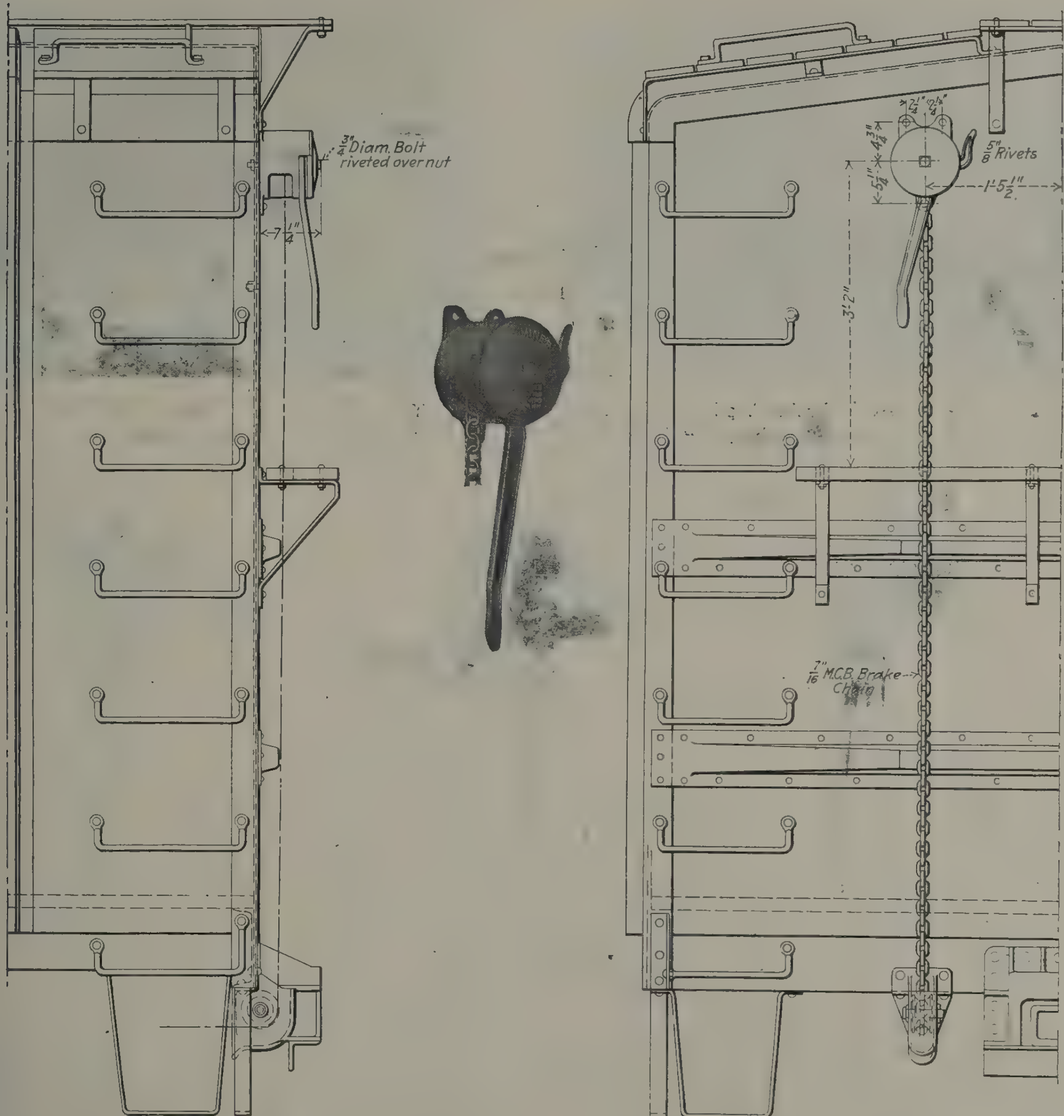


Fig. 1535—Ideal Safety Hand Brake Applied to Box Car. W. H. Miner.

Fig. 1536—Feasible Drop Brake Shaft. National Railway Appliance Company.

Fig. 1537—Type B Acme Brake Applied to Baggage Car with Dummy End. Pittsburgh Railway Appliance Company.

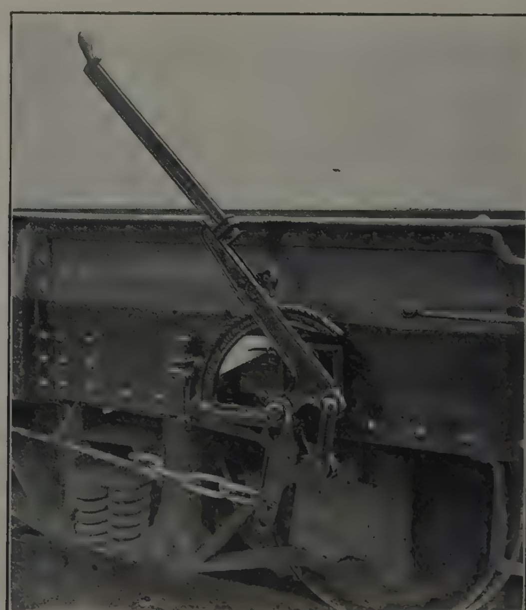
Fig. 1538—Type A Acme Brake Applied to Gondola Car. Pittsburgh Railway Appliance Company.

Fig. 1539 — Ideal Safety Hand Brake, Staff Type. W. H. Miner.

Fig. 1540 — Type C Acme Pull-Up Brake for All Classes of Freight and Baggage Cars. Pittsburgh Railway Appliance Company.

Fig. 1541—Type A Acme Brake for All Classes of Freight Equipment. Pittsburgh Railway Appliance Company.

Brake Released.



Brake Applied.

Fig. 1542—Klasing Hand Brake. Klasing Car Brake Co.

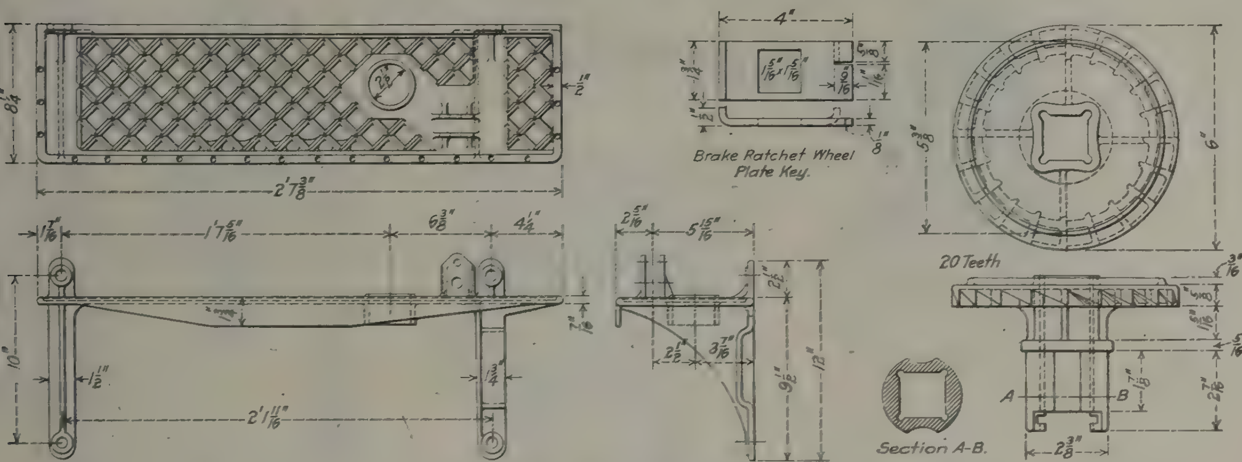


Fig. 1543—Metal Brake Step and Ratchet Used with Square Brake Shaft. Buffalo, Rochester & Pittsburgh.

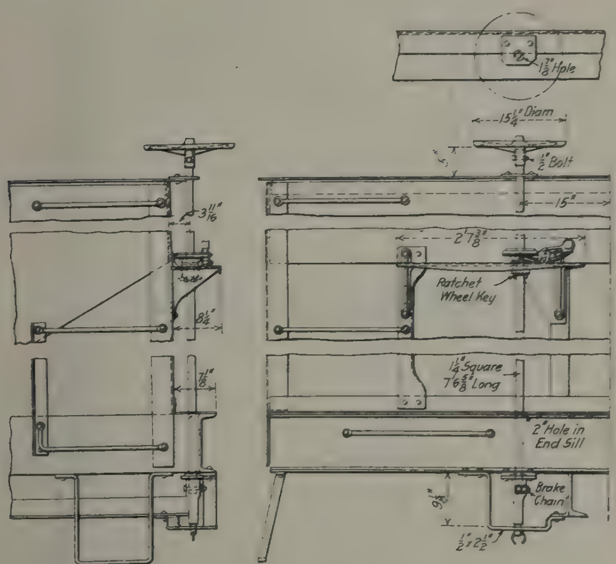


Fig. 1544—Square Brake Shaft Applied to Gondola Car on the Buffalo, Rochester & Pittsburgh.

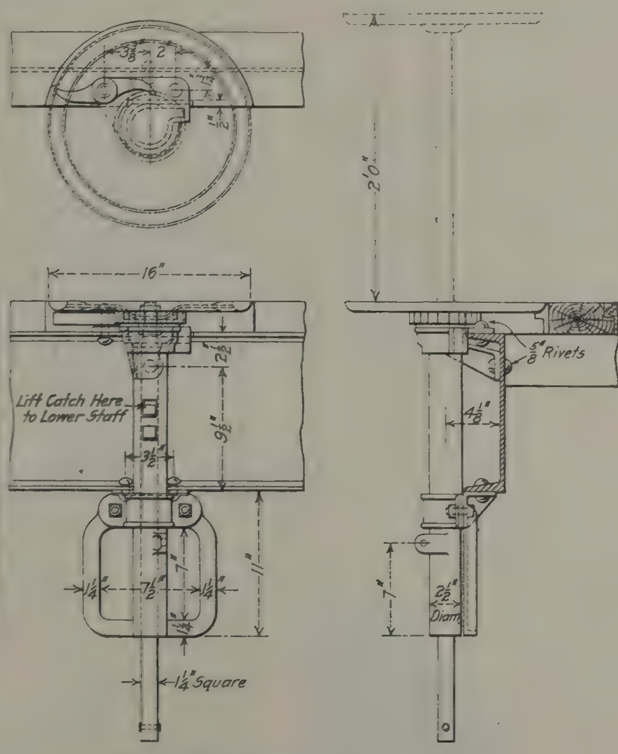


Fig. 1545—Ureco Drop Brake Shaft. Union Railway Equipment Company.

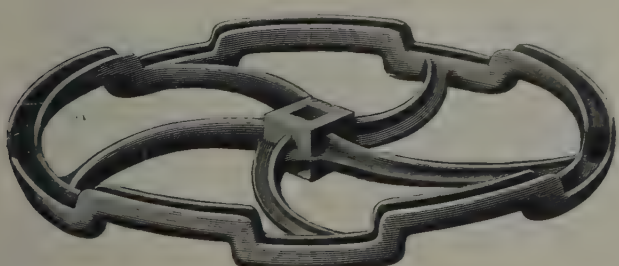


Fig. 1546—Perfect Brake Wheel. Dayton Malleable Iron Company.

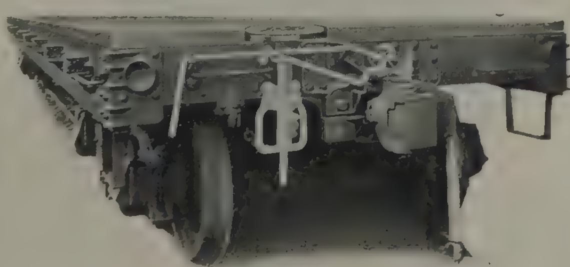


Fig. 1547—Ureco Drop Brake Shaft and Coupling Device. Union Railway Equipment Company.

Fig. 1548—Blackall Ratchet Brake, Flat Car Type, in Release Position. Robert H. Blackall.

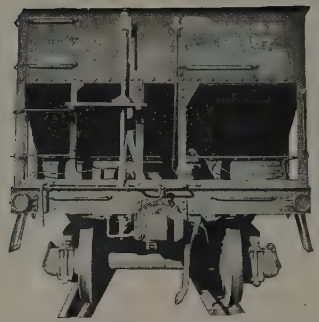


Fig. 1549—Ratchet Brake Applied to Hopper Car. Robert H. Blackall.

Fig. 1550—Blackall Drop Handle Type Ratchet Brake. Robert H. Blackall.

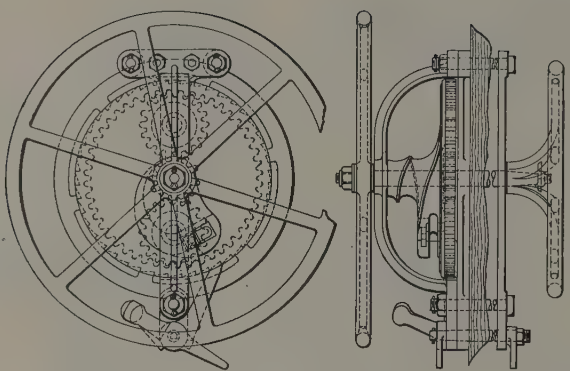


Fig. 1551—Peacock Brake for Blind End Cars. National Brake Company, Inc.

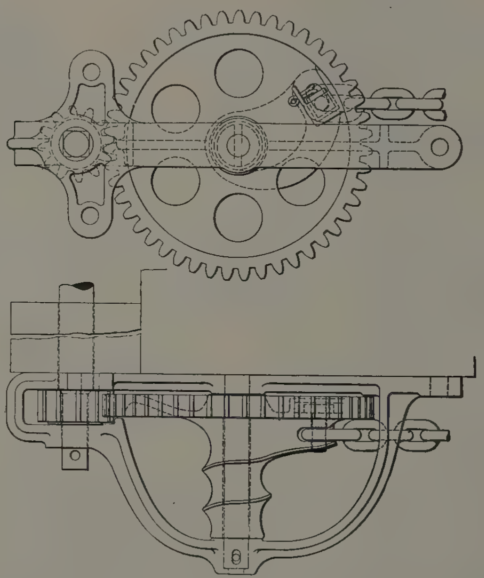


Fig. 1552—Peacock Geared Hand Brake for Freight Cars. National Brake Company, Inc.

Fig. 1553—H-R Ratchet Brake Lever Applied to Gondola Car. Robert H. Blackall.

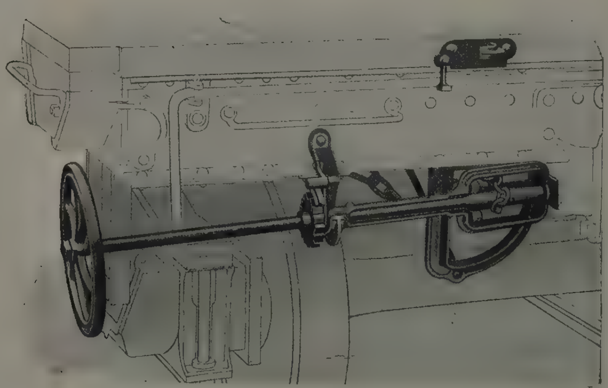


Fig. 1554—Barber Tilting Brake Staff. Standard Car Truck Company.

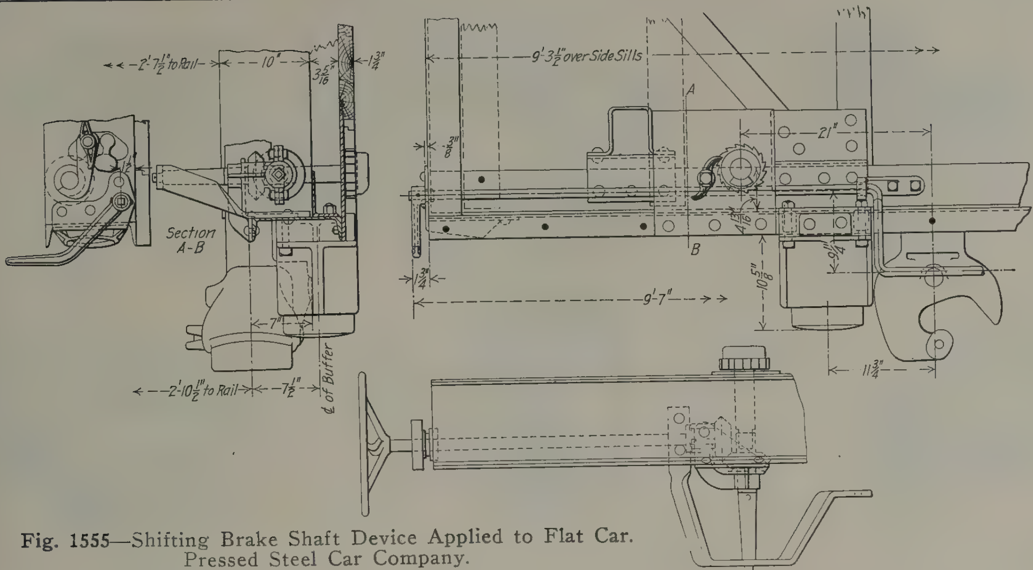


Fig. 1555—Shifting Brake Shaft Device Applied to Flat Car. Pressed Steel Car Company.

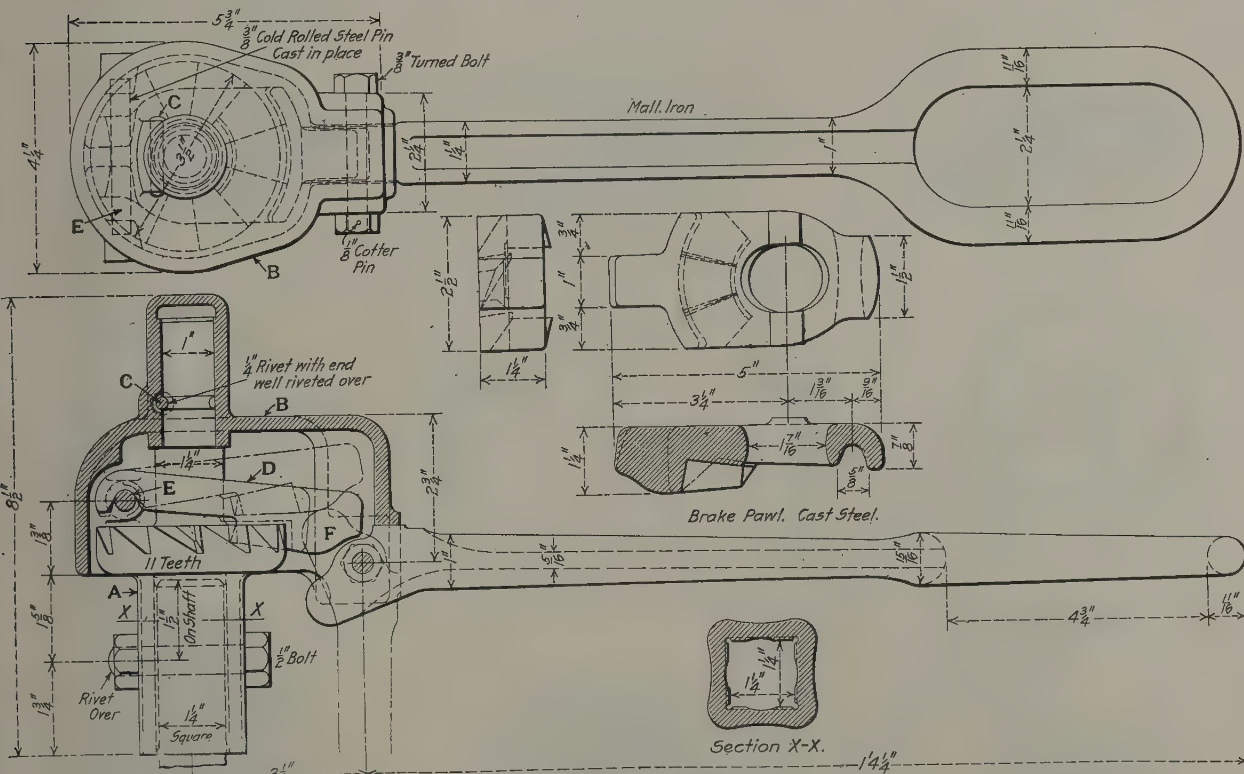


Fig. 1556—Brake Shaft, Ratchet Head and Drop Handle Used on the Buffalo, Rochester & Pittsburgh.

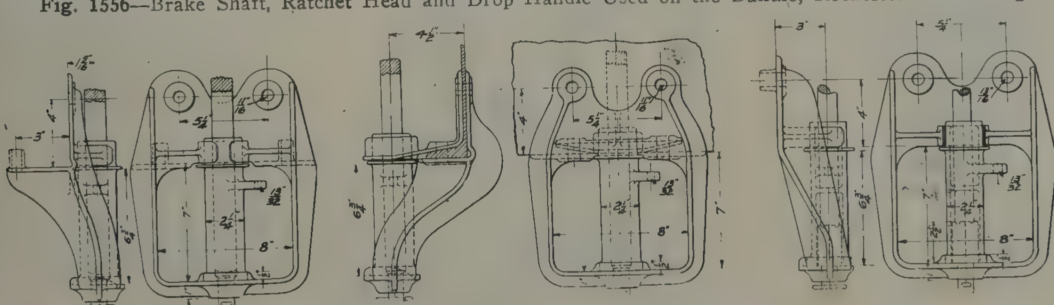


Fig. 1557—Brake Shaft Steps for Square and Round Shafts. National Malleable Castings Company.

Fig. 1558—Ratchet Wheel Pawl and Plate for Square Shaft—Assembled.

Fig. 1561—Ratchet Wheel, Pawl and Plate for Round Brake Shaft—Assembled.

Fig. 1559—Section Through Ratchet, etc., in Fig. 1558.

Fig. 1560—Square Brake Shaft Castings.

Fig. 1562—Application of Square Brake Shaft Castings to Brake Step.

Engaged Position. Disengaged Position. Top View.

Fig. 1563—One Hundred Per Cent Efficiency, National Hand Brake Ratchet.

Fig. 1564—Five-Spoke Hand Brake Wheel.

Fig. 1565—Square Shaft Roof Bracket.

Fig. 1566—Round Shaft Roof Bracket.

Fig. 1567—Six-Spoke Hand Brake Wheel.

Fig. 1569—Square Drop Shaft Step Sleeve and Seat.

Fig. 1568—Square Drop Shaft in Raised Position.

Hand Brake Mechanism.

National Malleable Castings Company.

Fig. 1570—Square Drop Shaft in Lowered Position.

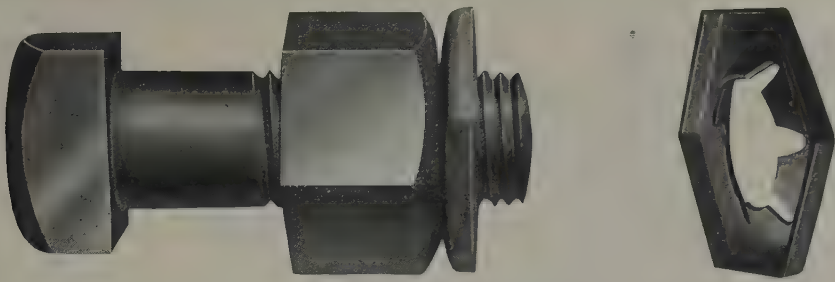


Fig. 1571—K-P Nut Lock. Waugh Draft Gear Company.

Fig 1572—O. K. Nut Lock and Bolt Prepared for its Application. O. K. Nut Company.

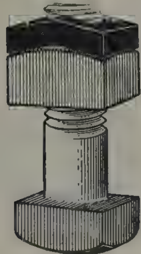


Fig. 1573—Square Toggle Lock Nut. Jones Positive Nut Lock Company.

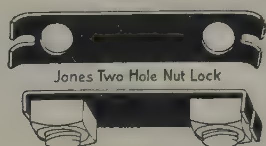


Fig. 1574—Application of Jones Multiple Two-Hole Nut Lock. Jones Positive Nut Lock Company.

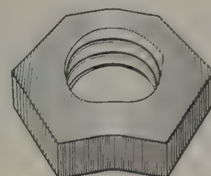


Fig. 1575—Hexagon Toggle Lock Nut. Jones Positive Nut Lock Company.

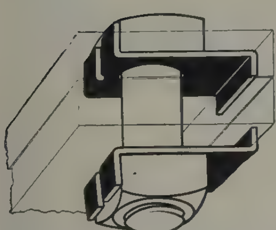


Fig. 1576—Jones Arch Bar Nut Lock. Jones Positive Nut Lock Company.

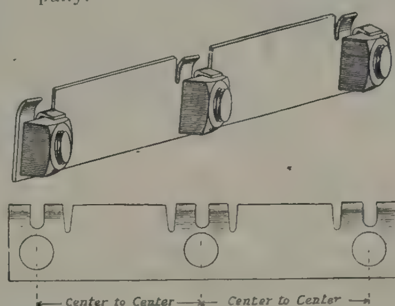


Fig. 1577—Jones Multiple Nut Lock. Jones Positive Nut Lock Company.

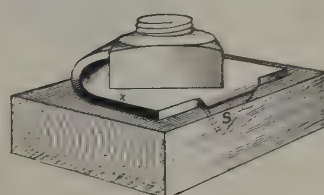


Fig. 1578—Jones Nut Lock for Application to Wood. Jones Positive Nut Lock Company.

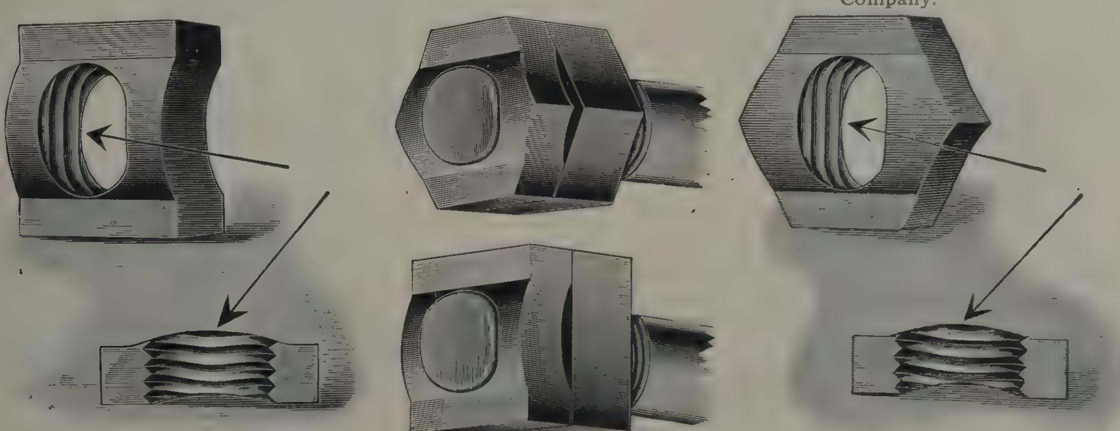
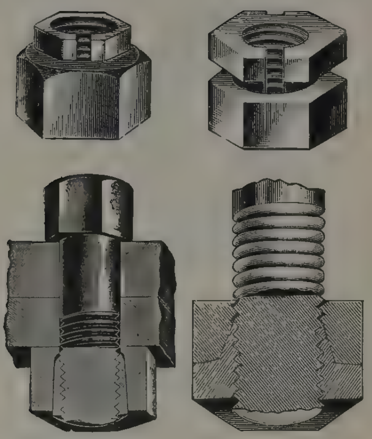


Fig. 1579—Square and Hexagon Grip Nuts, Showing Curve in Thread-Pitch Exaggerated to Show Locking Method. Grip Nut Company.



Original. Improved.

Fig. 1580—Columbia Lock Nuts and Application. Columbia Nut & Bolt Company, Incorporated.

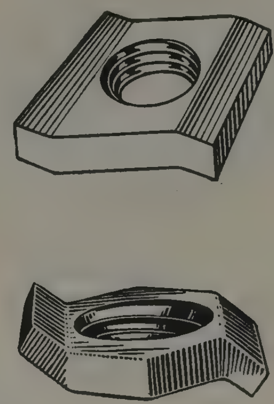


Fig. 1581—Square and Hexagon Gib Nuts. Columbia Nut & Bolt Company, Incorporated.

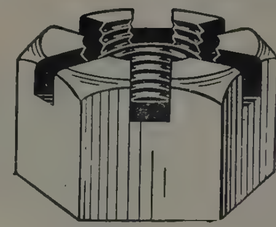


Fig. 1582—Castle Nut; Columbia Nut & Bolt Company, Incorporated.

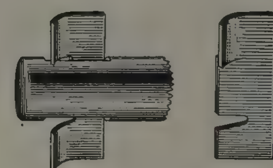


Fig. 1583—Simplicity Cotter Key. Columbia Nut & Bolt Company, Incorporated.

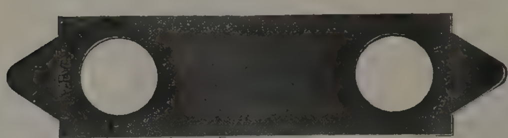


Fig. 1584—F. B. C. Lock for Striking Plate Bolts.

Fig. 1585—F. B. C. Continuous Lock.

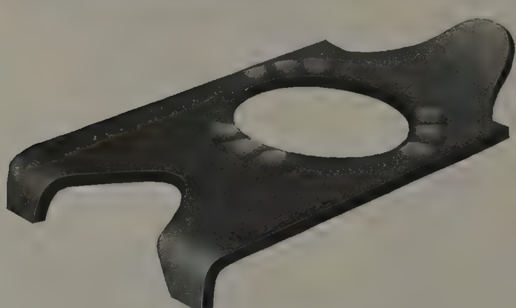


Fig. 1586—F. B. C. Arch Bar Nut Lock.

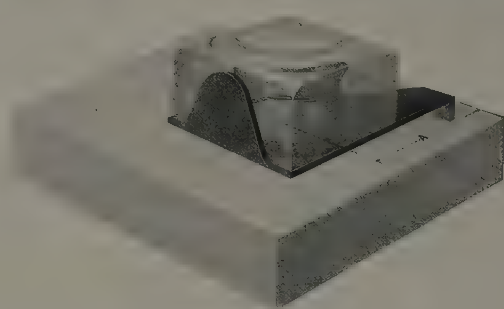


Fig. 1587—F. B. C. Arch Bar Nut Lock Applied.

Figs. 1584-7—Keystone Nut Lock Manufacturing Company.

Fig. 1588—Removal of Absolute Lock Nut, Showing Ordinary Nail Inserted; American Lock Nut Company.

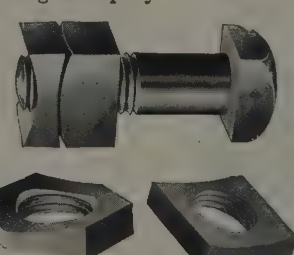


Fig. 1589—Boss Nut. Boss Nut Company.

Fig. 1590—Turnbuckle. Cleveland **City Forge & Iron Company.**

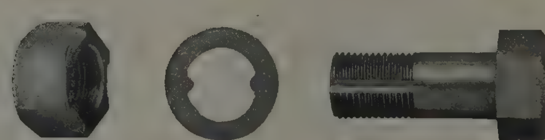
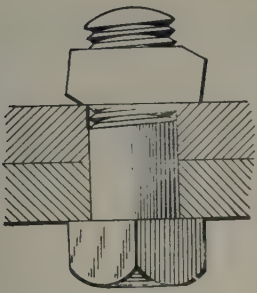
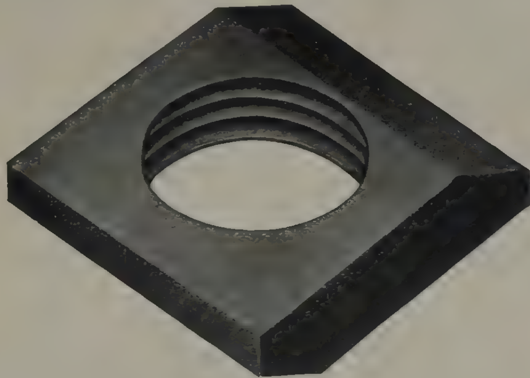
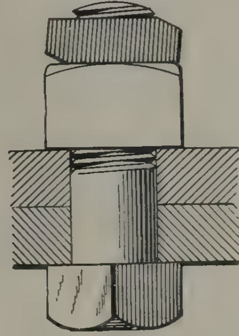


Fig 1591—Stevenson Permanent Nut Lock; Permanent **Products Company.**



Holder Nut.





Lock Nut.

Fig. 1592—D. S. Holder Nut and Lock Nut. Standard Safety Nut Corporation.

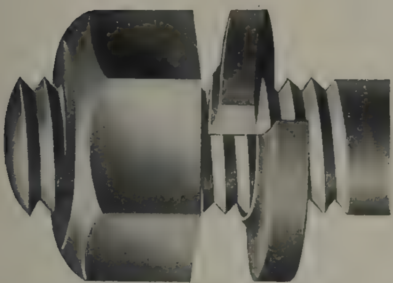
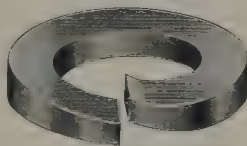
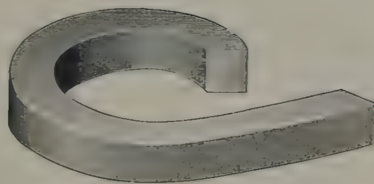


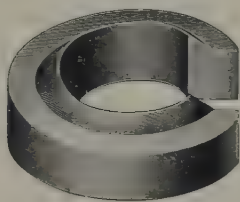
Fig. 1593—Application of National Lock Washer. National Lock Washer Company.



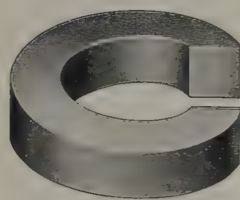
Positive Pattern.



Tail Pattern.



National Pattern.



Plain Pattern.

Fig. 1594—Lock Washers. American Nut & Bolt Fastener Company.

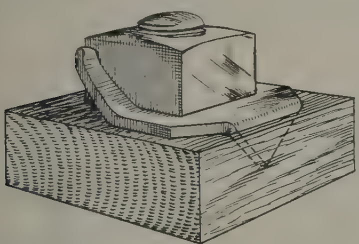


Fig. 1595—Bartley Diamond Tang Fastener for Application to Wood. American Nut & Bolt Fastener Company.

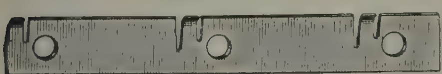


Fig. 1596—Bartley Multiple Nut Fastener. American Nut & Bolt Fastener Company.

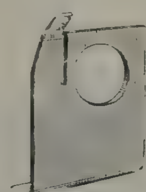


Fig. 1597—Bartley Flange Nut Fastener. American Nut & Bolt Fastener Company.

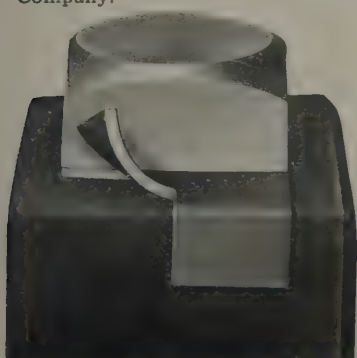


Fig. 1598—Bar Nut Lock, Applied to Square Nut.

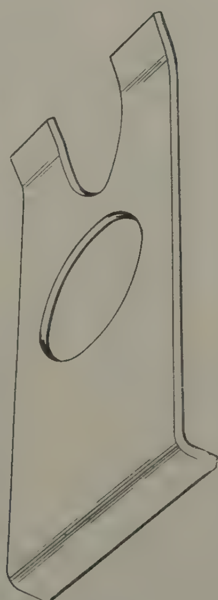


Fig. 1599—O. S. Nut Lock.

Fig. 1600—Bar Nut Lock, Applied to Hex Nut.

American Nut & Bolt Fastener Company.

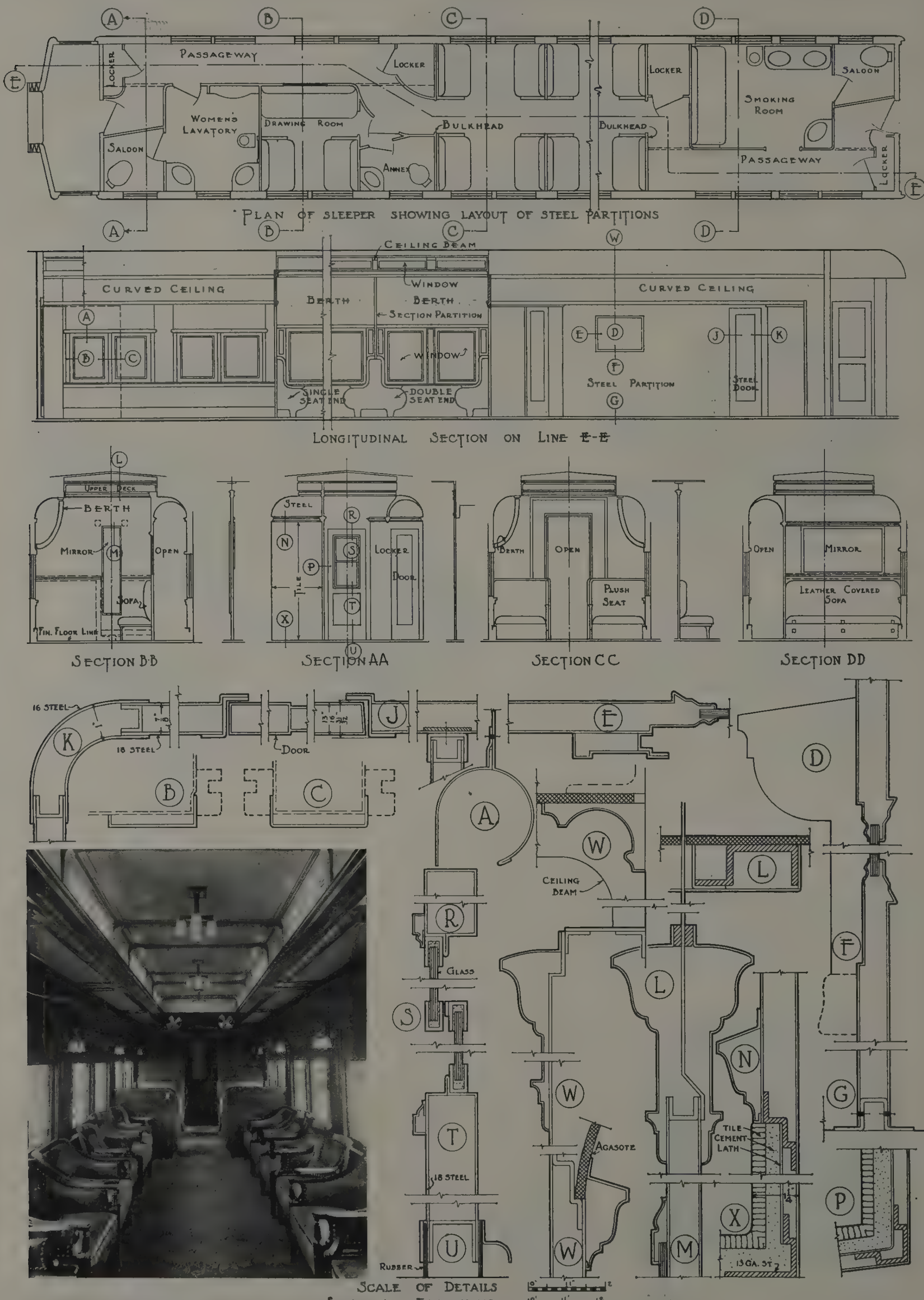


Fig. 1601—Steel Interior Finish for Passenger Train Cars. Dahlstrom Metallic Door Company.

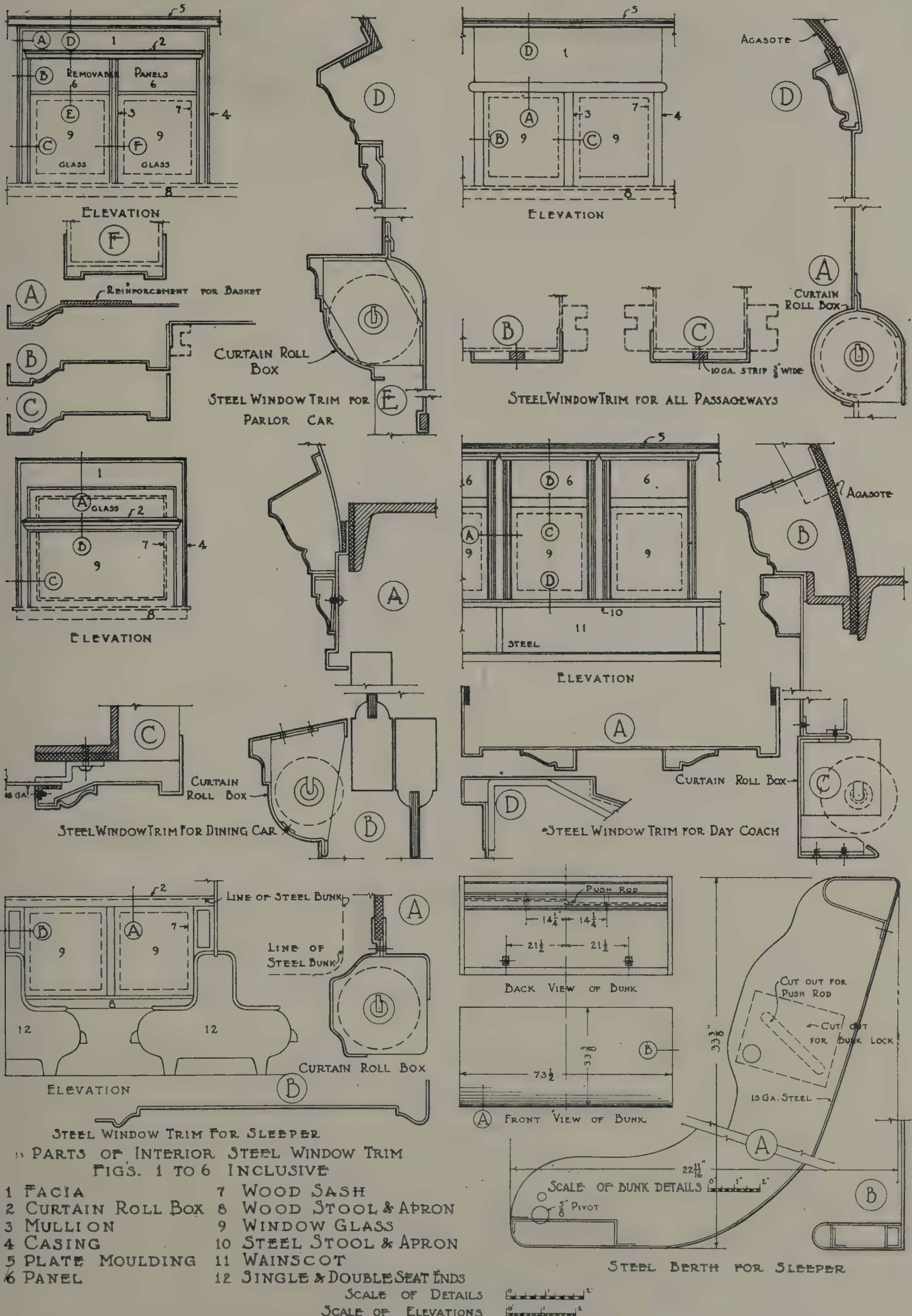


Fig. 1602—Steel Interior Finish for Passenger Train Cars. Dahlstrom Metallic Door Company.

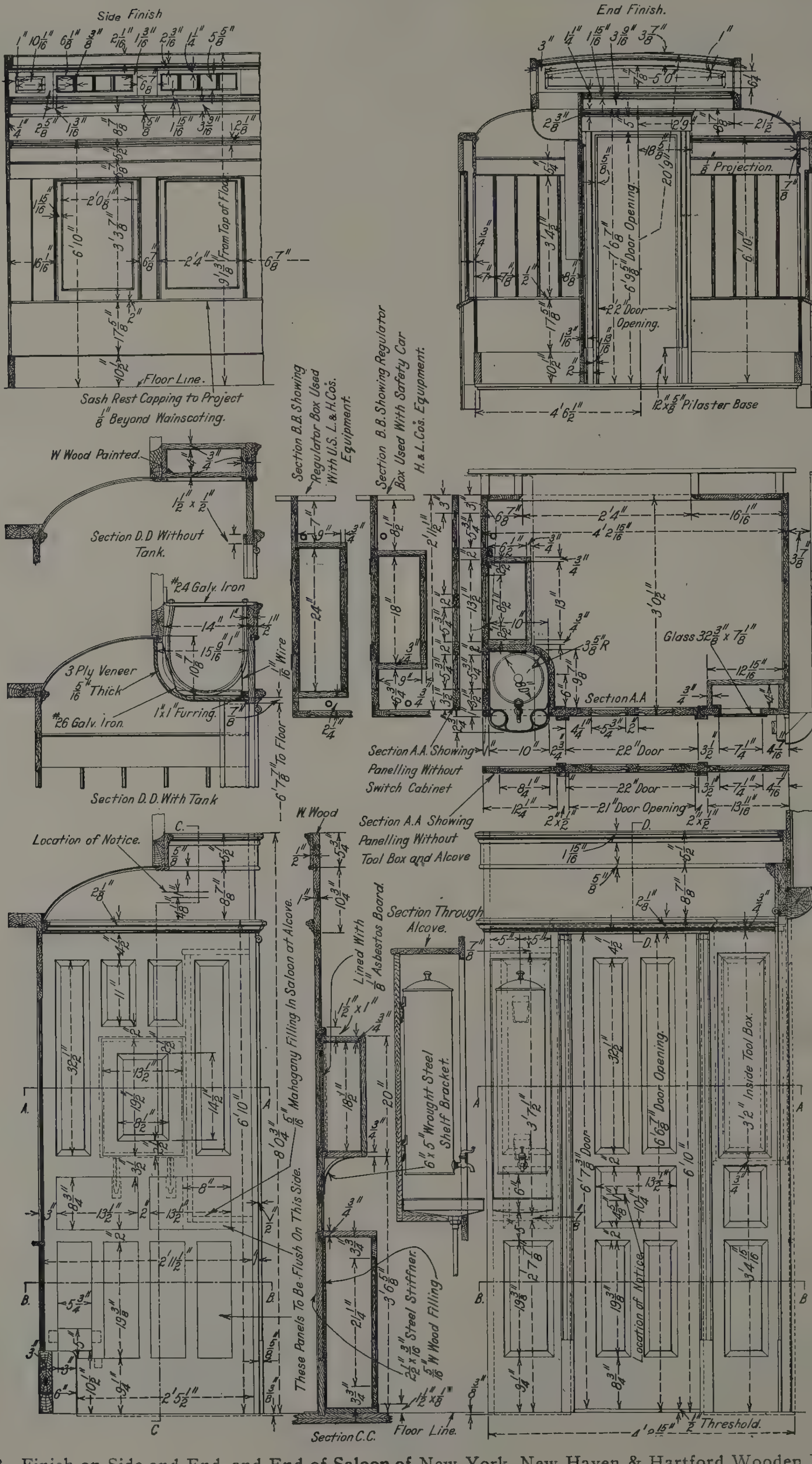


Fig. 1603—Finish on Side and End, and End of Saloon of New York, New Haven & Hartford Wooden Day Coach.

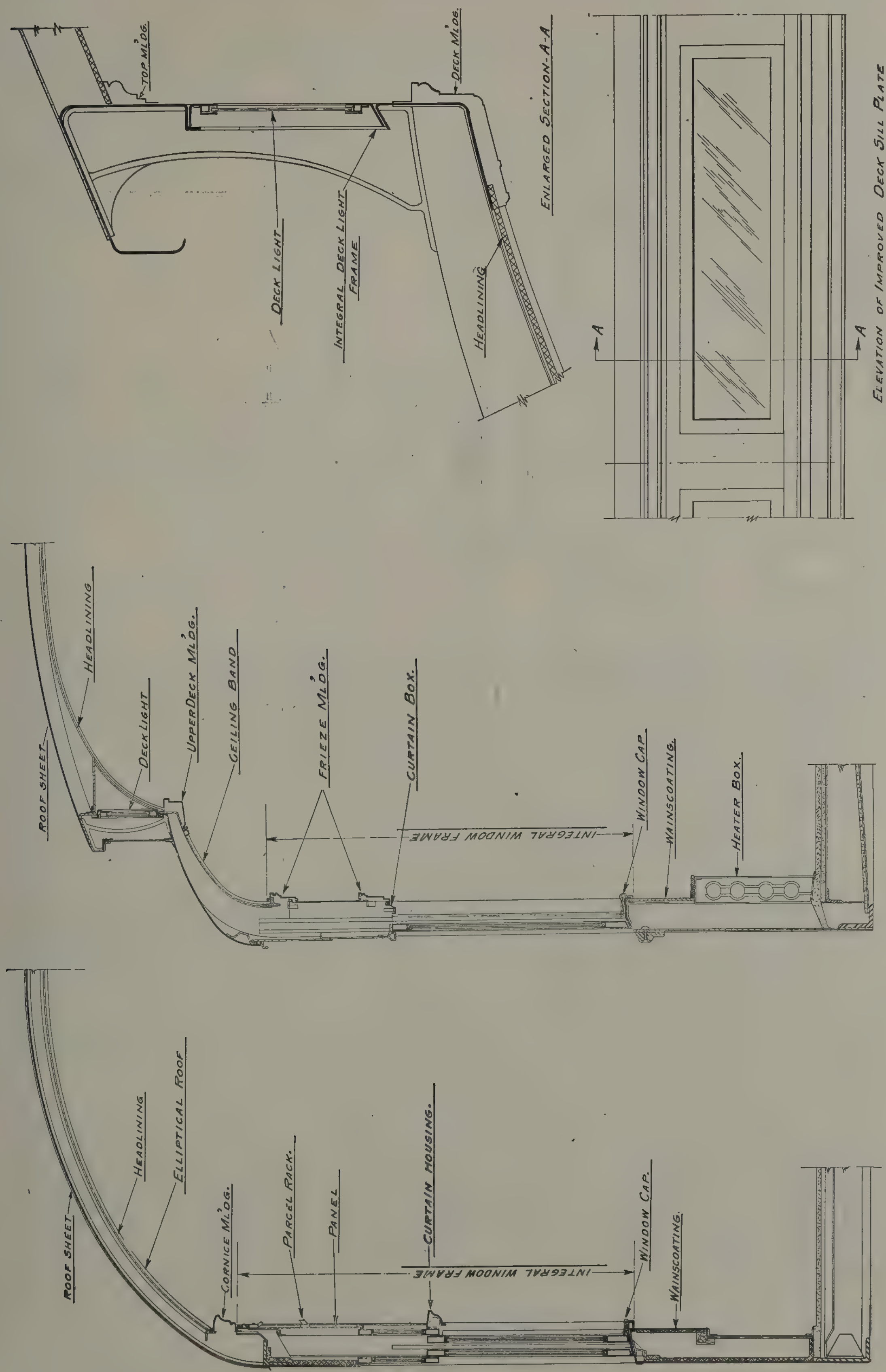


Fig. 1604—Interior Finish for Steel Passenger Train Cars. The Hale & Kilburn Company.

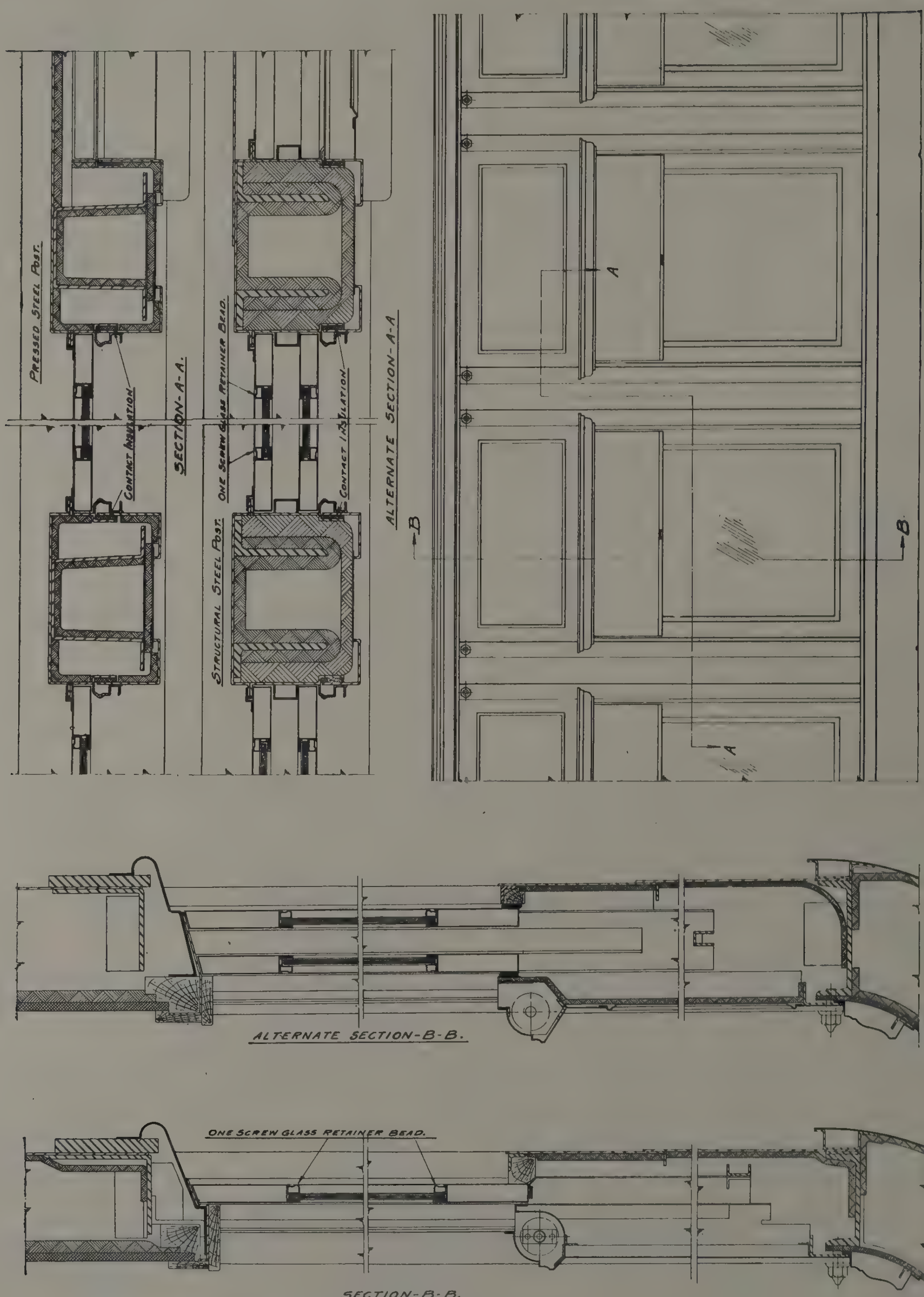


Fig. 1605—Integral Window Frames for Steel Passenger Equipment. The Hale & Kilburn Company.

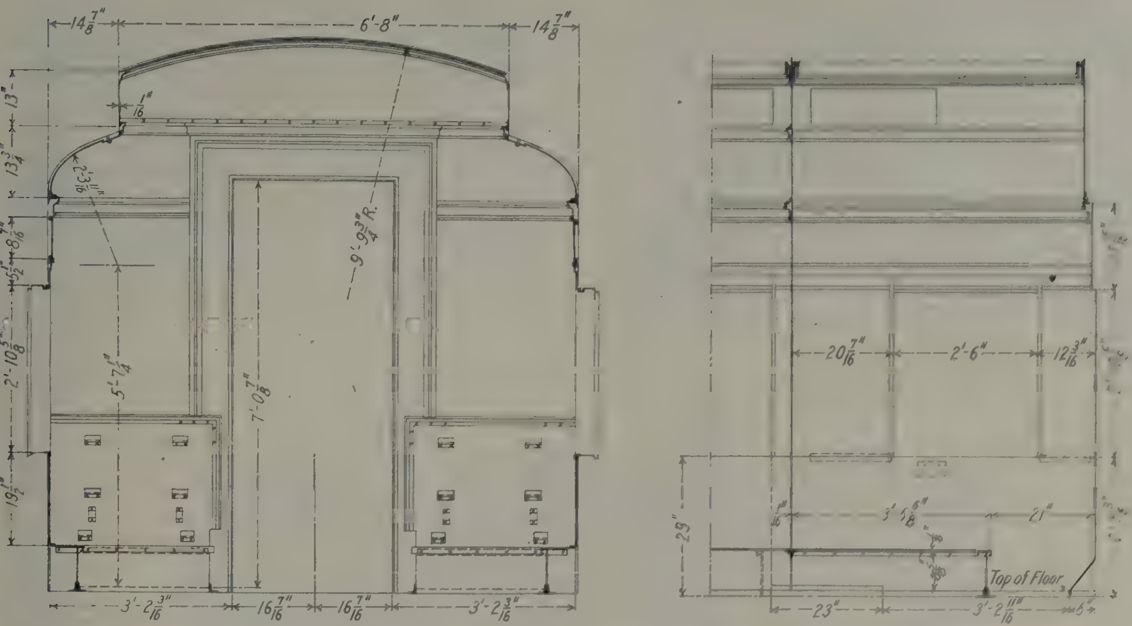


Fig. 1606—Steel Interior Finish for Passenger Coach. Art Metal Construction Company.

Fig. 1606-A—Interior Finish of Steel Passenger Coach. Art Metal Construction Company.

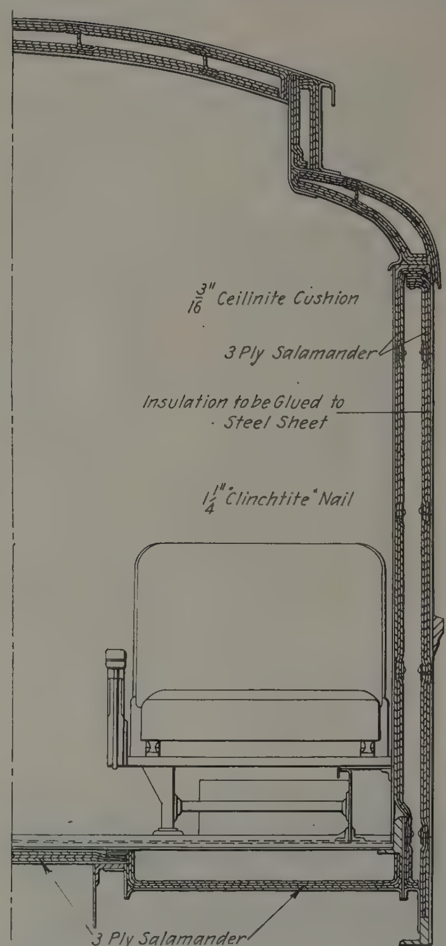


Fig. 1607—Application of Three-Ply Salamander Insulation to Steel Coach. H. W. Johns-Manville Company.

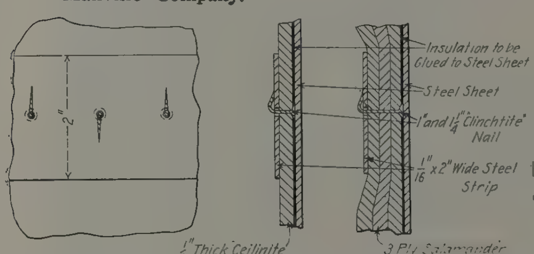


Fig. 1608—Method of Fastening Insulation by Electric Spot Welding and Clinchtite Nails. H. W. Johns-Manville Company.

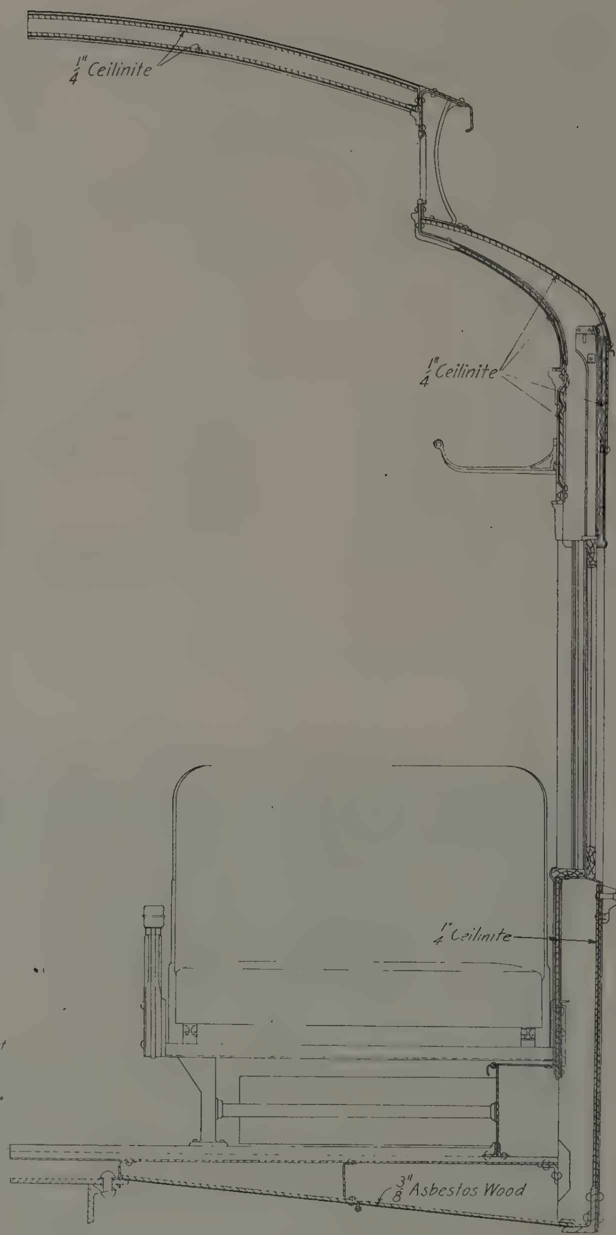


Fig. 1609—Application of J-M Ceilinite Fireproof Insulation to Passenger Coach. H. W. Johns-Manville Company.

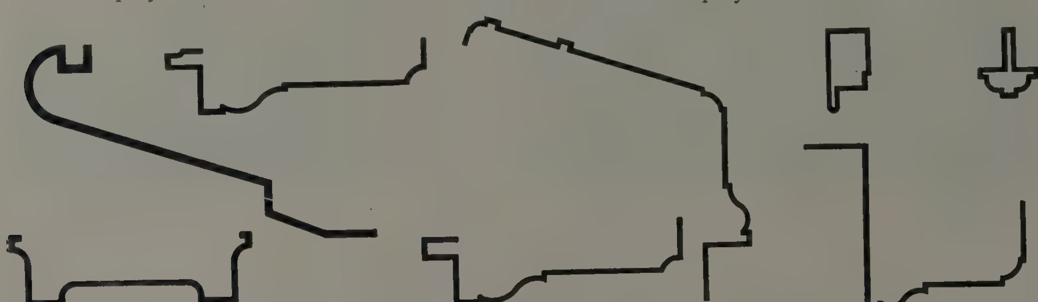
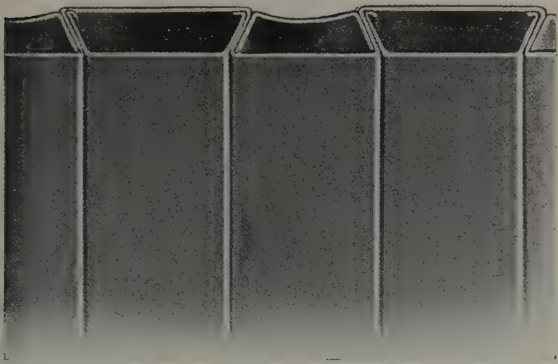
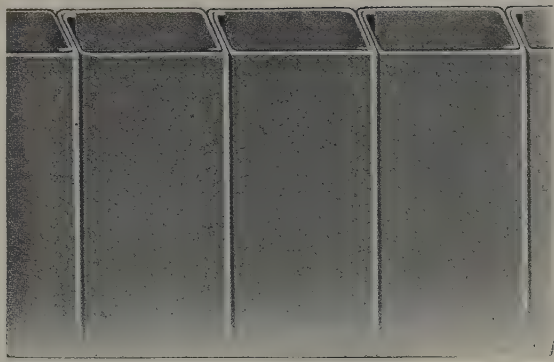


Fig. 1610—Sections of Moldings for Metal Interior Finish. Grinden Art Metal Company.



No. 1-A Panel.



No. 3-A Slat.

Fig. 1611—Metallic (Steel) Sheathing for Wood Cars. Tuco Products Corporation.

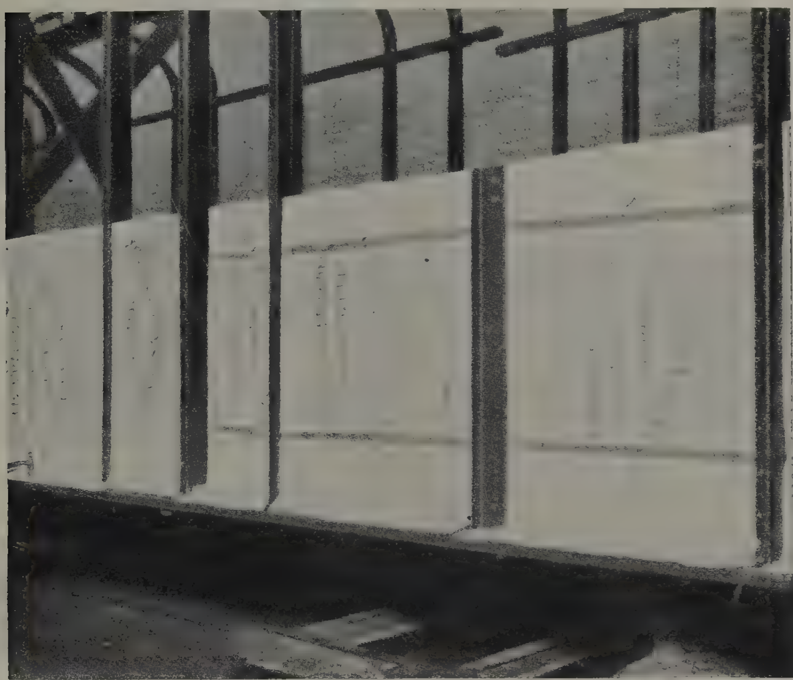
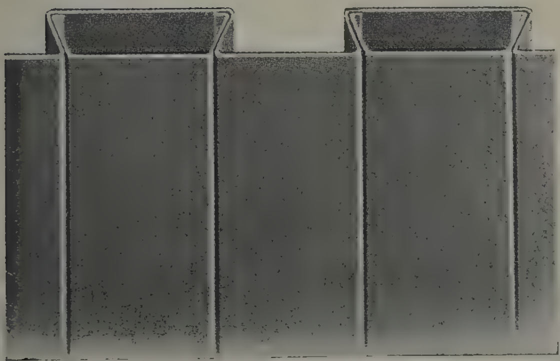
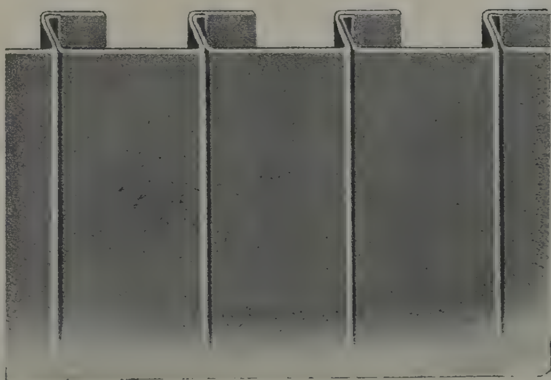


Fig. 1612—Resisto Hair Felt Insulation. Tuco Products Corporation.



No. 1 Panel.



No. 3 Slat.

Fig. 1613—Metallic (Steel) Sheathing for Wood Cars. Tuco Products Corporation.

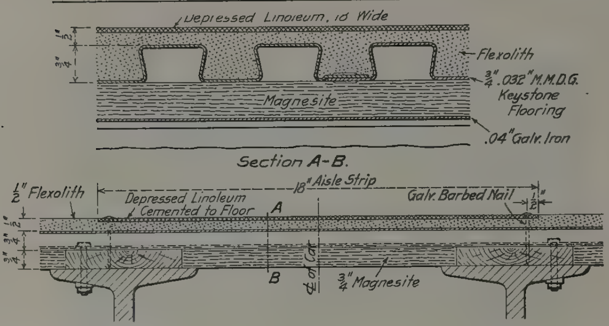


Fig. 1614—Depressed Aisle Strip. Union Pacific.

Fig. 1615—Steel Bulkhead and Saloon for Arch Roof Coach. Hale & Kilburn Company.

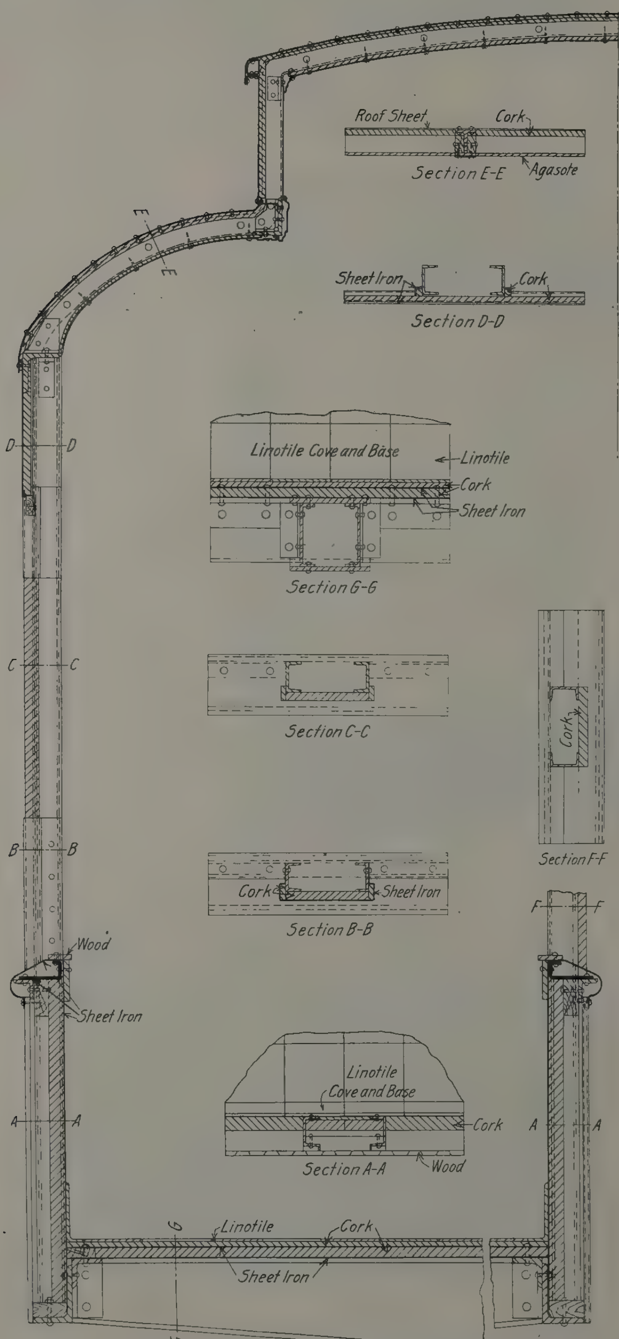


Fig. 1616—Insulation for Passenger Train Cars. Armstrong Cork Company.

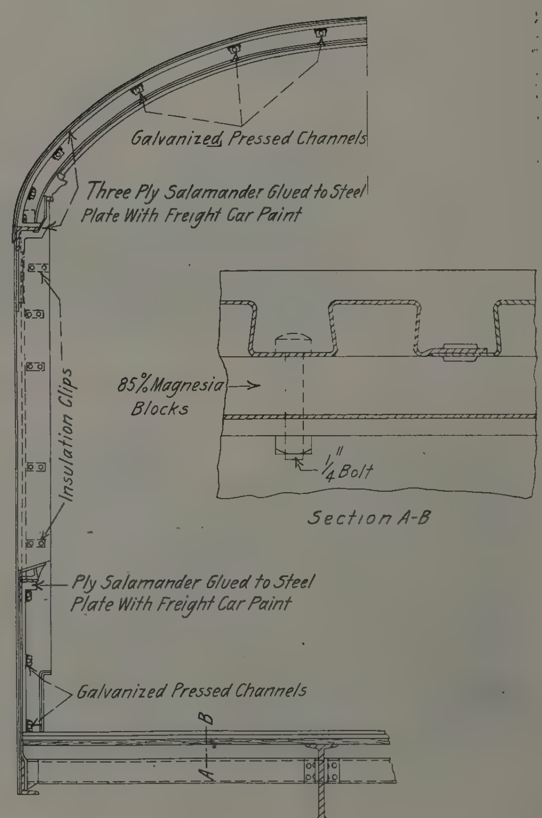


Fig. 1617—Application of Channels for Holding Three-Ply Salamander Insulation, H. W. Johns-Manville Company.

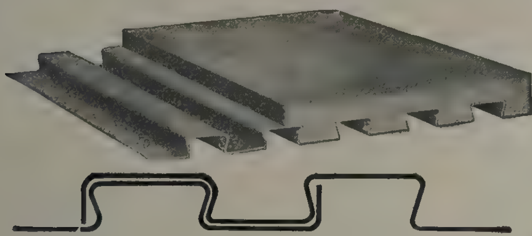


Fig. 1618—Keystone Car Flooring. Berger Manufacturing Company.

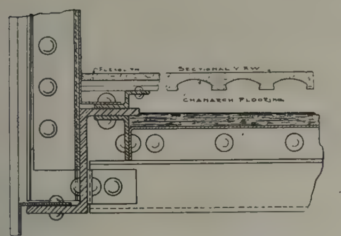


Fig. 1619—Chanarch Metal Flooring. Dunbar Manufacturing Company.

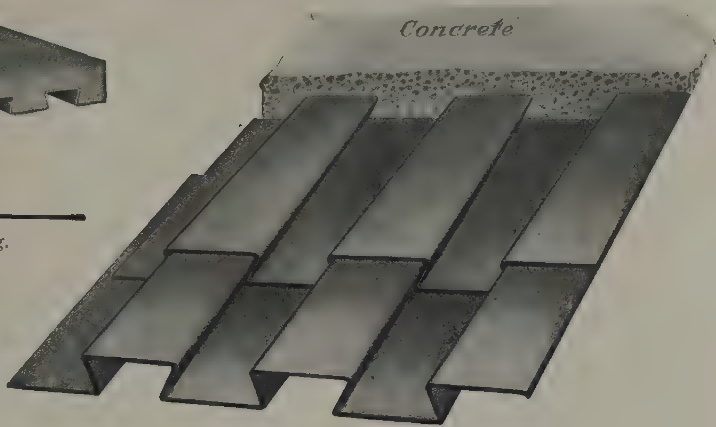


Fig. 1620—Ferroinclave Floor Covering. Brown Hoisting Machinery Company.

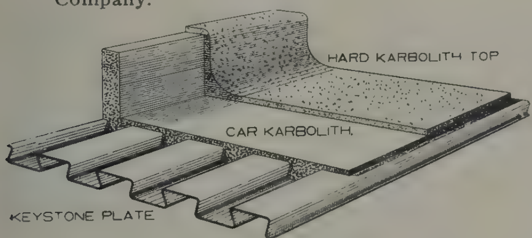


Fig. 1621—Karbolith Flooring as Applied to Steel Passenger Cars. American Mason Safety Tread Company.

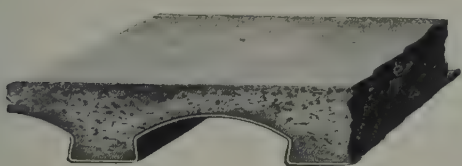


Fig. 1622—Flexolith Composition Flooring. Tuco Products Corporation.

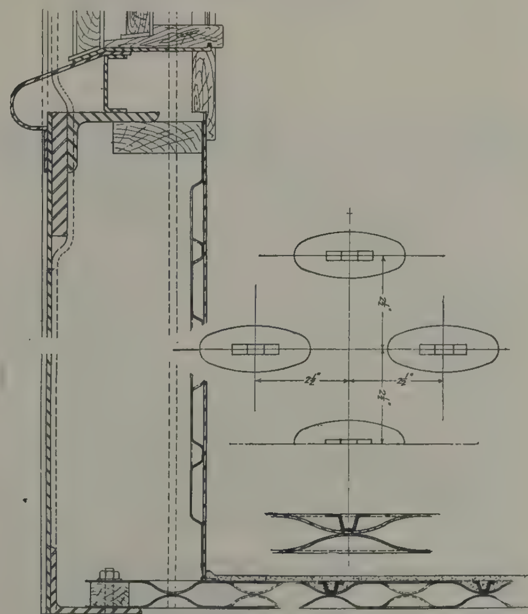


Fig. 1623—Trussplate Steel Flooring. Hale & Kilburn Corporation.

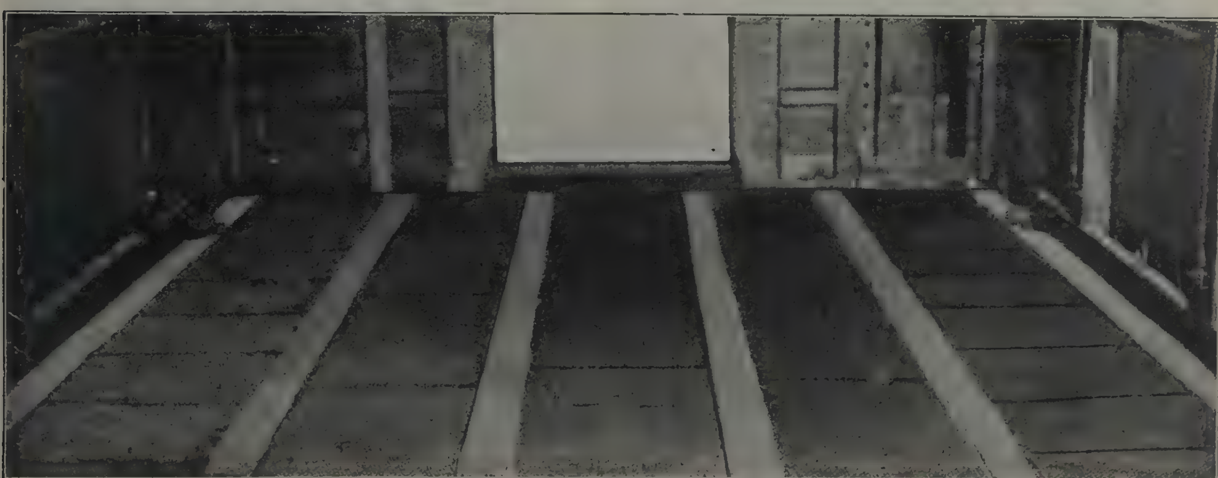


Fig. 1624—Tucork Floor Insulation Applied to Steel Passenger Car. Tuco Products Corporation.

Parts of Sleeping Car Sections, Figs. 1626 and 1627.

1 *Lower Berth*
2 *Upper Berth*
3 *Lower Berth Arranged as Seat*
4 *Head Board*
5 *Clothes Hammock*
6 *Berth Curtain Rod*
7 *Berth Curtain*
8 *Mirror*
9 *Berth Lamp*
10 *Berth Chain*
11 *Berth Chain Pulley*
12 *Coat Hanger*
13 *Berth Safety Rope*
14 *Upper Berth Ladder*
15 *Upper Berth Safety Straps*
16 *Head Rest, Used at Night as Clothes Rack*
17 *Window Shade*
18 *Electric Bell Push Button*
19 *Portable Table*
20 *Lower Deck Head Lining*

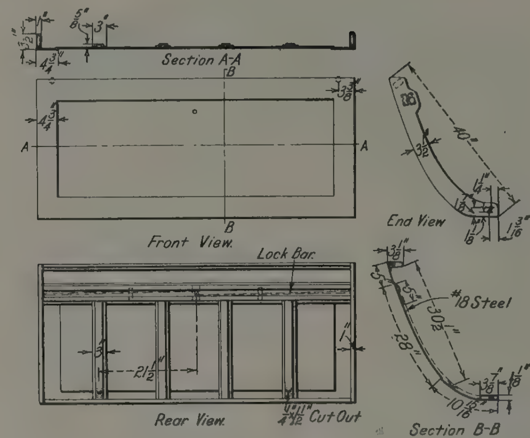


Fig. 1625—Steel Upper Berth. Dahlstrom Metallic Door Company.

Fig. 1626—Pullman Sleeping Car Section with Upper Berth Down.

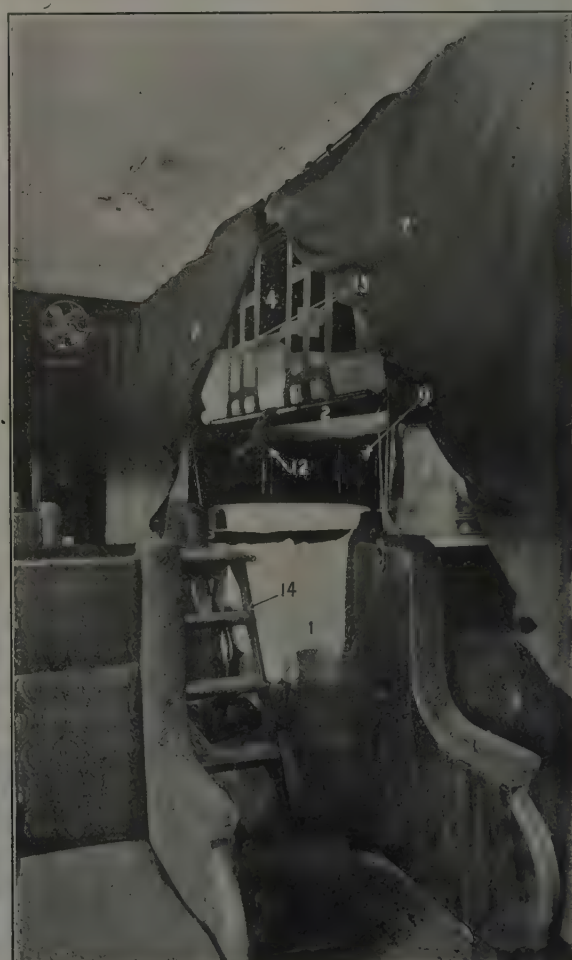
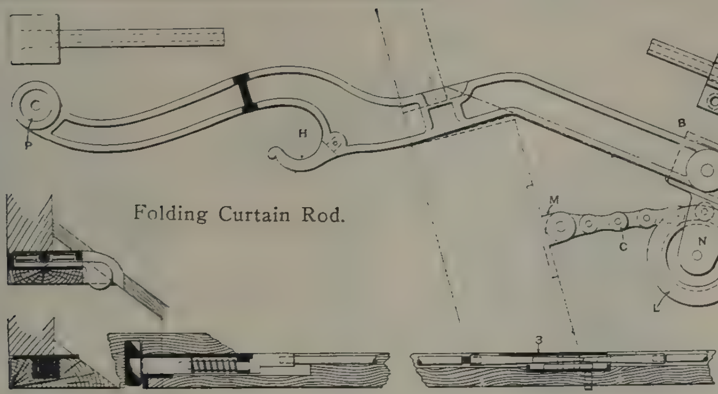


Fig. 1627—Pullman Sleeping Car Section with Curtain Drawn Back Showing Berths Made Up.

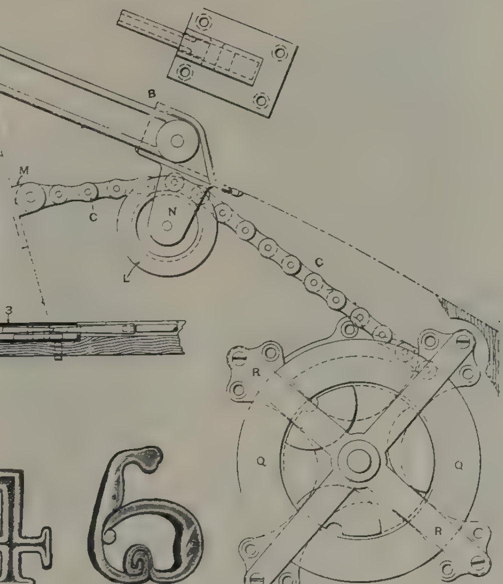
See Above for Names of Numbered Parts.



Folding Curtain Rod.

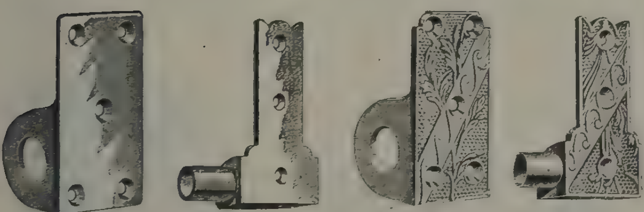
Section Through Latch.

Fig. 1628—Upper Berth Details.



Berth Spring, Chain and Pulley.

Fig. 1629—Berth Numbers. Dayton Manufacturing Company.



A. & W. Co. D. M. Co. A. & W. Co. D. M. Co.

Fig. 1630—Berth Hinges.

Fig. 1631—Head Board Fastener. Adams & Westlake Company.

Fig. 1632—Head Board Plates. Adams & Westlake Company.

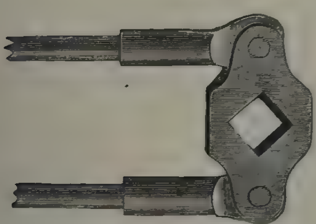


Fig. 1633—Berth Lock Rods. Dayton Manufacturing Company.

Fig. 1634—Berth Lock Handle. Adams & Westlake Company.

Fig. 1635—Berth Curtain Hook. D. M. Co.

Fig. 1636—Berth Safety Rope Hook. A. & W. Co.

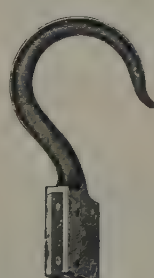


Fig. 1637—Berth Curtain Hook.

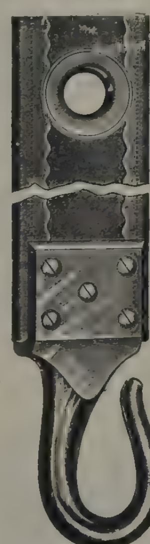


Fig. 1638—Upper Berth Safety Strap and Hook. J. L. Howard & Co.

Fig. 1639—Upper Berth Catch. A. & W. Co.

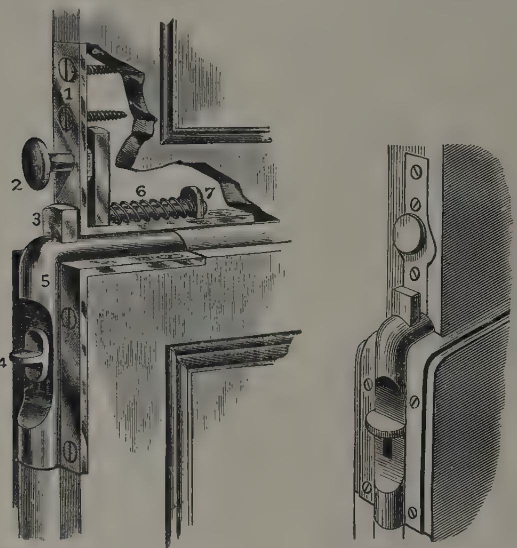


Fig. 1640—Head Board Bolt and Application Details. Dayton Manufacturing Company.

Parts of Fig. 1640.

1 *Upper Face Plate*
2 *Knob Latch*
3 *Lower or Fixed Bolt*
4 *Side Latch*
5 *Lower Face Plate*
6 *Bolt Spring*
7 *Upper or Spring Bolt*

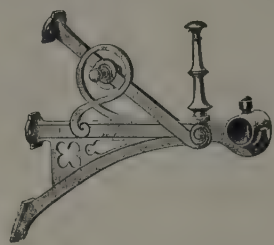


Fig. 1641—Berth Curtain Rod Bracket. Jas. L. Howard & Co.

Fig. 1642—Berth Curtain Rod Bracket. Adams & Westlake Company.

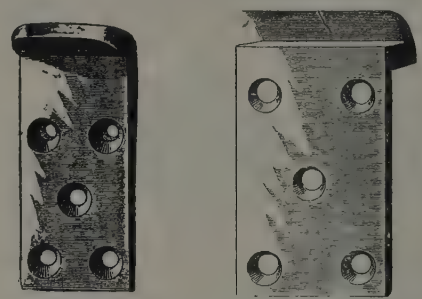


Fig. 1643—Table Hooks. Dayton Manufacturing Company.

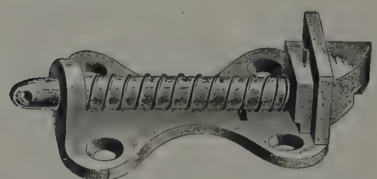
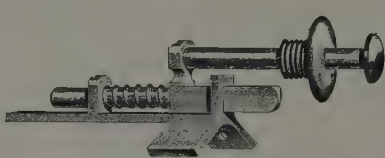


Fig. 1644—Sofa Bolt. Adams & Westlake Company.



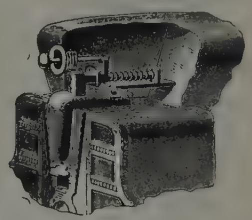


Fig. 1645—Sofa Arm Rest Bolt. Fig. 1646—Sofa Arm Rest Dayton Manufacturing Company.

Pin Bushing. Pin Plate. Catch Plate. Pin.

Fig. 1647—Sofa Arm Rest Fixtures. Dayton Manufacturing Company.

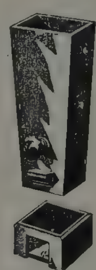


Fig. 1649—Sofa Back Leg Socket and Pocket. Dayton Manufacturing Company.

Fig. 1650—Sofa Rail End and Socket. Adams & Westlake Company.

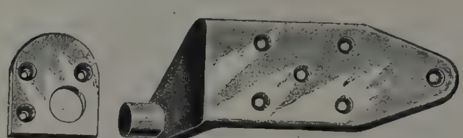


Fig. 1648—Sofa Back Pivot, Hinge and Bushing. Dayton Manufacturing Company.

Fig. 1651—Sofa Arm Rest Fixtures. Dayton Manufacturing Company.

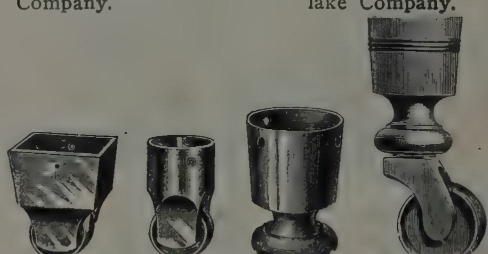


Fig. 1652—Chair and Sofa Casters. Adams & Westlake Company.

Fig. 1653—Straight Seat Arm Stops. Adams & Westlake Company.

A. & W. Co. Dayton Manufacturing Co.
Fig. 1654—Curved Seat Arm Stops.

Fig. 1655—Seat Arm Stops. D. M. Co.

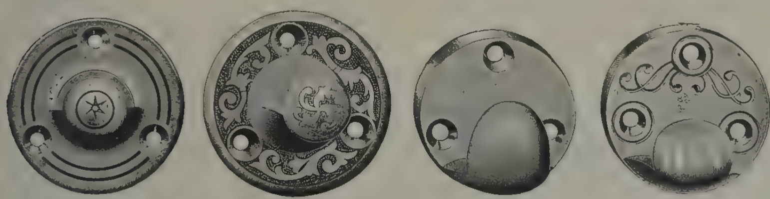


Fig. 1656—Round Seat Arm Stops Which May be Fitted with Locks. Adams & Westlake Company.

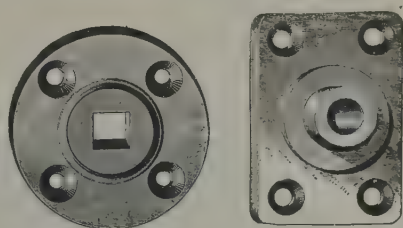


Fig. 1657—Seat Arm Pivots. Dayton Manufacturing Company.

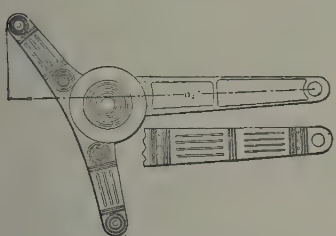


Fig. 1658—Pivoted Seat Back Arm. Dayton Manufacturing Company.

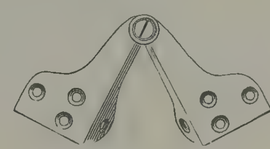


Fig. 1659—Seat Hinge. D. M. Co.

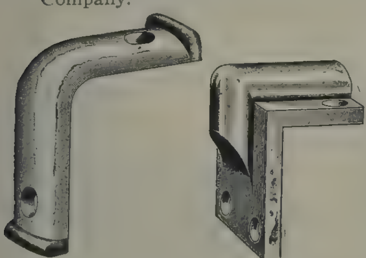


Fig. 1660—Seat Back Corners. Adams & Westlake Company.

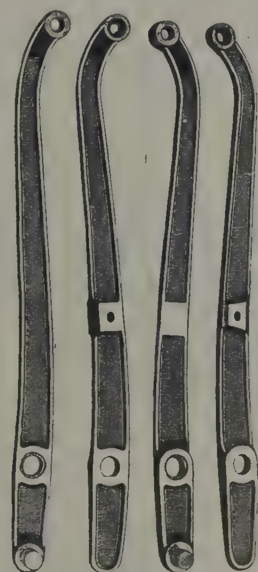


Fig. 1661—Seat Back Arms for Forney Seats. Adams & Westlake Company.

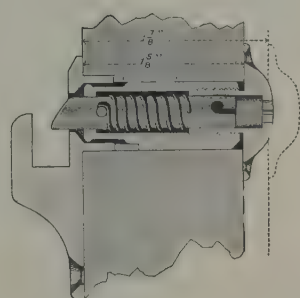


Fig. 1662—Kirby's Seat Lock for Wood Seat Ends. Dayton Manufacturing Company.

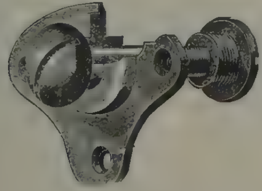


Fig. 1663—Seat Arm Pivot Bolt. Dayton Manufacturing Company.

Fig. 1664—Curved Seat Arm Stop with Lock.

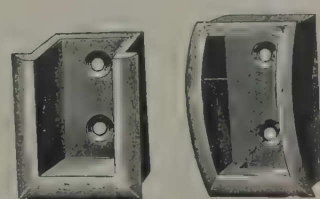
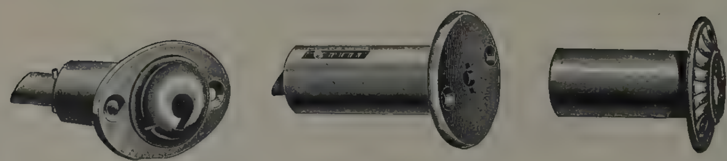


Fig. 1665—Seat Rail Sockets. Adams & Westlake Company.



Adams & Westlake Company. Dayton Manufacturing Company.

Fig. 1666—Seat Back Arm Locks with Escutcheons.

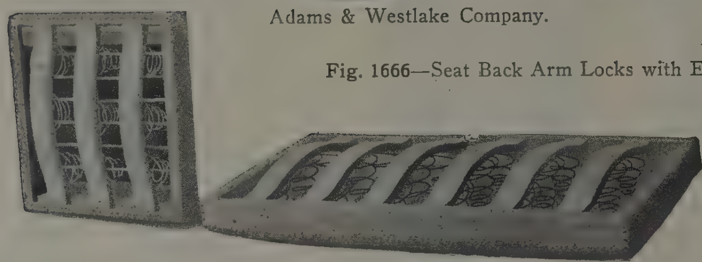


Fig. 1667—Reverse Side of Single and Double Rattan Spring Seats, Showing Construction. Hale & Kilburn Company.

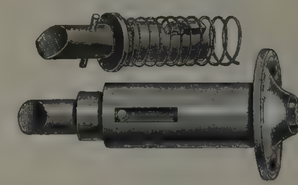


Fig. 1668—Seat Back Arm Lock, Bolt and Spring. Adams & Westlake Company.

Fig. 1669—Spring Seat, Showing the Use of Slat and Webbing and the Elastic Slat Edge. Hale & Kilburn Company.

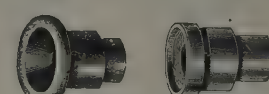


Fig. 1670 — Seat Arm Thimbles. Adams & Westlake Company.

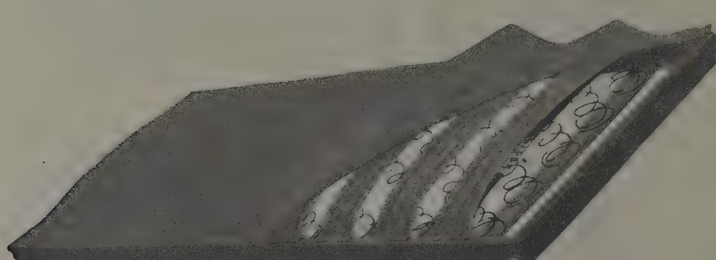


Fig. 1671—Sleeping Car Upper Berth Spring. Hale & Kilburn Company.

Fig. 1672 — Seat Pull. Adams & Westlake Company.

Fig. 1673—Seat Arm Rivets. Dayton Manufacturing Company.

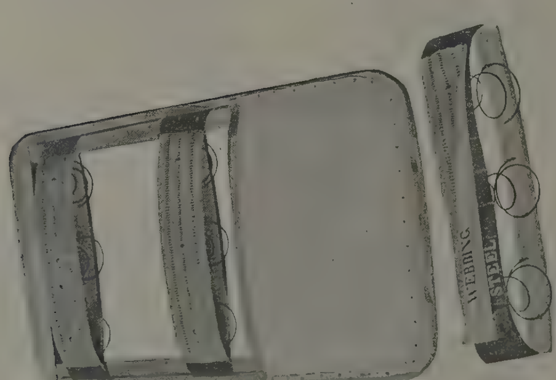


Fig. 1674—Improved Combination Spring Back, with One Section Detached. Hale & Kilburn Company.

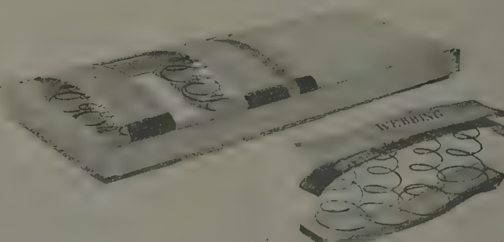


Fig. 1675—Improved Combination Spring Cushion, with One Section Detached. Hale & Kilburn Company.

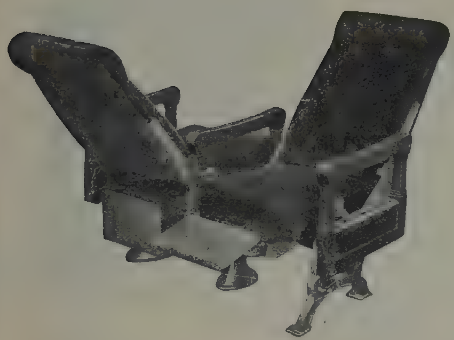


Fig. 1676—Double Reclining Chair No. 65 with Plush Upholstery.

Fig. 1677—Steel Walkover Seat with Plush Upholstery, for New York Central Steel Coaches.

Seaboard Air Line Style. New York Central Style. Atchison, Topeka & Santa Fe.

Fig. 1678—Neverbreak Pressed Steel Walkover Seats.

Fig. 1679—Steel Walkover Seat with Rattan Upholstery, for New York Central Suburban Cars.

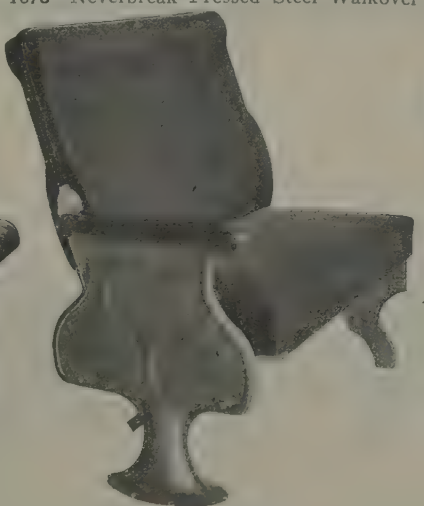


Fig. 1680—Steel Walkover Seat with Plush Upholstery, for Union Pacific Steel Coaches.

Fig. 1681—Steel Walkover Seat with Frieze Plush Upholstery, for Pennsylvania Railroad Steel Coaches.

Hale & Kilburn Company.

Fig. 1682—Standard Coach Seat with Plush Upholstery.

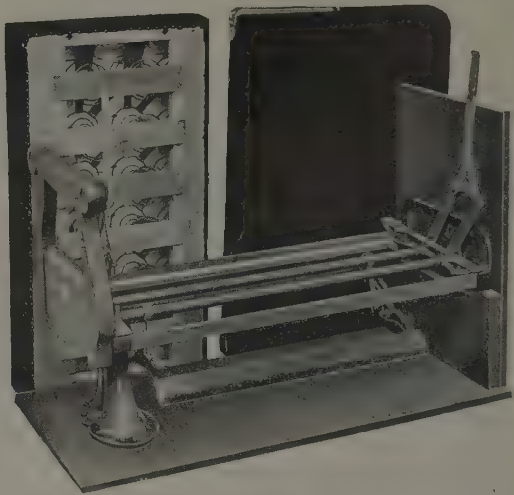


Fig. 1683—Mechanism of Standard Coach Seat.

The Barney & Smith Car Company

Fig. 1684—Steel Walkover Seats and Steel Integral Window Construction.
Hale & Kilburn Company.

Fig. 1685—Walkover Seat No. 197 with Plain High Back and Frieze Plush Upholstery.

Fig. 1686—Walkover Seat No. 197 with Extra High Headroll Back and Plain Plush Upholstery.

Hale & Kilburn Company.

Fig. 1687—Double Reclining Chair with Plush Upholstery.
Heywood Bros. & Wakefield Company.

Fig. 1688—Steel Seat.
The Barney & Smith Car Company.

Fig. 1689—No. 350 A. C. F. Universal Slideover Seat, Leather Upholstery.

Fig. 1690—Revolving Parlor Car Chair with Rattan Upholstery.

Fig. 1691—Revolving Parlor Car Chair with Plush Upholstery.

Heywood Brothers & Wakefield Company.

Fig. 1692—No. 302 A. C. F. Universal Turnover Seat.

Fig. 1693—No. 85 A. G. F. Universal Slideover Seat.

Fig. 1694—No. 85 S. G. F. Universal Slideover Seat, Rattan Upholstery.

Heywood Brothers & Wakefield Company.

Fig. 1695—Parlor Car Chair with Revolving Pedestal.
S. Karpen & Brother.

Fig. 1696—Parlor Car Chair No. 114.
Scarritt Car Seat & Manufacturing Company.

Fig. 1697—Reed Chair for Parlor and Observation Cars.
S. Karpen & Brother.

Fig. 1698—Richards Panel Back Fiber-Rush Chair.
Richards Chair Panel Company.

Fig. 1699—Richards Panel Back Parlor Car Chair.
Pullman Standard.
Richards Chair Panel Company.

Fig. 1700—Richards Panel Back Revolving Chair Seat, with or without Reclinng Back.
Richards Chair Panel Company.

Fig. 1701—Richards Panel Back Dining Car Chair, without Arms.

Fig. 1702—Richards Panel Back Double Seat.
Richards Chair Panel Company

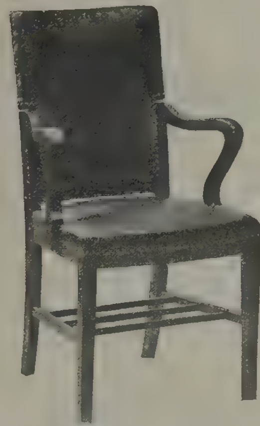


Fig. 1703—Richards Panel Back Dining Car Chair, with Arms.

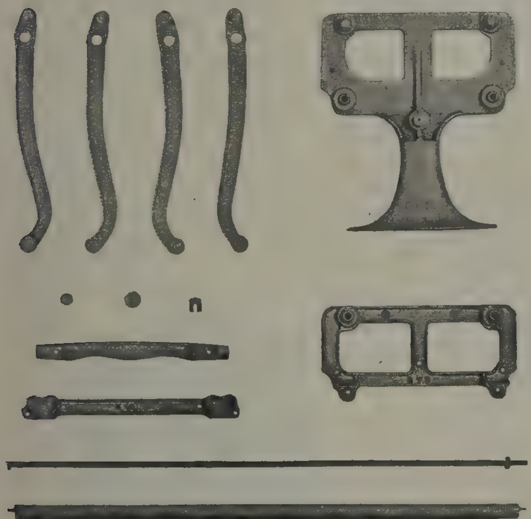


Fig. 1704—Metal Parts of Scarritt Low Back Coach Seat No. 16. Scarritt Car Seat & Manufacturing Company.

Fig. 1705—Reversible Low Back Coach Seat No. 16. Scarritt Car Seat & Manufacturing Company.

Fig. 1706—Stationary Coach Seat No. 135. Scarritt Car Seat & Manufacturing Company.

Fig. 1707—Simplex Coach Seat No. 37. Scarritt Car Seat & Manufacturing Company.

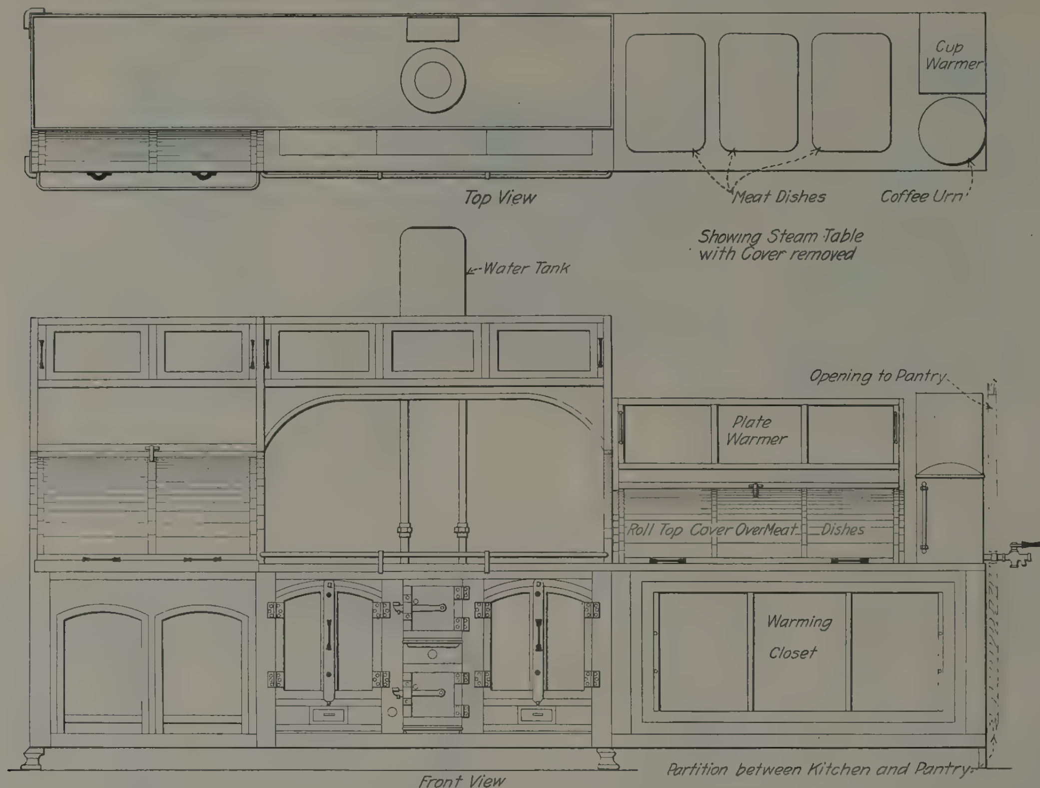


Fig. 1708—Stearns Steel Safety Range for Dining Cars. Stearns Steel Range Company.

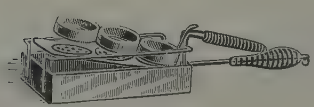


Fig. 1709—Egg Poacher No. 1505.

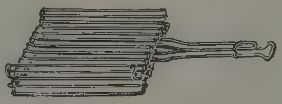


Fig. 1711—Broiling Iron No. 1502.

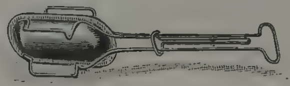


Fig. 1710—Hash Browner No. 1504.

Fig. 1712—Frying Pan No. 1503.

Fig. 1713—Gas Broiler No. 1500.

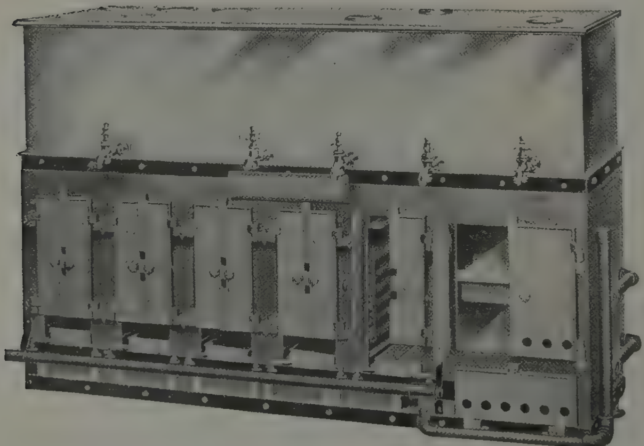


Fig. 1714—Gas Broiler and Oven No. 1507.

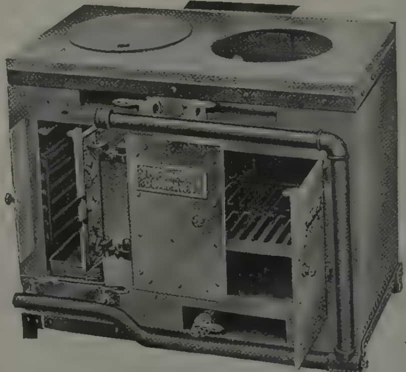
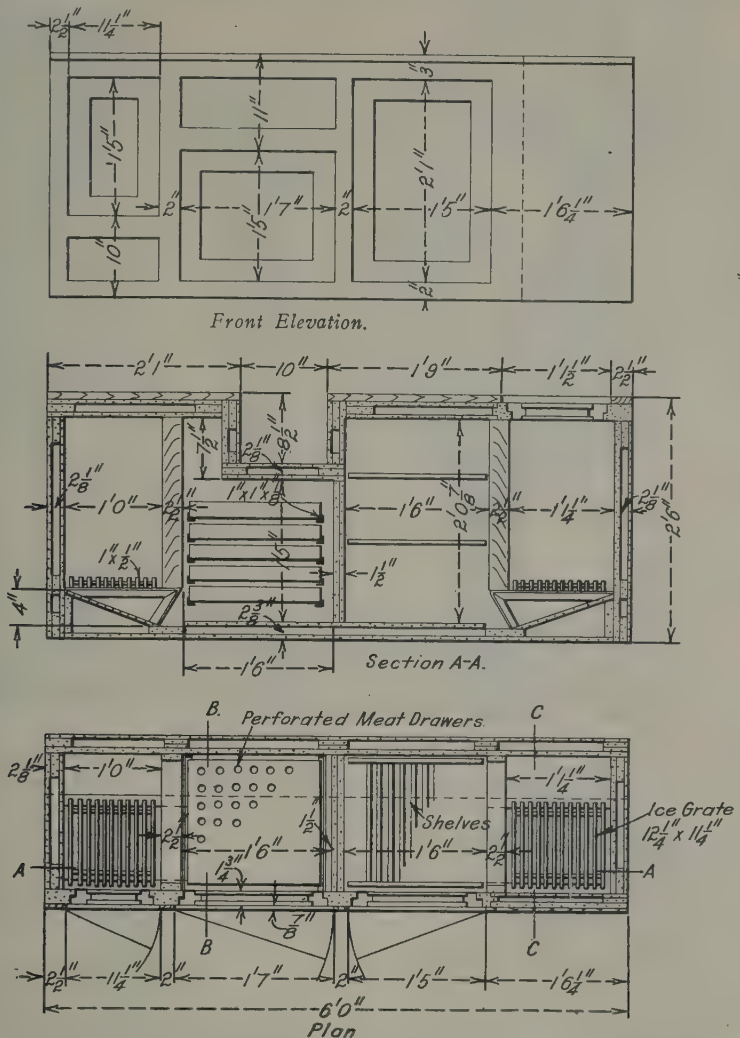


Fig. 1715—Gas Broiler and Oven No. 1501a.

The Safety Car Heating & Lighting Company.



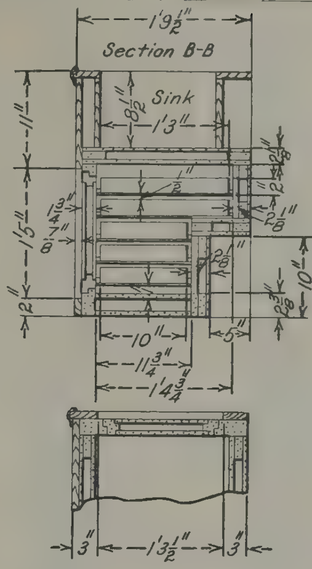


Fig. 1716—Buffet Refrigerator. The Bohn Refrigerator Company.

Fig. 1717—Buffet Stove and Urn. Adams & Westlake Company.

Fig. 1718—Towel Rods. Dayton Manufacturing Company.

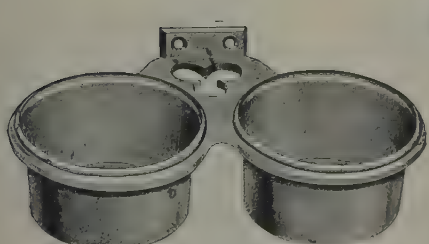


Fig. 1719—Double Tumbler Holder. Dayton Manufacturing Company.

Fig. 1720—Tumbler Holder. Adams & Westlake Company.

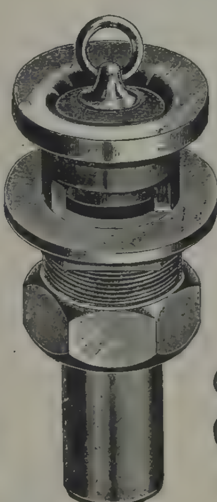


Fig. 1722—Sink Bushing and Plug.

Fig. 1721—Basin Bushing and Plug for Overflow Bowl.

Fig. 1723—Basin Bushing and Plug.

Adams & Westlake Company

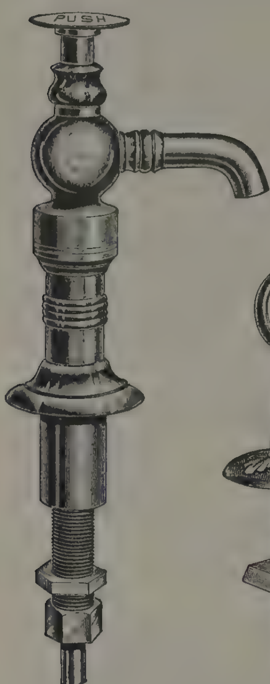


Fig. 1724—Compression Faucet. Fig. 1725—Chain Post or Stay. Adams & Westlake Company.

Fig. 1726—Combination Hot and Cold Water Faucet. Adams & Westlake Company.

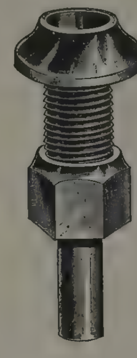


Fig. 1727—Tail Coupling for Alcove Faucet. Fig. 1728—Tumbler Holder and Drip. Adams & Westlake Company.

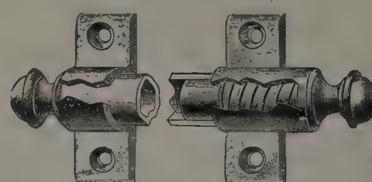


Fig. 1729—Towel Rod Bracket. Dayton Manufacturing Company.

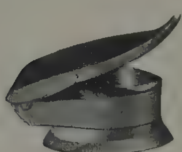


Fig. 1730—Filler Cover. Jas. L. Howard & Company.

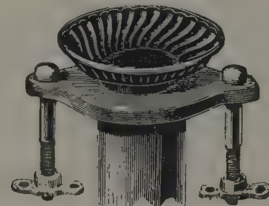


Fig. 1731—Soap Dish. A. & W. Co.

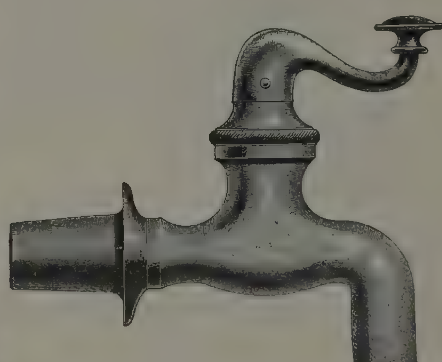


Fig. 1734—Telegraph Faucet, Dayton Manufacturing Company.

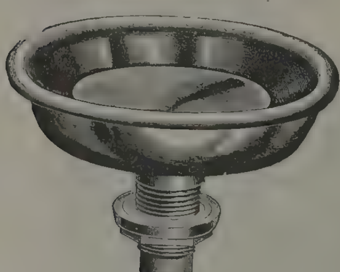
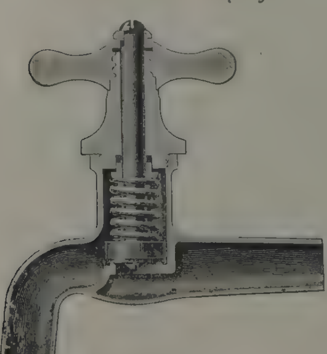


Fig. 1732—Soap Dish. Adams & Westlake Company.

Fig. 1733—Spud and Coupling. D. M. Co.

Fig. 1733a—Tank Waste Cock. A. & W. Co.



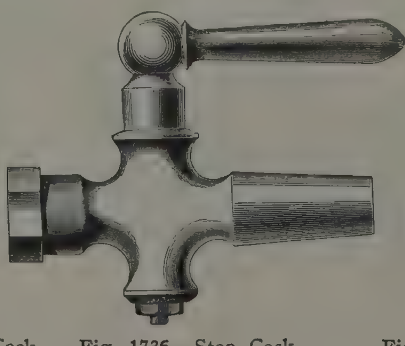


Fig. 1735—Zane's Self-Closing Bibb Cock. Fig. 1736.—Stop Cock. Dayton Manufacturing Company.

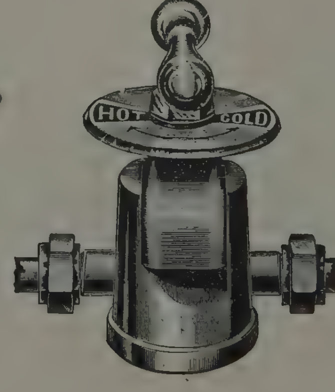


Fig. 1737—Combination Hot and Cold Water Faucets. A. & W. Co.

Fig. 1738—Toilet Rack. Adams & Westlake Company.

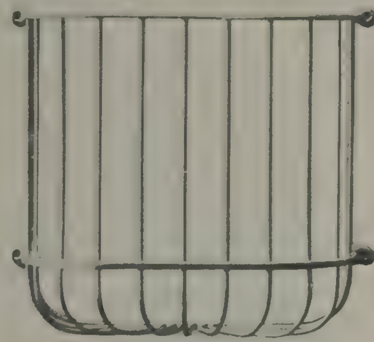


Fig. 1741—Rack for Soiled Towels. Jas. L. Howard & Company.

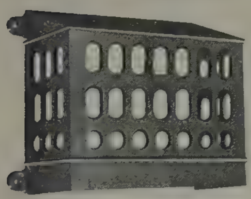


Fig. 1739—Rack for Used Cups. Dayton Manufacturing Company.

Fig. 1740—White Metal Drip Tray. Jas. L. Howard & Company.

Fig. 1742 — Rack for Used Cups. Dayton Manufacturing Company.

Fig. 1743—Comb and Brush Rack. Adams & Westlake Company.

Fig. 1744—Corner Toilet Rack. Adams & Westlake Company.

Parts of Washroom Pump, Fig. 1746.

A *Pump Body with Spout and Cylinder*
B *Nut for Attaching Body to Base*
C *Base*
D *Screws for Attaching Base to Slab*
E *Nuts for Attaching Base to Slab*
F *Lever*
G *Rosewood Handle*
H *Handle Nut*
I *Rocker Arm*
J *Rocker Arm Pivot Screw, Upper*
K *Rocker Arm Pivot Screw, Lower*
L *Piston Rod*
M *Piston Rod Pivot Screw*
N *Piston Rod Shock Absorber (Leather)*
O *Piston Rod Stuffing Box Nut*
P *Piston Rod Stuffing Box Collar*
Q *Piston and Valve*
R *Piston Packing (Leather)*
S *Plunger*
T *Cylinder Head with Valve*
U *Cylinder Head Washer (Leather)*
V *Suction Pipe, with Coupling Nut and Strainer*

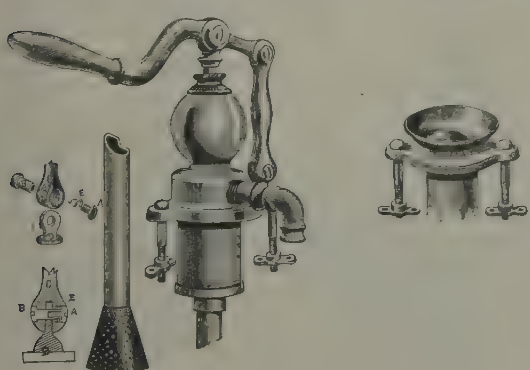


Fig. 1745—Washroom Pump and Soap Holder. Dayton Manufacturing Company.

Fig. 1746—Washroom Pump and Fittings. Jas. L. Howard & Company.

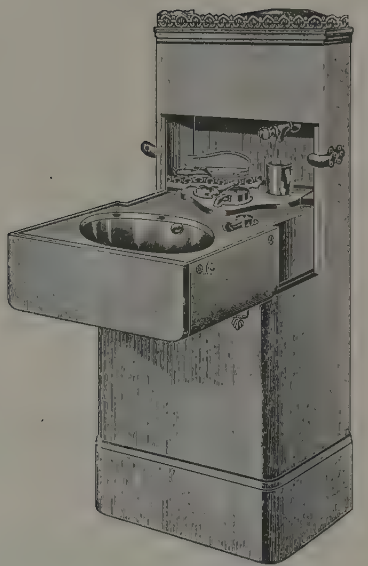


Fig. 1747—Folding Corner Lavatory. Dayton Manufacturing Company.

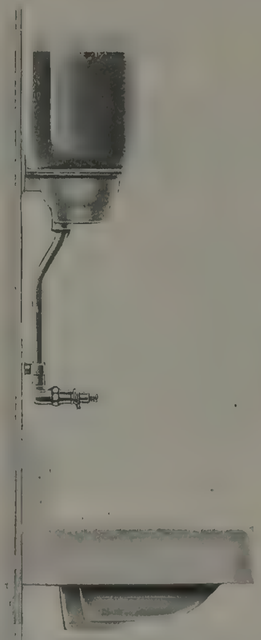


Fig. 1748—Gravity Liquid Soap Dispenser. Single or Multiple. The Watrous Company.

Fig. 1749—Towel Vendor. Individual Drinking Cup Company.

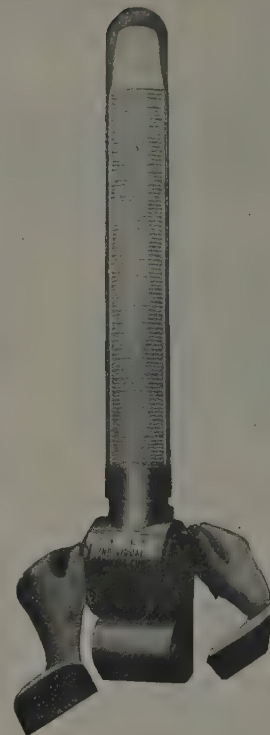


Fig. 1750—Drinking Cup Vendor. Individual Drinking Cup Company.

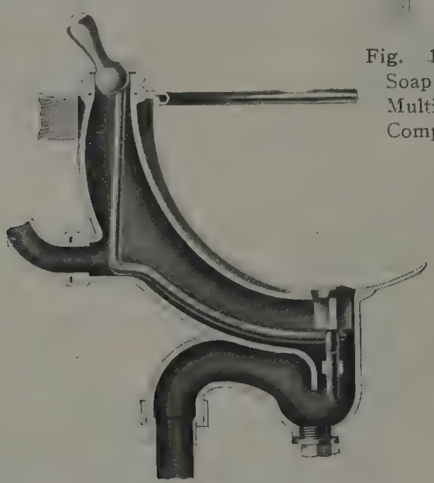


Fig. 1751—Section Through White Metal Lavatory Showing Tilting Lever Waste and Trap. The Watrous Company.

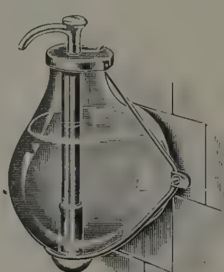


Fig. 1752—Watrous, Style M, Liquid Soap Fixture. The Watrous Company.

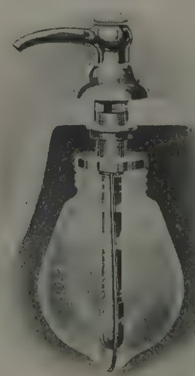


Fig. 1753—Watrous, Style V, Concealed Liquid Soap Fixture. The Watrous Company.

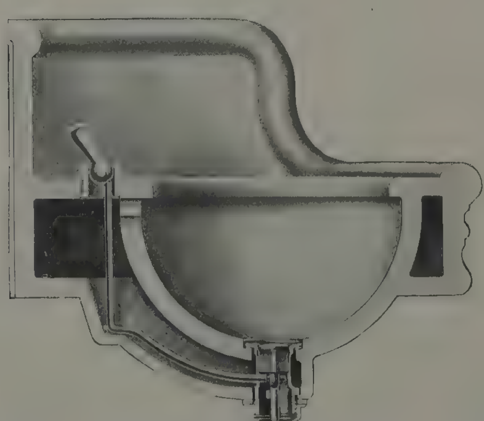


Fig. 1754—Section Through Vitreous Ware Lavatory Showing Waste Attachment. The Watrous Company.

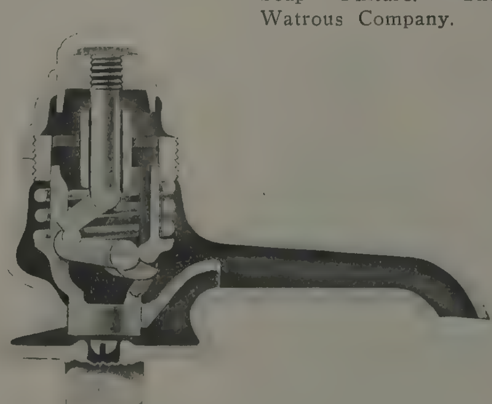


Fig. 1755—Section Through Push Button Faucet The Watrous Company.

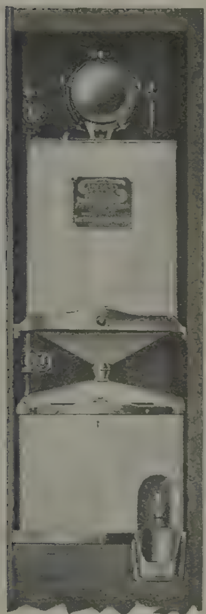


Fig. 1756—North Pole Sanitary Drinking Fountain. Type 15-A-625. Henry Giessel Company.

Fig. 1757—Folding Lavatory. Adams & Westlake Company.

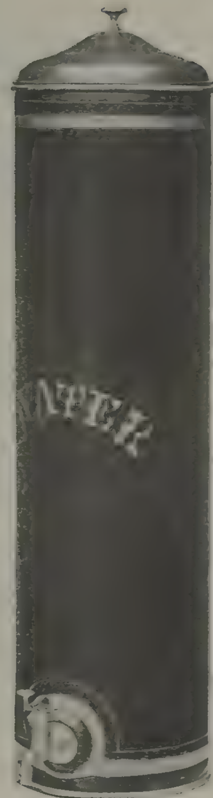


Fig. 1758 — Passenger Coach Water Cooler with Self-Closing Faucet. Peter Gray & Sons.

Fig. 1758 A —Finback Junior Cabinet for Drinking Cups. Peter Gray & Sons.

Fig. 1760 — Drip Pan for Water Cooler. Peter Gray & Sons.

Fig. 1759 — No. 2 Standard Dining Car Filter. Henry Giessel Company.

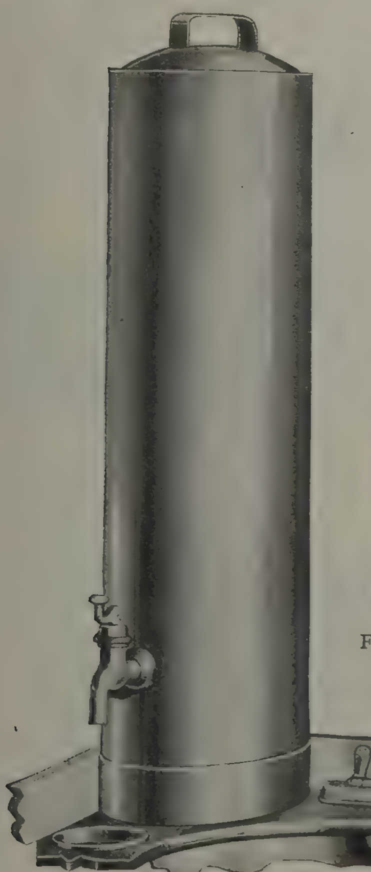


Fig. 1761—Water Cooler and Lavatory Faucets. Adams & Westlake Company.

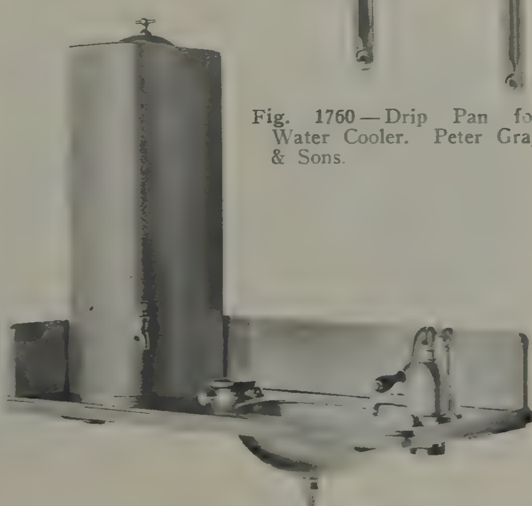


Fig. 1762—White Metal Washstand with Pump and Water Cooler. James L. Howard & Company.

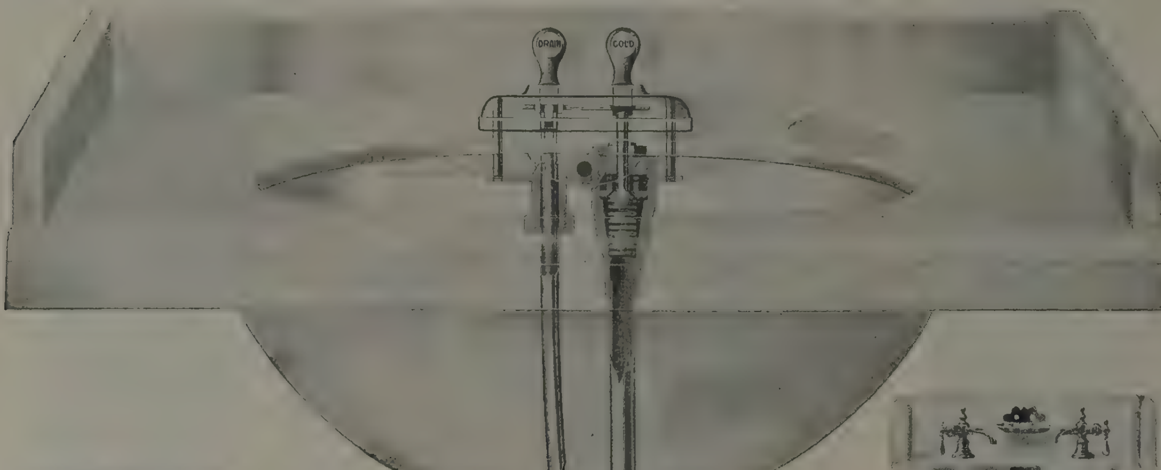


Fig. 1764—Lavatory and Faucets. Adams & Westlake Company.

Fig. 1763—Postal Car Corner Washstand. Railway Supply & Curtain Company.

Fig. 1765—Postal Car Flat Back Washstand. Railway Supply & Curtain Company.

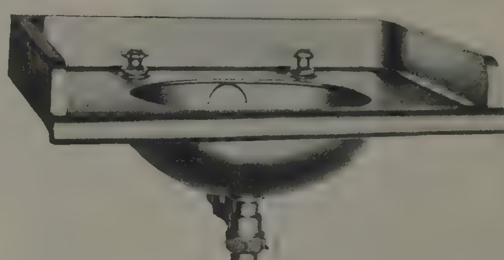


Fig. 1766—White Metal Washstand for Pressure System. Cold Water Only. James L. Howard & Co.

Fig. 1767—Dental Lavatory. Dayton Manufacturing Company.

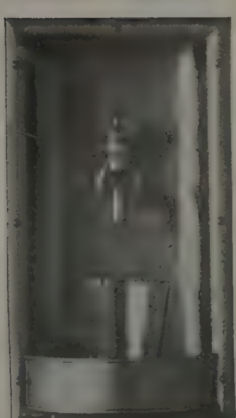


Fig. 1768—Water Alcove. Jas. L. Howard & Company.

Fig. 1769—Vitreous Ware Dental Lavatory. The Watrous Company.

Fig. 1770—Folding Wash Basin. Dayton Manufacturing Company.

Fig. 1771—Double White Metal Lavatory.

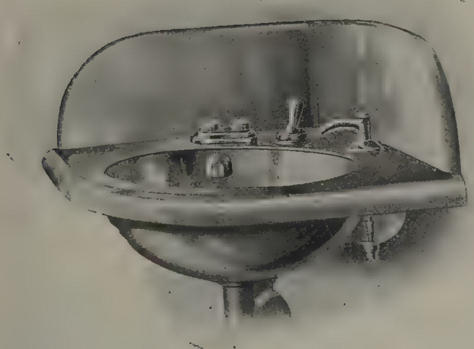


Fig. 1772—White Metal Corner Lavatory.

Fig. 1773—Vitreous Ware Corner Lavatory.

Fig. 1774—Vitreous Ware Lavatory.

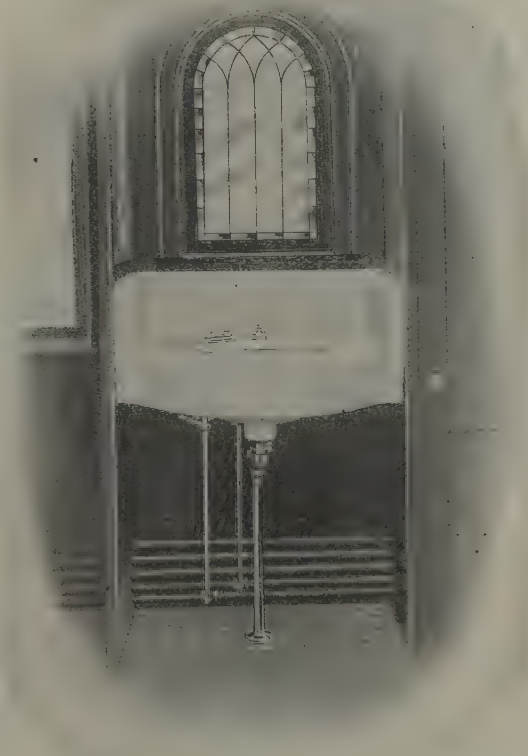


Fig. 1775—Vitreous Ware Recess Lavatory.

The Watrous Company.

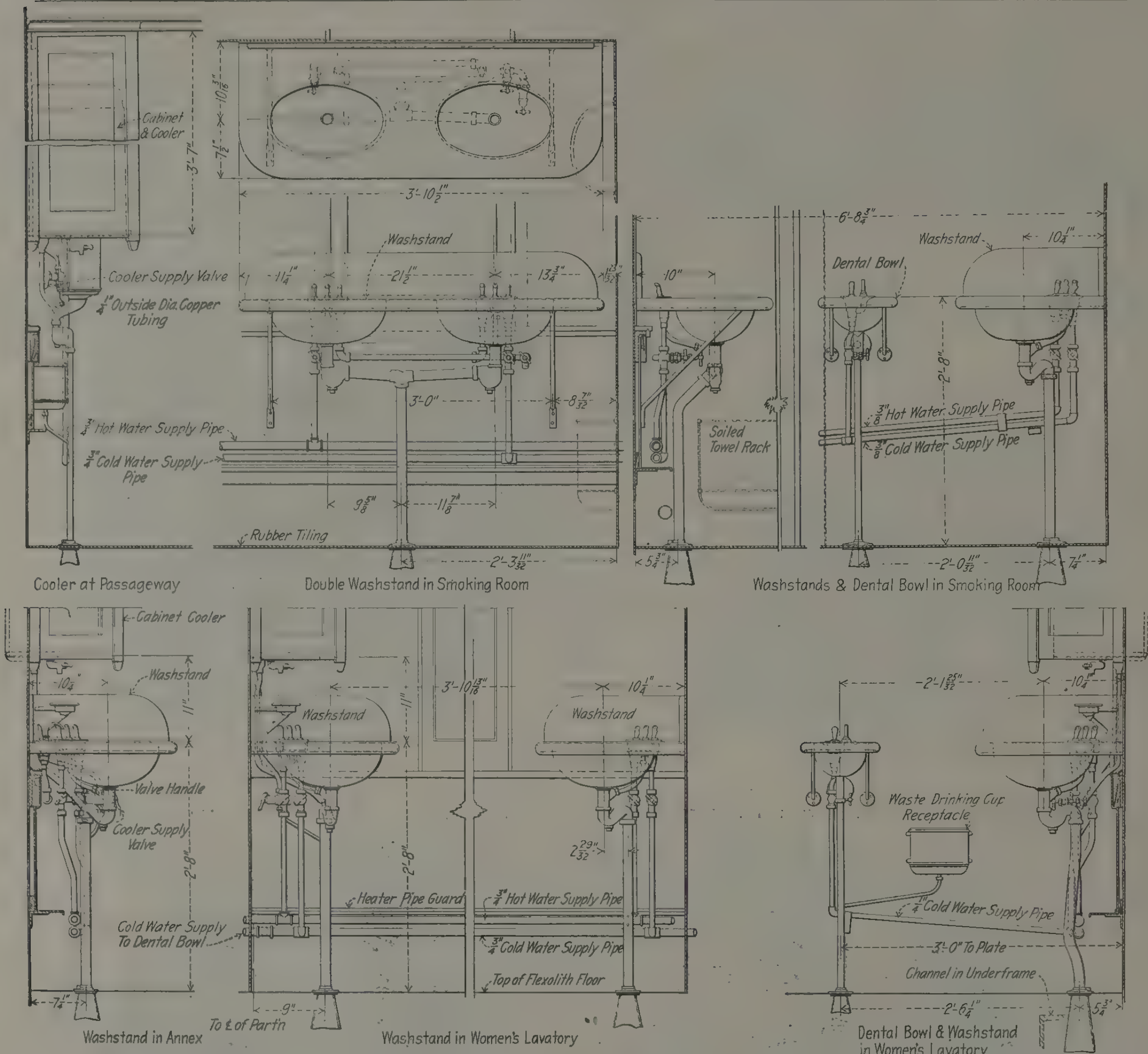


Fig. 1776—Arrangement of Washstands, Dental Bowls and Coolers. The Pullman Company.

Fig. 1777—Tilting Lever Type Waste Valve. The Dayton Manufacturing Company.

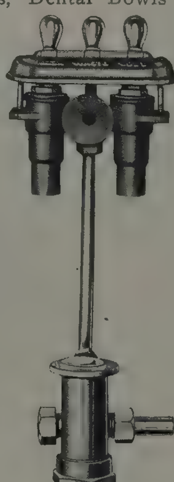


Fig. 1778—Combination Tilting Lever, Hot and Cold Basin Cock and Waste Valve. The Dayton Manufacturing Company.

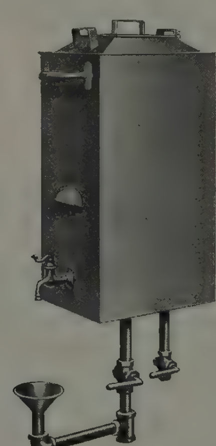


Fig. 1779—Galvanized Iron Compartment Water Cooler for U. S. Postal Cars. The Dayton Manufacturing Company.

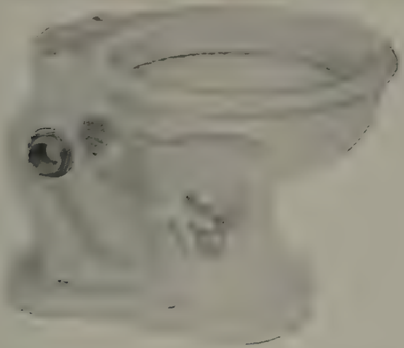


Fig. 1780—Duojet Closet, Showing Arrangement of Jets. The Watrous Company.

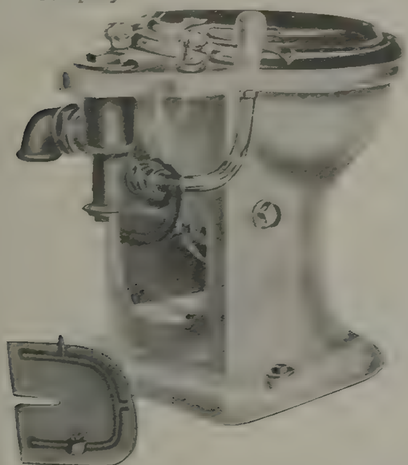


Fig. 1781—Americo Car Closet. The Watrous Company.

Fig. 1782—Watometer for Flushing Closets. The Watrous Company.

Fig. 1783—Atlas Combination Dry Closet, Hopper and Urinal with Seat-Raising Device. Railway Supply & Curtain Company.

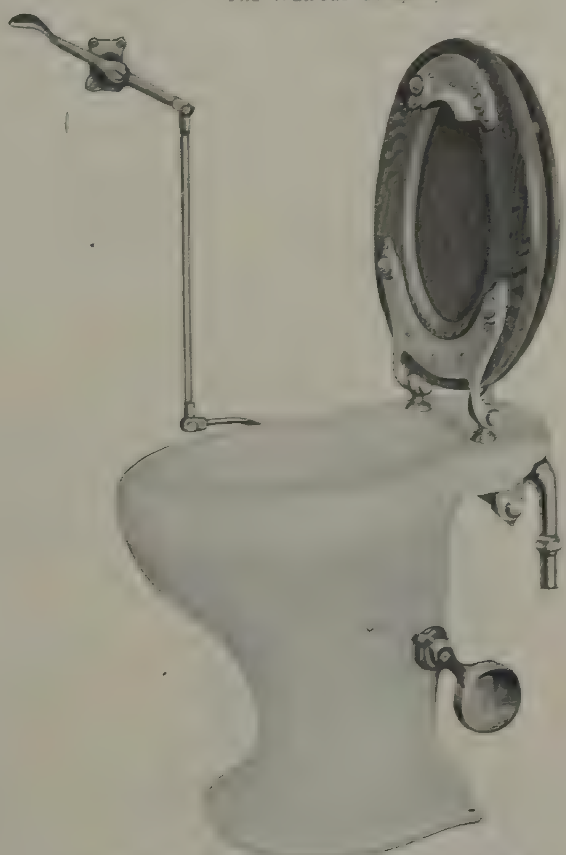


Fig. 1784—Duner Closet with Side Wall Pull Duner Company.

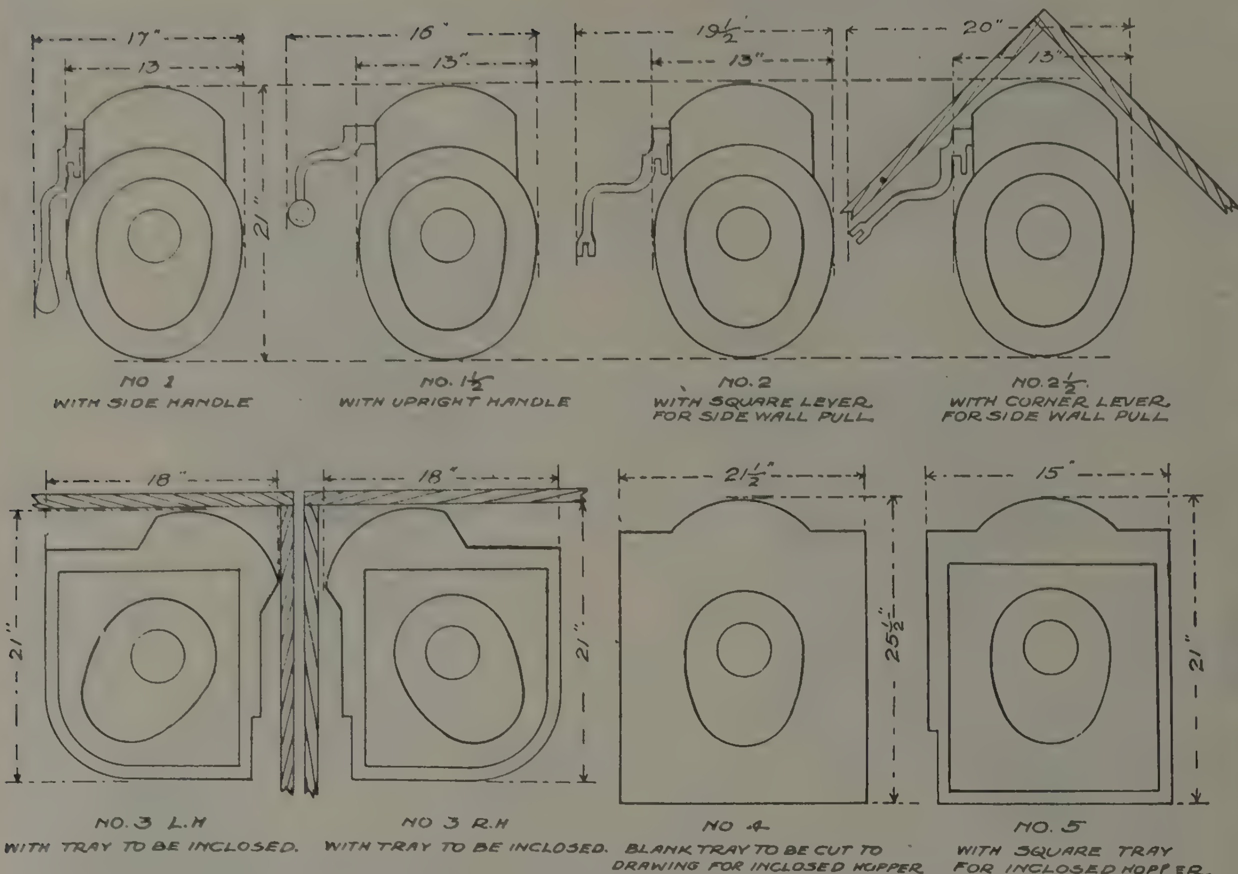


Fig. 1785—Types and Dimensions of Duner Car Closets.

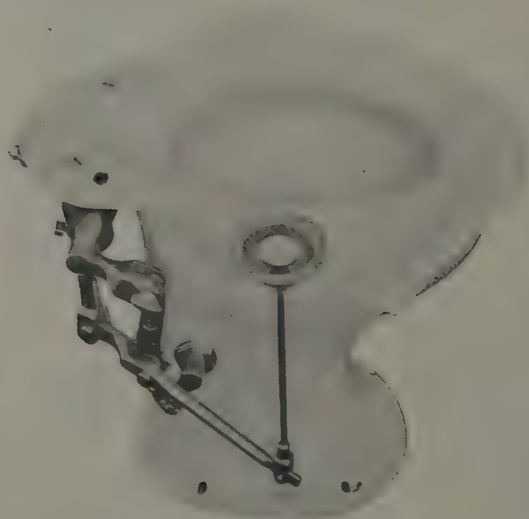


Fig. 1786—Duner Enameled Iron Corner Closet No. 3 with Tray to be Inclosed.

Fig. 1787—Duner Combined Flush and Dry Closet with Side Handle.

Duner Company.

Apron and Lid Partly Raised.

Apron and Lid Raised.

Fig. 1788—Protection Dry Closet. Adams & Westlake Company.

Fig. 1789—Americo Closet with Operating Lever on Side Wall. The Watrous Company.

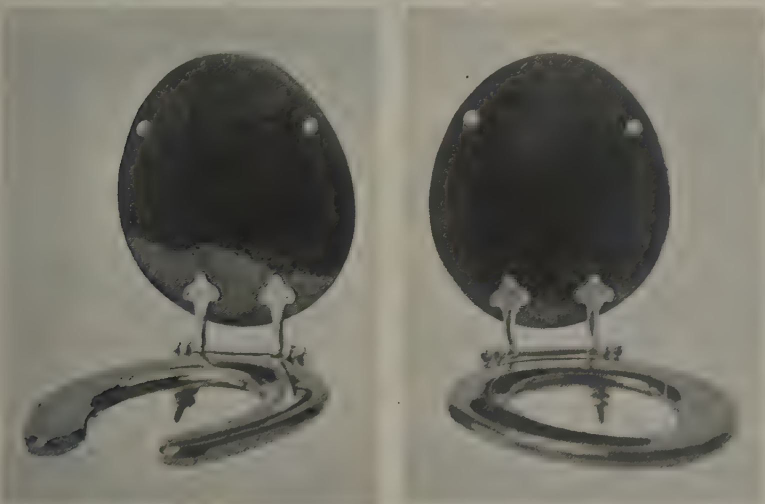


Fig. 1790—Non-Breakable Hopper Seats. Open and Closed Front. Sherburne & Company.

Fig. 1791—Eckert Closet with Side-Wall Valve. The Dayton Manufacturing Company.

Fig. 1792—Special Dry Hopper. Sherburne & Company.

Fig. 1793—Enameled Iron Hopper with Seat Raising Attachment. Jas. L. Howard & Company.

Fig. 1794—No. 32 Hopper. Adams & Westlake Company.

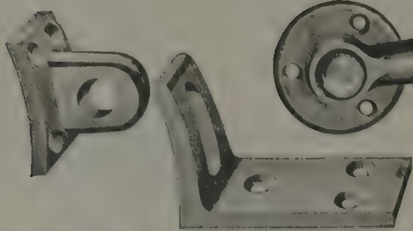


Fig. 1795—Sliding Door Hasp and Staple for Mail Car.

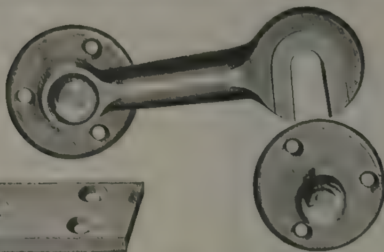


Fig. 1796—Sliding Door Hook and Button for Baggage Car.

Adams & Westlake Company.

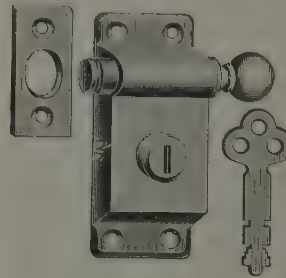


Fig. 1797—Rim Sash Lock. Russell & Erwin Manufacturing Company.

Fig. 1798—Cupboard Catches and Bolts. Adams & Westlake Company.

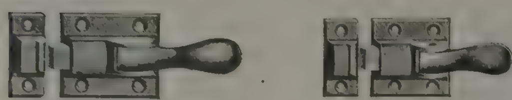


Fig. 1799—Refrigerator Catches. Russell & Erwin Manufacturing Company.

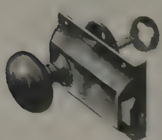


Fig. 1800—Baggage Car Door Latch.

Fig. 1801—Cabin Door Hook and Button.

Adams & Westlake Company.

Fig. 1802 Door Top and Bottom Latch. James L. Howard & Company.

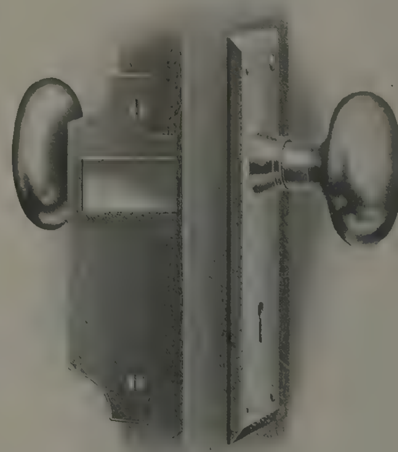


Fig. 1803—Rim Knob Lock. Russell & Erwin Manufacturing Company.

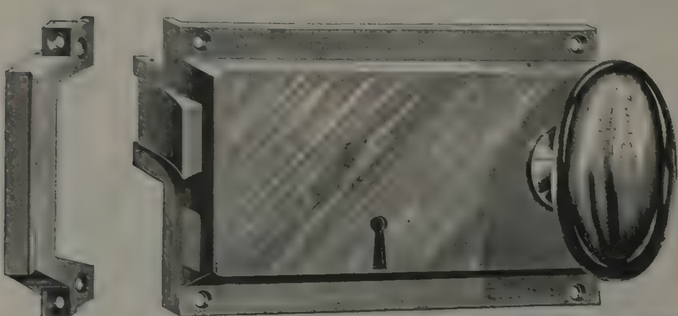


Fig. 1804—End Door Lock. Dayton Manufacturing Company.

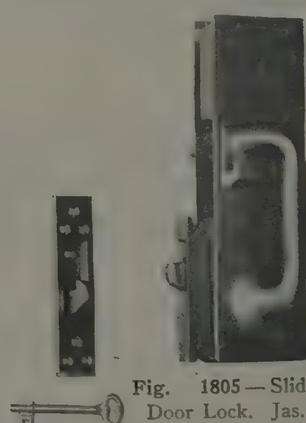


Fig. 1805—Sliding Door Lock. Jas. L. Howard & Company.

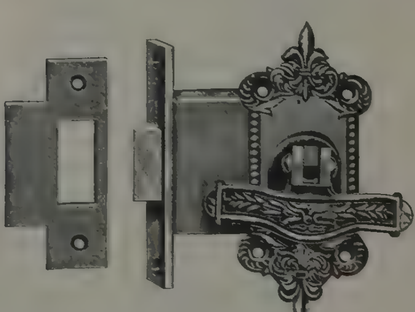


Fig. 1806—Vestibule Door Mortise Latch. Dayton Manufacturing Company.

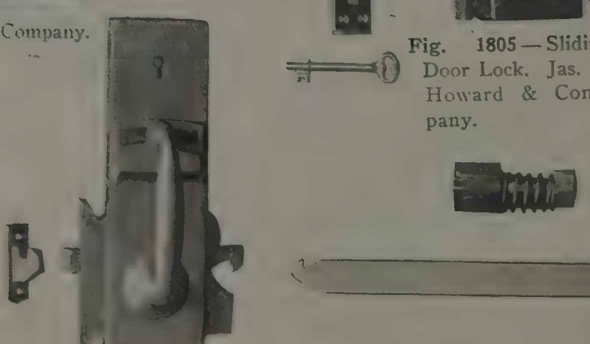
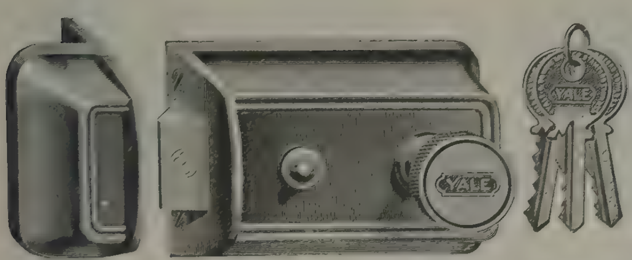
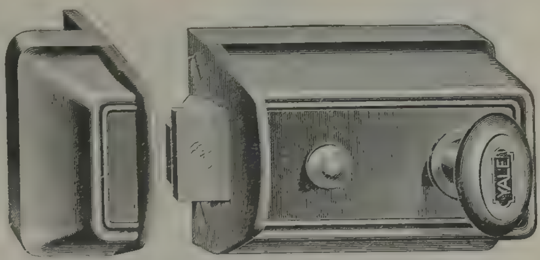


Fig. 1807—Sliding Door Lock Which Latches Door Either Open or Closed. Jas. L. Howard & Company.



No. 42 Rim Night Latch.



No. 44 Rim Night Latch.

Fig. 1808—Rim Night Latches, Cylinder and Keys.

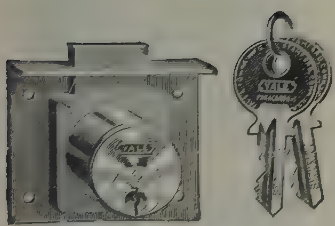


Fig. 1809—No. 563 Drawer Lock.

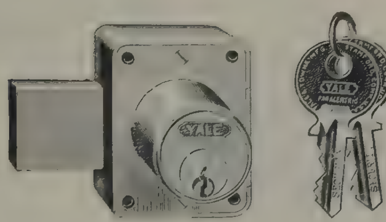


Fig. 1810—No. 611 Locker Lock.

Fig. 1811—No. 850 Padlock.

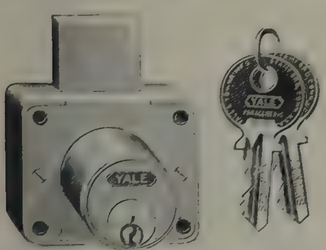


Fig. 1812—No. 519 Drawer Lock.

Fig. 1813—No. 823 Padlock.

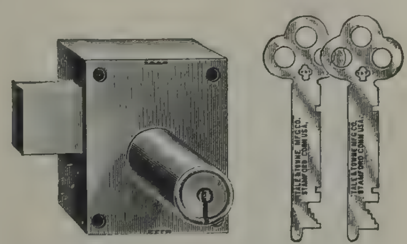


Fig. 1814—No. W120 Locker Lock.

Fig. 1815—No. 830 Padlock

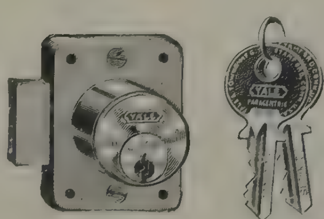


Fig. 1816—No. 511 Wardrobe Lock.

Fig. 1817—No. 563 Padlock.

Yale & Towne Manufacturing Company.

Fig. 1818—Square Door Bolt and Keeper.

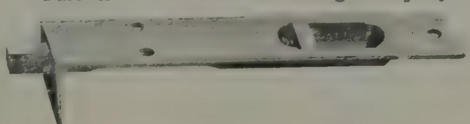


Fig. 1819—Flush Door Bolt.

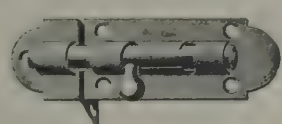


Fig. 1820—Barrel Door Bolt with Bent Staple Plate.

Adams & Westlake Company.

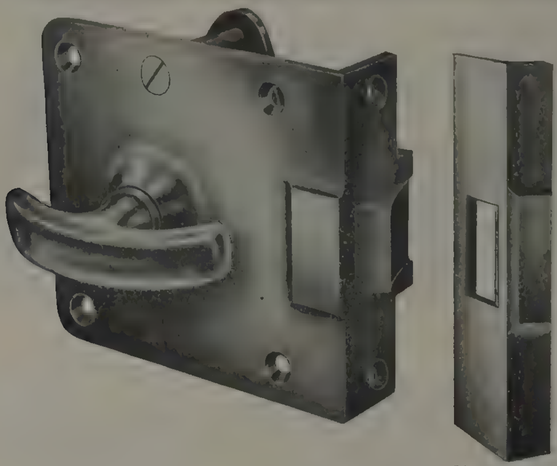


Fig. 1821—No. 696 Vestibule Door Latch and Keeper.

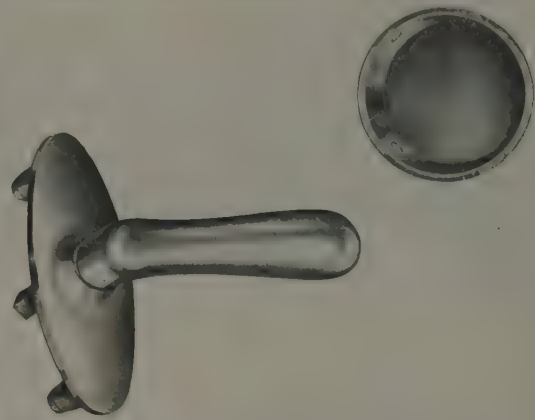


Fig. 1822—Handle and Flush Handle Receiver for No. 696 Vestibule Door Latch.

Dayton Manufacturing Company.

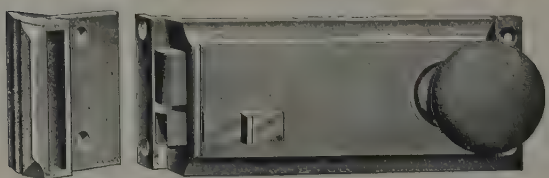


Fig. 1823—Extra Long Saloon Door Lock and Keeper. Adams & Westlake Company.

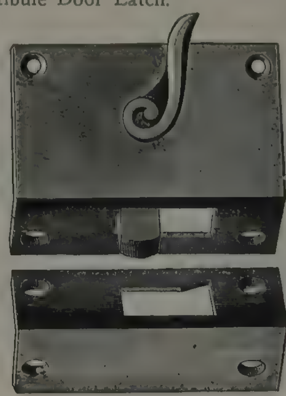


Fig. 1824—Vestibule Door Bolt. Adams & Westlake Company.

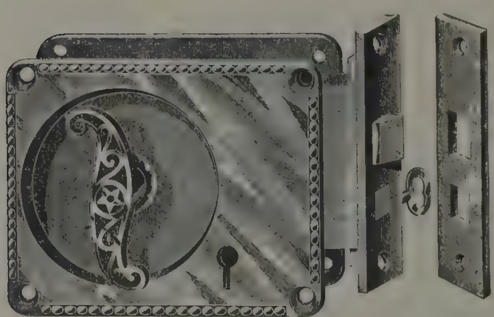


Fig. 1825—Double Flush Handle Saloon Door Mortise Lock. Dayton Manufacturing Company.

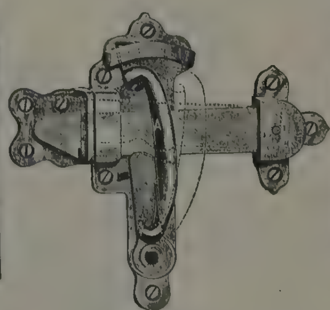


Fig. 1826—Sliding Door Latch. Dayton Manufacturing Company.

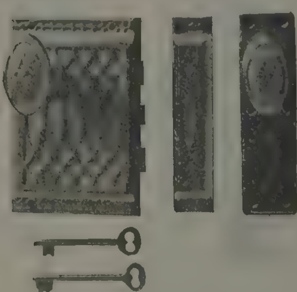


Fig. 1827—Two-Bolt Lock and Details. Jas. L. Howard & Company.

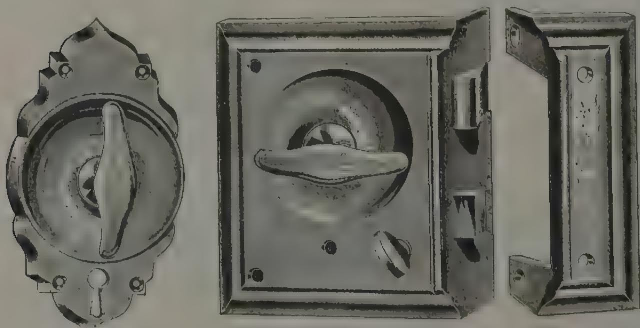


Fig. 1828—Double Flush Handle Saloon Door Lock and Keeper.

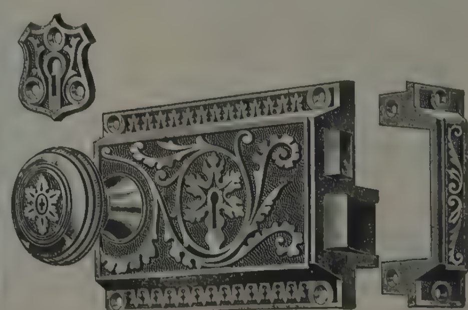


Fig. 1829—End Door Lock, Keeper and Escutcheon.

Adams & Westlake Company.

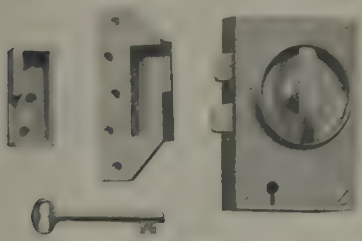


Fig. 1830 Motorman's Cab Door Lock No. 48. Jas. L. Howard & Company.

Fig. 1831 — Sliding Door Latch.

Fig. 1832—Sliding Door Mortise Latch.

Dayton Manufacturing Company.

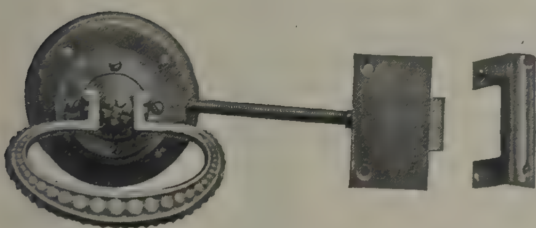


Fig. 1833—Vestibule Door Latch and Keeper.

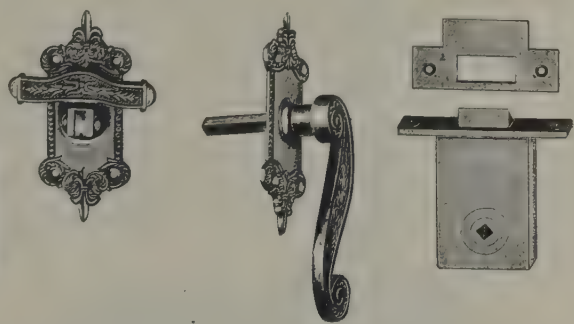


Fig. 1834—Platform Vestibule Door Latch, Handles and Keeper.

Adams & Westlake Company.

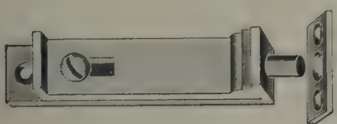


Fig. 1835—Cupboard Bolt, Russell & Erwin Manufacturing Company.

Fig. 1836—Cupboard Bolt. Russell & Erwin Manufacturing Company.

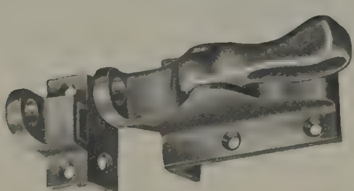


Fig. 1837—Refrigerator Door Latch. Dayton Manufacturing Company.

Fig. 1838 — Vestibule Door Mortise Latch. Dayton Manufacturing Company.

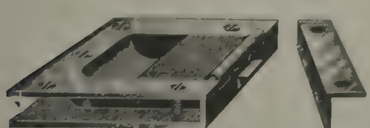


Fig. 1839—Vestibule Trap Door Latch and Pull. Dayton Manufacturing Company.

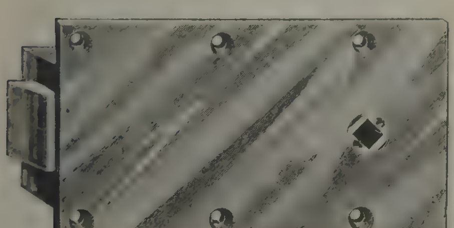


Fig. 1840—Vestibule Trap Door Latch. Dayton Manufacturing Company.

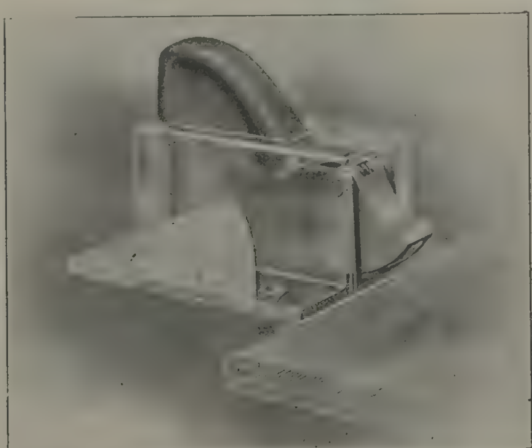


Fig. 1841—Tuco K-1 Kicker Lock for Vestibule Trap Door. Tuco Products Corporation.

Fig. 1842—Edwards, Design K, Trap Door Lock.

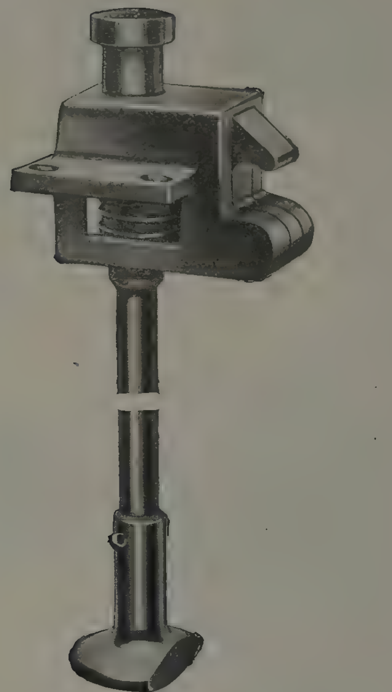


Fig. 1843—Edwards, Design B, Trap Door Lock.

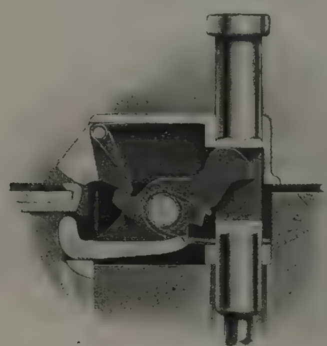


Fig. 1845—Section of Design H, Trap Door Lock, in Normal Position, With Door Locker Down.

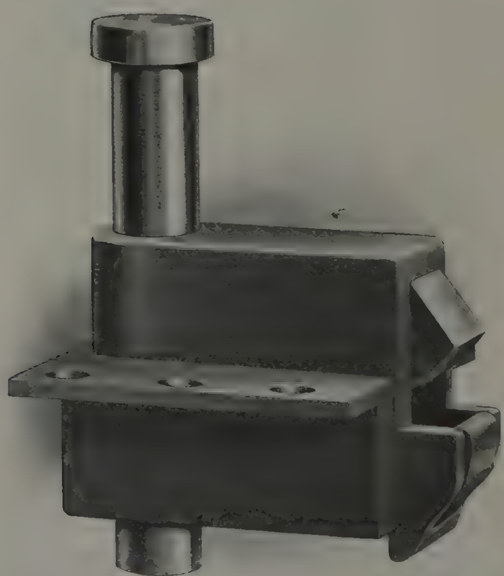


Fig. 1844—Edwards, Design H, Trap Door Lock.

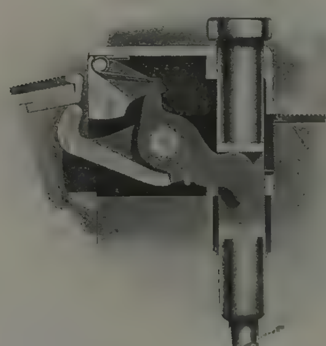


Fig. 1846—Section of Design H, Trap Door Lock, With Latch Releaser and Starting Device Forcing Door Open.

O. M. Edwards Company.

Fig. 1847—Rex Rod Basket Rack and Removable Bottom.

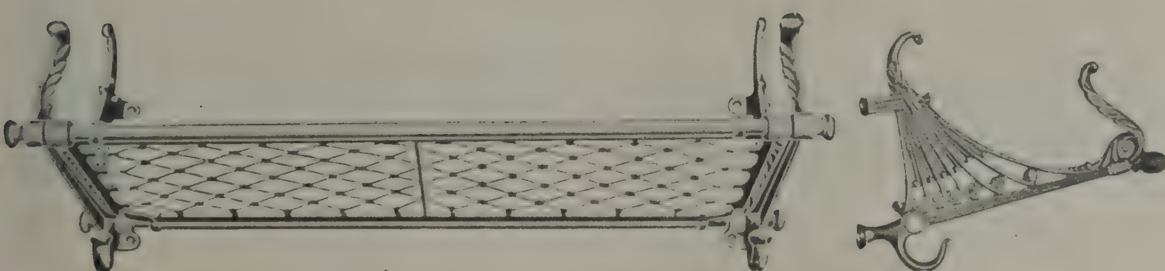


Fig. 1848—Rex Wire Cord Basket Rack with Removable Bottom. Length of Section, 36 in.; Width, 12½ in.

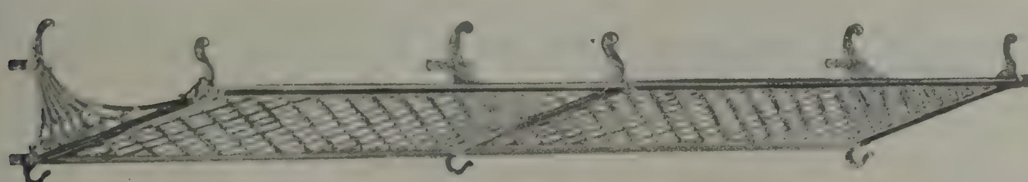


Fig. 1849—Cast Basket Rack with Fixed Bottom.

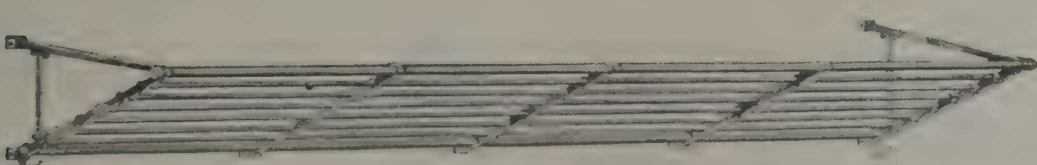


Fig. 1850—Rod Basket Rack. Length, 48½ in.; Width, 12½ in.

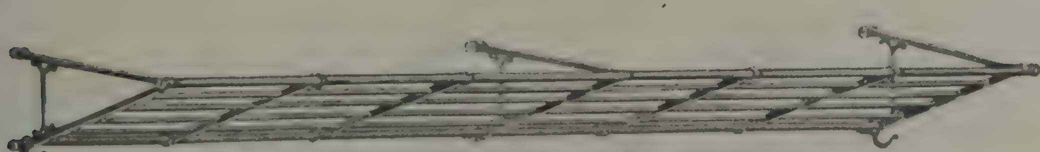


Fig. 1851—Rod Basket Rack. Length, 48 in.; Width, 11 in.

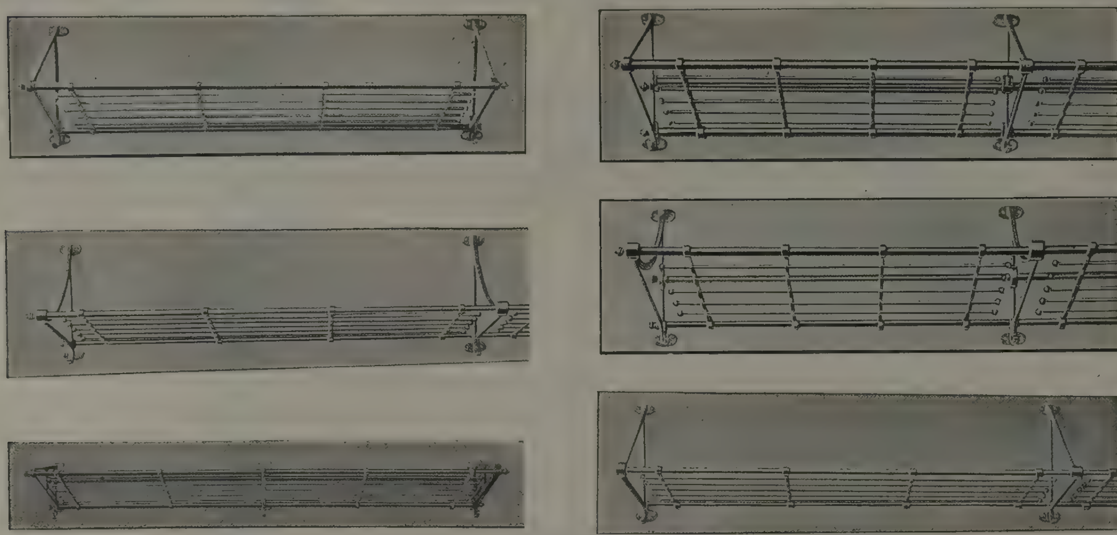


Fig. 1852—Removable Bottom Basket Racks. Adams & Westlake Company.

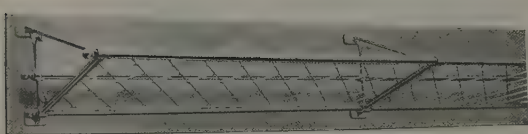


Fig. 1853—Continuous, Removable Bottom Baggage Rack No. 5. Jas. L. Howard & Company.

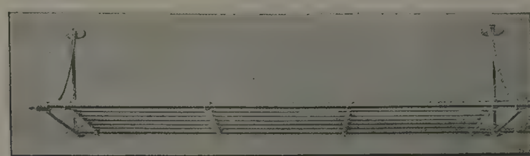


Fig. 1854—Removable Bottom Basket Rack. Adams & Westlake Company.

Fig. 1855—Continuous Baggage Rack No. 61. Jas. L. Howard & Company.

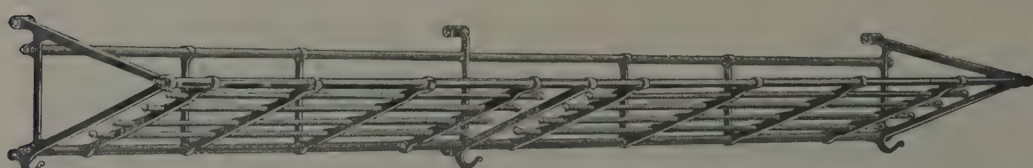


Fig. 1856—Rod Basket Rack with Fixed Bottom and Back Rod. Length, 62 in.; Width, 12¾ in. Dayton Manufacturing Company.

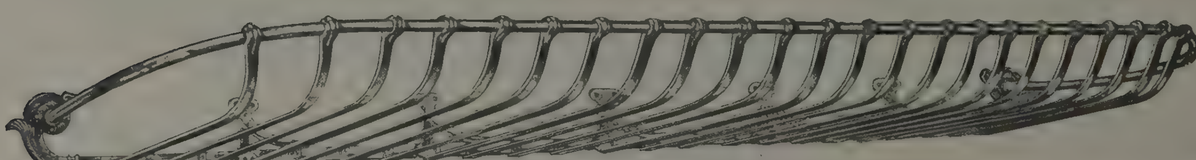


Fig. 1857—Basket Rack No. 184 for Flat Surface. Dayton Manufacturing Company.

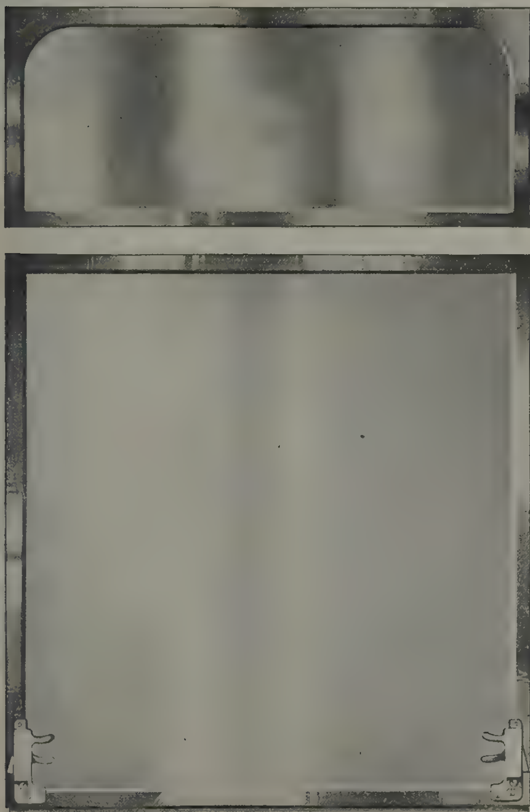


Fig. 1858—Beadless Type of Brass Sash with Narrow Rail.

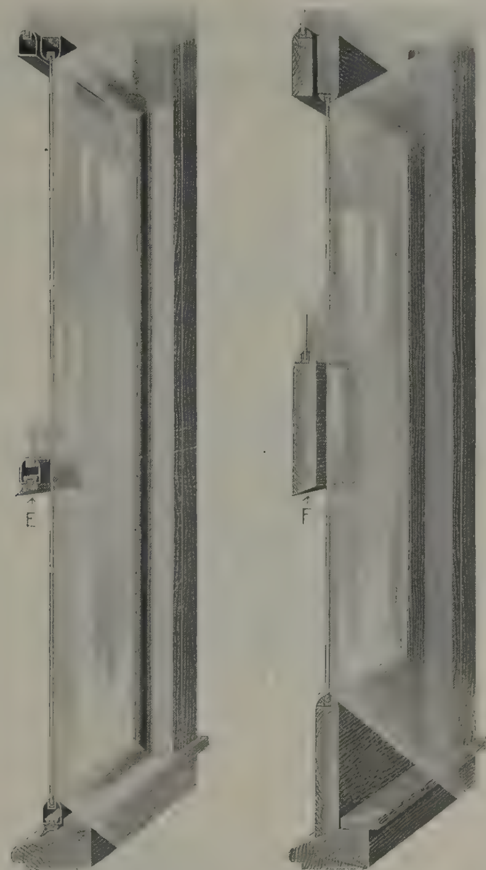


Fig. 1859—Forsyth "Indestructible" Narrow Rail Brass Sash and Bottom Cushion Weather Stripping.

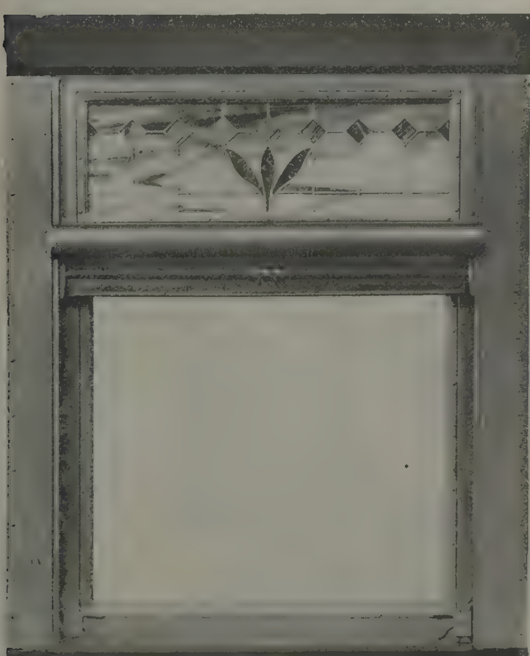


Fig. 1860—Brass Sash for Wooden or Steel Passenger Train Cars.

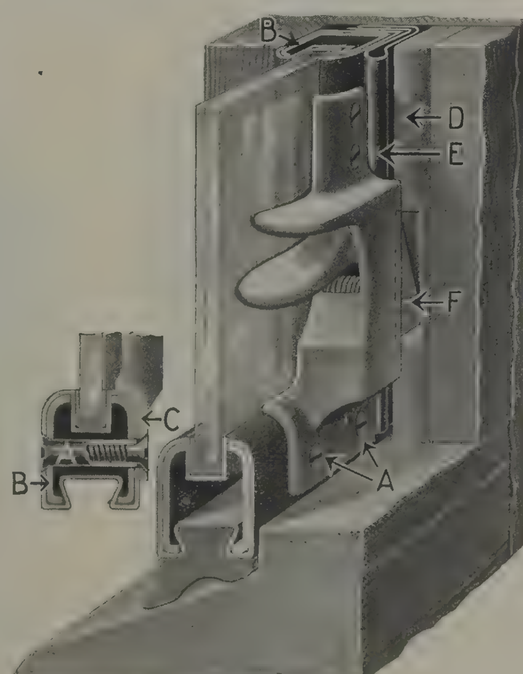


Fig. 1861—Forsyth "Substantial" Sash Locks for Wood and Brass Sash.

Forsyth Brothers Company.

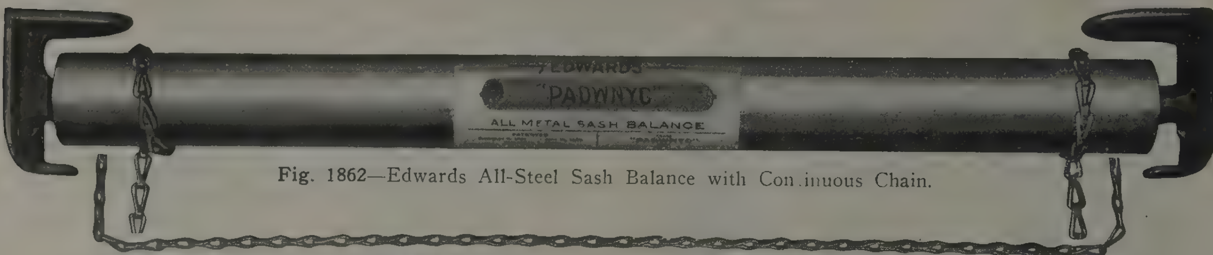


Fig. 1862—Edwards All-Steel Sash Balance with Con.inuous Chain.

Fig. 1863—Edwards No. 13 Sash Lock with Phantom View of Stop Bar in Wood Stop Casing.

Fig. 1864—Edwards No. 13 Flush Extension Sash Lock with Phantom View of Detents in Steel Stop Casing.

Fig. 1865—Sash Lock No. 13 and Stop Bar.

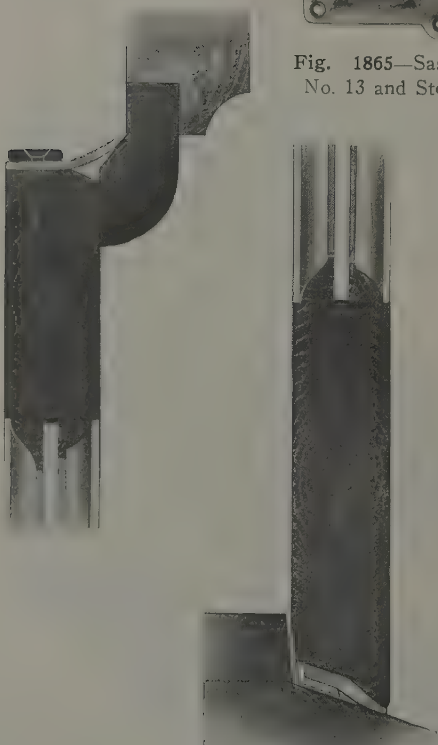


Fig. 1866—Edwards Top and Bottom Weather Stripping, Top Rubber Reinforced with Spring Brass Strip.

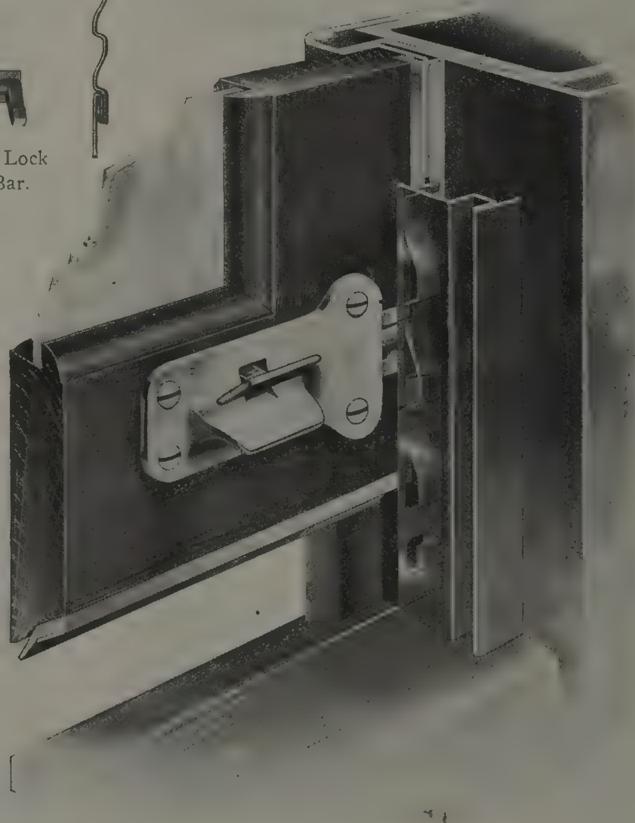


Fig. 1867—Edwards No. 13 Lock with Metal Stop Casing and Side and Bottom Weather Stripping Used on Steel Cars.

O. M. Edwards Company, Incorporated.

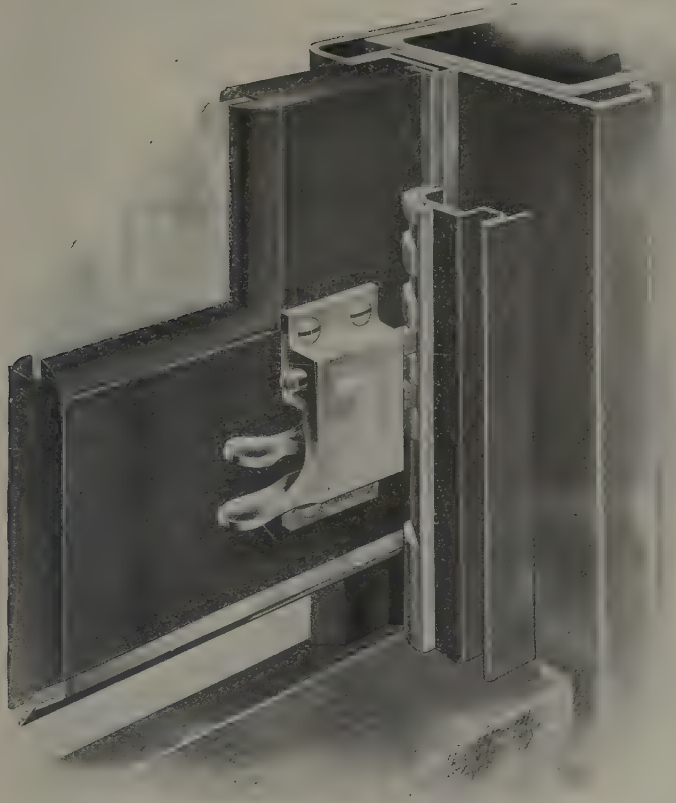


Fig. 1868—Edwards No. 7 Lock and Brass Bar with Metal Stop Casing and Side and Bottom Weather Stripping, Used on Steel Cars, Unbalanced Sash.

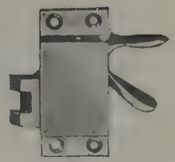


Fig. 1869—No. 7 Wedge Lock and Bar

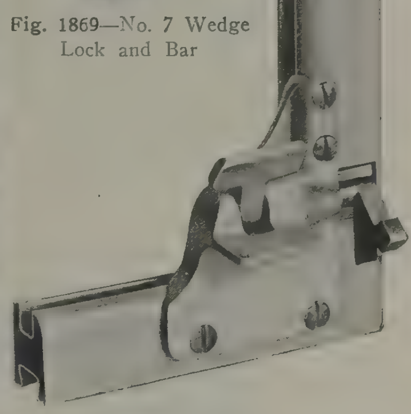


Fig. 1870—Edwards No. 13 Sash Lock applied to Metal Sash.

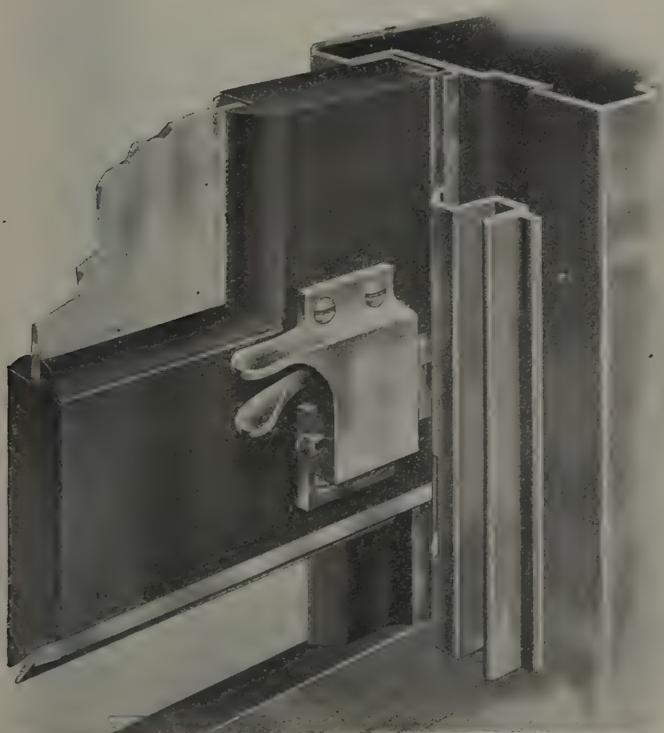


Fig. 1871—Edwards No. 7 Lock and Extended Brass Stop Casing and Curtain Guide with Side and Bottom Weather Stripping, Used on Steel Cars with Balanced Sash.

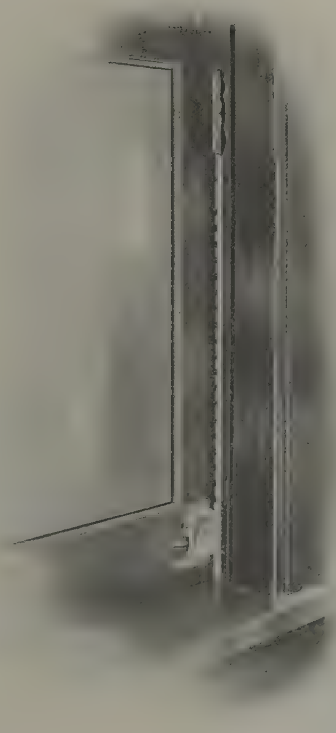


Fig. 1872—Edwards No. 7 Wedge Lock and Stop Bar, with Stop Casing Broken Away to Show Anti-Rattling Device.

Fig. 1873—Meeting Rail Construction Duplex Weatherproof Window.

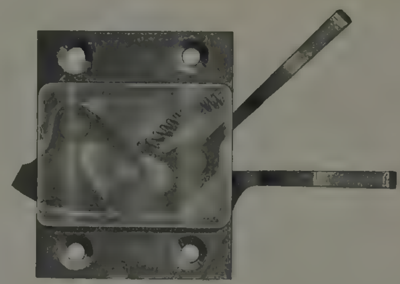


Fig. 1874—Acme Type C Sash Lock for Application to the Base of the Sash.

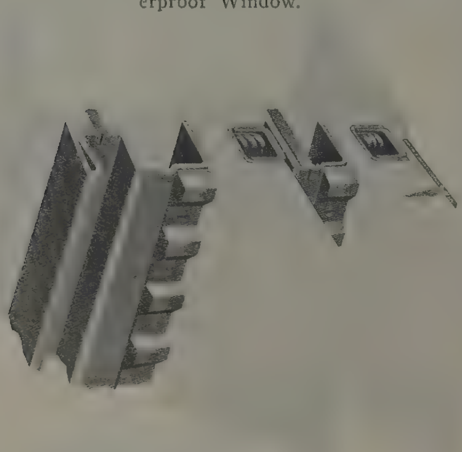


Fig. 1875—Cross Section of Duplex Weatherproof Window for Double Sash.

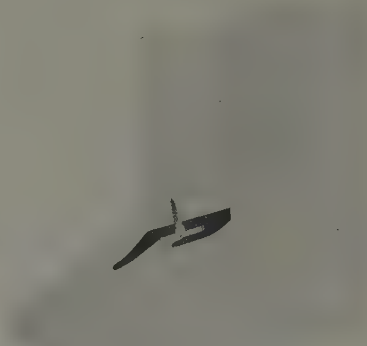


Fig. 1876—Sill Construction of Duplex Weatherproof Window.

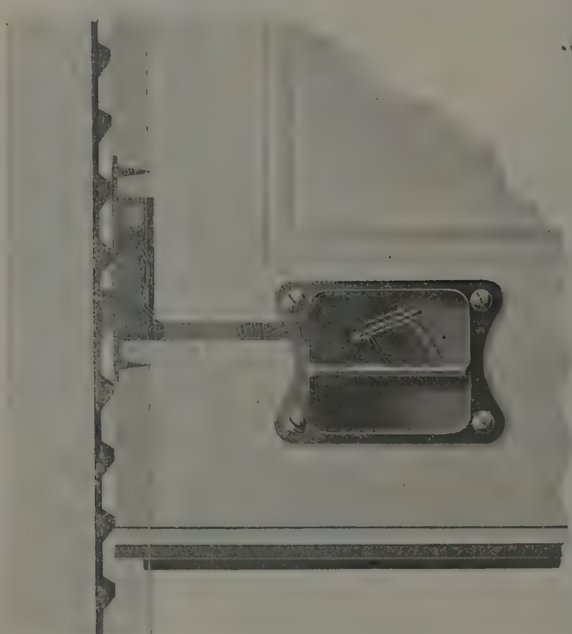


Fig. 1877—Acme Flush Lock No. 3, Applied to Sash.

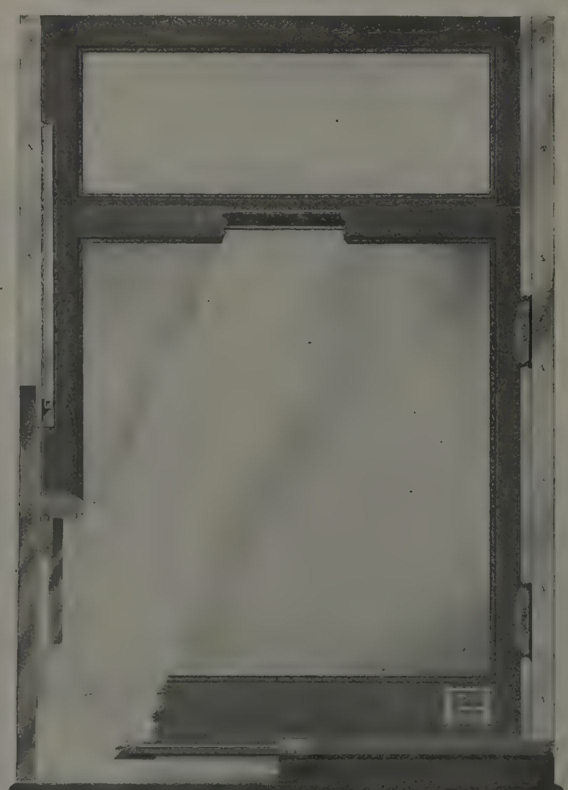


Fig. 1878—Duplex Weatherproof Window, Showing Arrangement of Side Compression Springs and No. 3 Flush Lock.

Dunbar Manufacturing Company.

Fig. 1879—Regal Revolving Shade Box, Type B, Open, With Curtain Roller Exposed, from Inside of Car.

Fig. 1880—Regal Revolving Shade Box, Type B, in Cross Section, from Outside of Car with Side of Car Cut Away to Show Curtain Roller and Bracket in Position, Shield Closed.

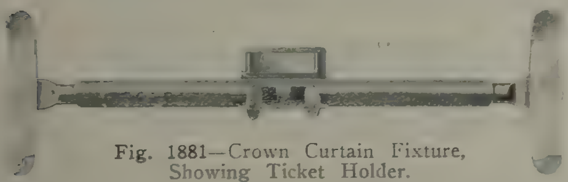


Fig. 1881—Crown Curtain Fixture, Showing Ticket Holder.

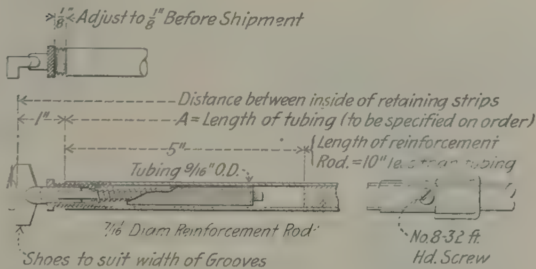


Fig. 1882—Acme Enclosed Groove Curtain Fixture.

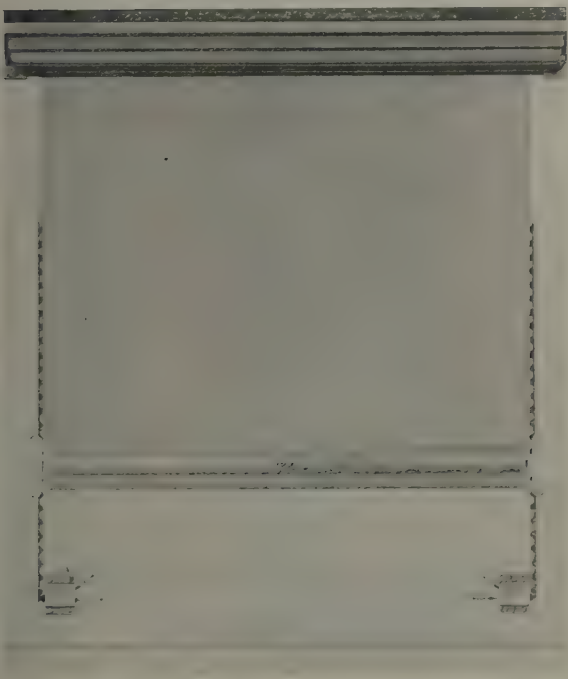


Fig. 1883—Regal Revolving Shade Box, Type B, in Position on Window with Crown Curtain Fixture. Acme Type C Sash Locks and Racks.

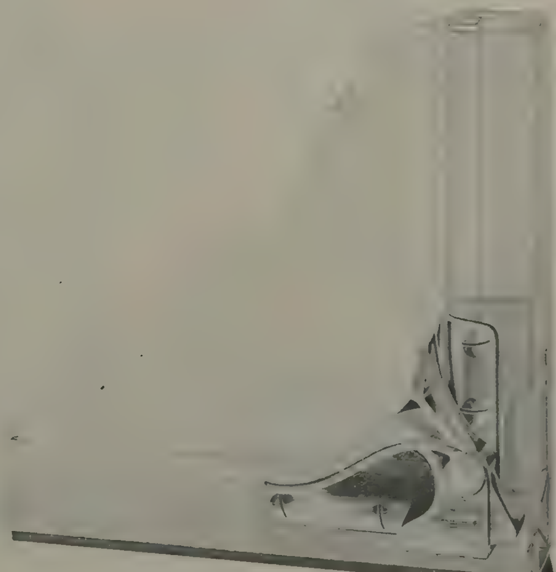


Fig. 1884—Corner of Acme Brass Sash, Showing Reinforcement and Lock.

Dunbar Manufacturing Company.

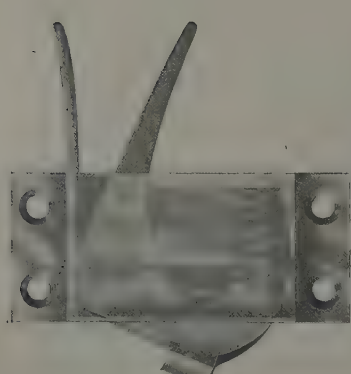


Fig. 1885—Detail Construction of National Wedge Lock.

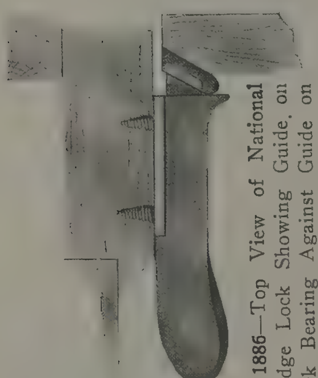


Fig. 1886—Top View of National Wedge Lock Showing Guide, on Lock Bearing Against Guide on Stop-Bar.

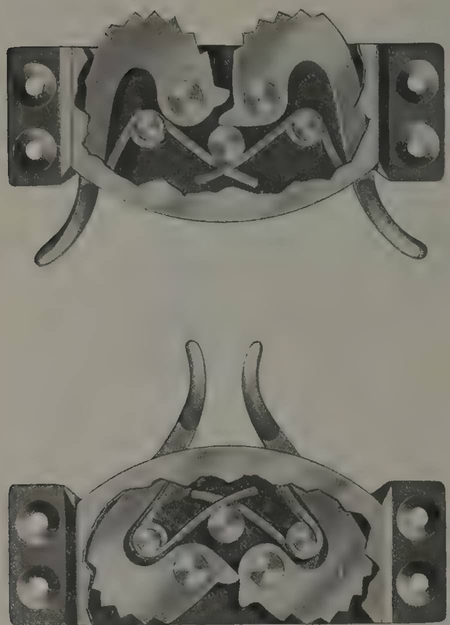


Fig. 1887—Double Cam Sash Lock.

Fig. 1888—National Wedge Lock and Compression Cams Applied to Sash.

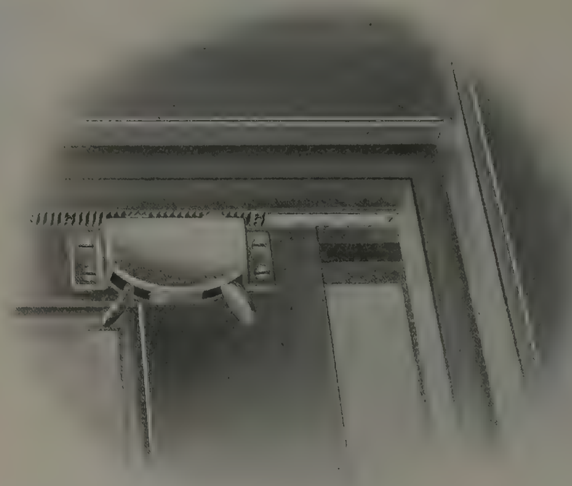


Fig. 1889—Double Cam Sash Lock Applied to Sash.

National Lock Washer Company.

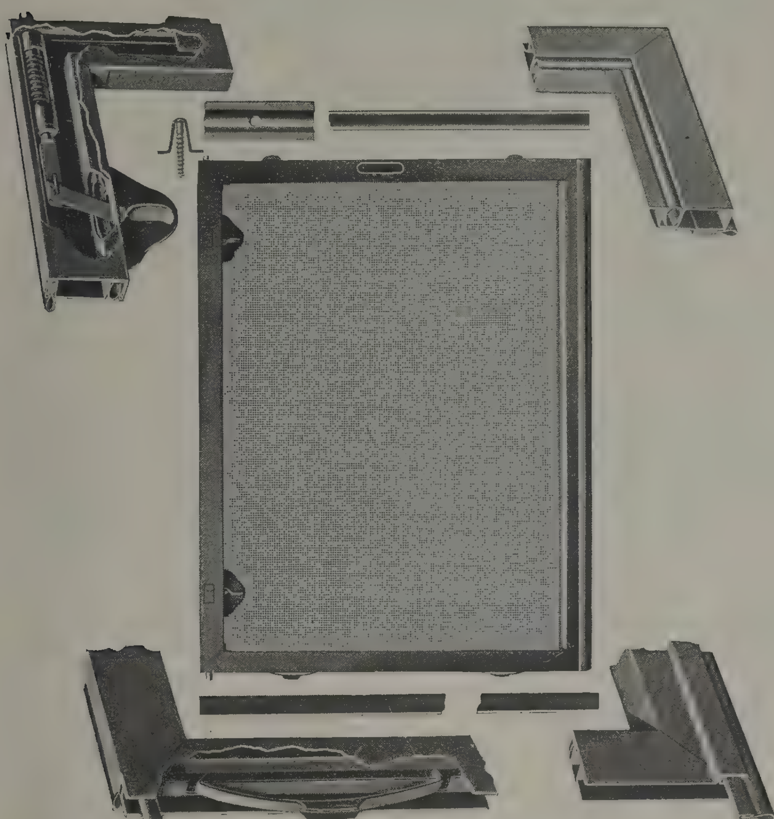


Fig. 1891—Universal Car Window Screen. Tuco Products Corporation.

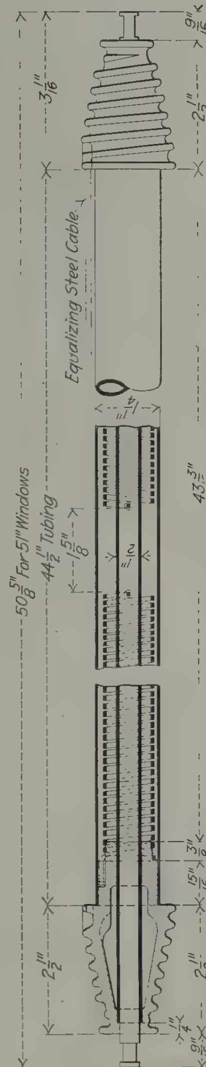


Fig. 1893—Reliance Sash Balance. Tuco Products Corporation.

Fig. 1890—Sash Balance, Straight Chain. National Lock Washer Company.

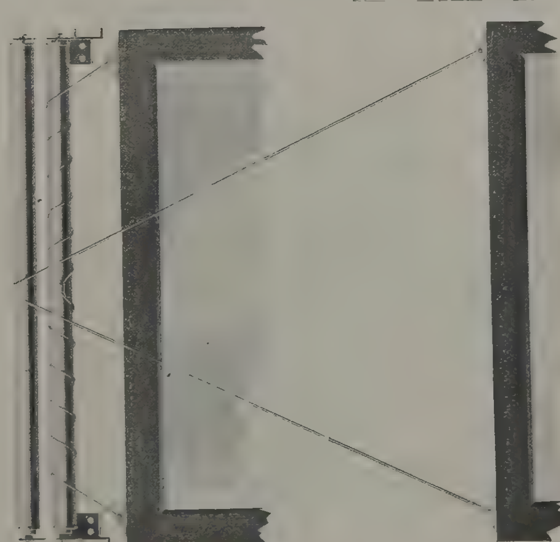


Fig. 1892—Reliance Sash Balance. Tuco Products Corporation.

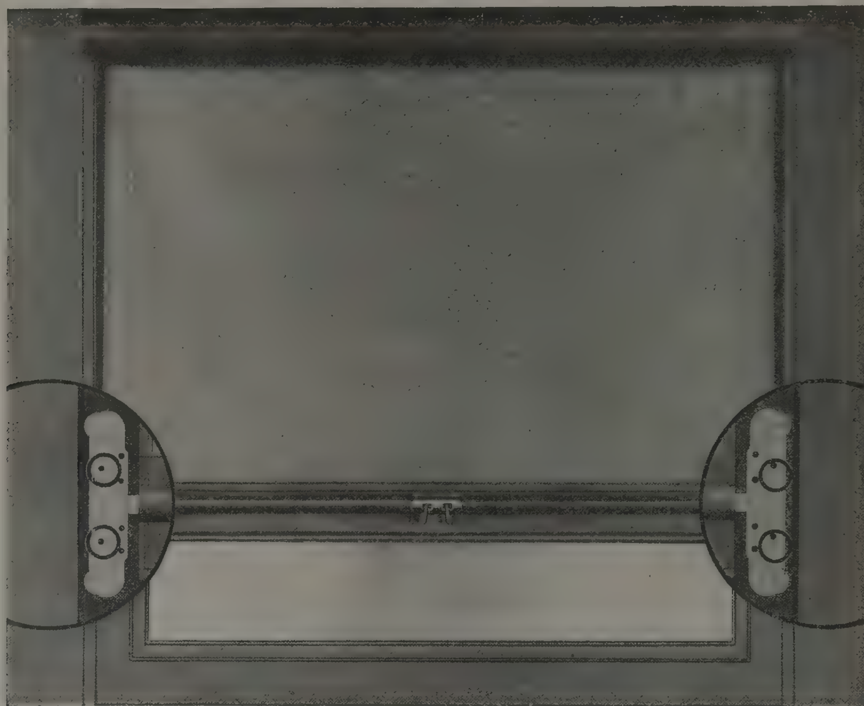


Fig. 1894—Car Window Curtain with Improved No. 88 Fixtures and Rex All-Metal Roller.
The Curtain Supply Company.

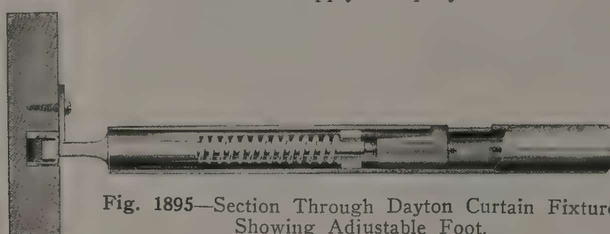


Fig. 1895—Section Through Dayton Curtain Fixture, Showing Adjustable Foot.
Dayton Manufacturing Company.

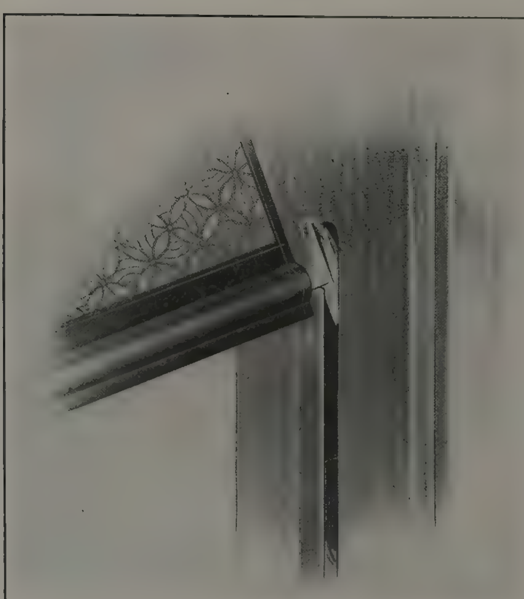


Fig. 1896—Dayton Curtain Fixture, Showing Removal of Shoe from Groove When Necessary.

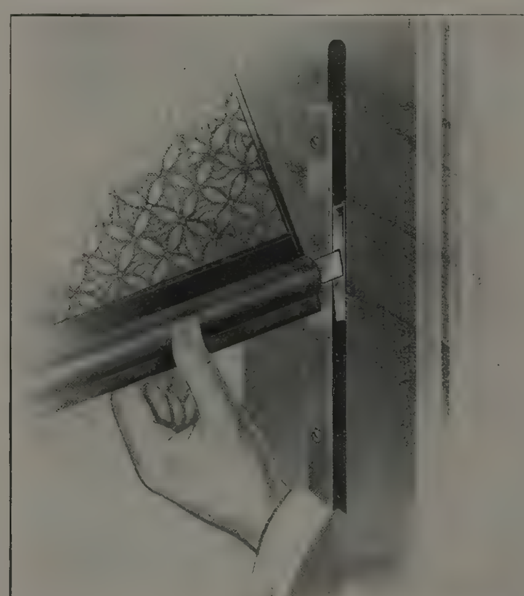
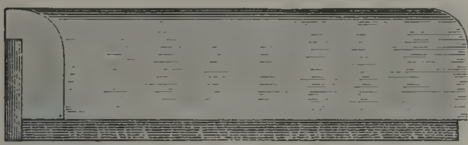
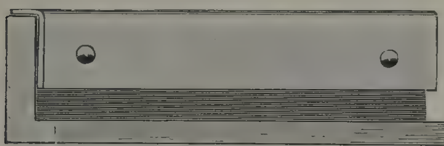


Fig. 1897—Dayton Curtain Fixture with Retaining Strip to Prevent Accidental Displacement.

Dayton Manufacturing Company.



Sides and Bottom of Window Sash.

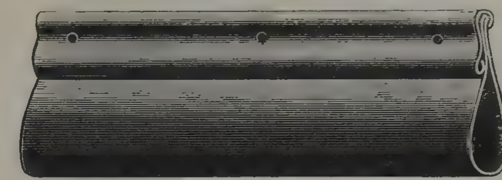


Sides and Top of Doors.

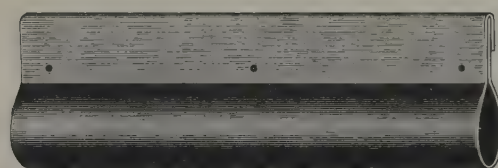
Bottom and Top of Window Sash.

Fig. 1898—Steel Car Weather Strips.

Flat Back, Single Rubber.



Creased Back, Double Rubber.



Flat Back, Double Rubber.

Fig. 1899—Metallic Weather Strips.

D. W. Bosley Company.

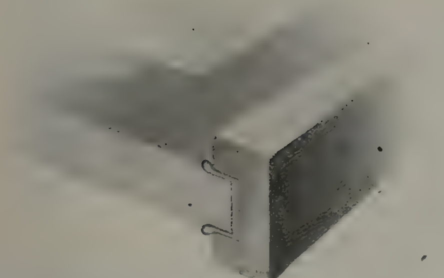


Fig. 1900—Brown Metallic Window Strip. Tuco Products Corporation.

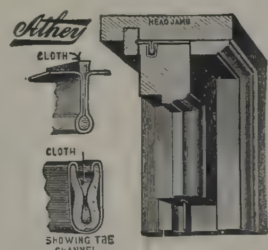


Fig. 1901—Cloth Lined metal Weather Strip applied to Car Window. Athey Company.

Fig. 1902—A Forsyth "Effective Without Binding." Top Brass Without Stripping. Forsyth Brothers Company.

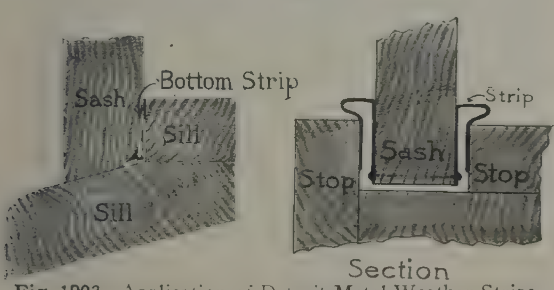


Fig. 1903—Application of Detroit Metal Weather Strips. Frost Railway Supply Company.

Fig. 1904—Detroit Metal Weather Strips. Frost Railway Supply Company.

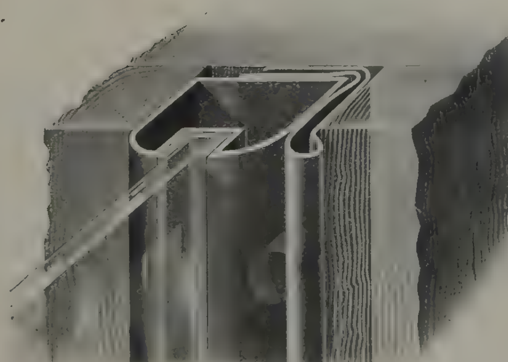


Fig. 1905—Forsyth Spring Bronze Side Weather Stripping, Applicable to Either Brass or Wooden Sash. Forsyth Brothers Company.

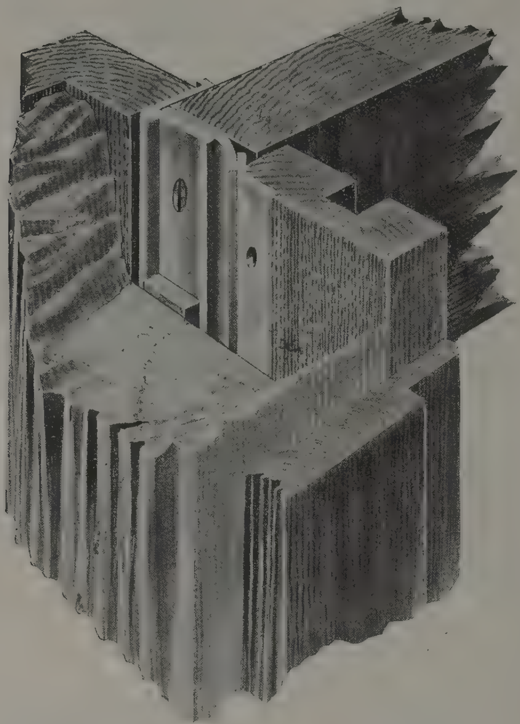


Fig. 1906—Universal Side Weather Stripping, Standard Design.

Fig. 1907—Universal Top Weather Stripping.

Fig. 1908—Universal Bottom Weather Stripping and No. 20 Wedging Sash Lock and Rack.

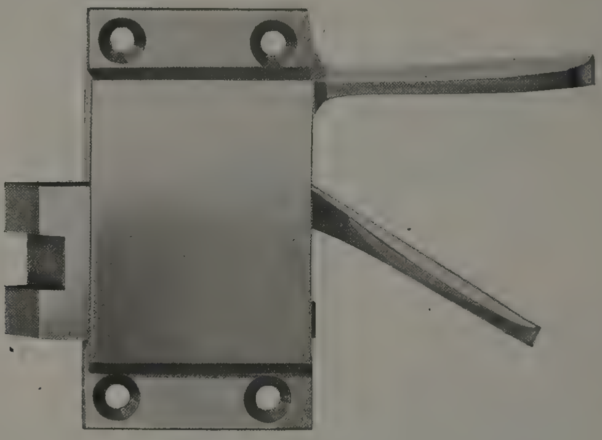


Fig. 1909—Universal No. 23 Wedging Sash Lock.

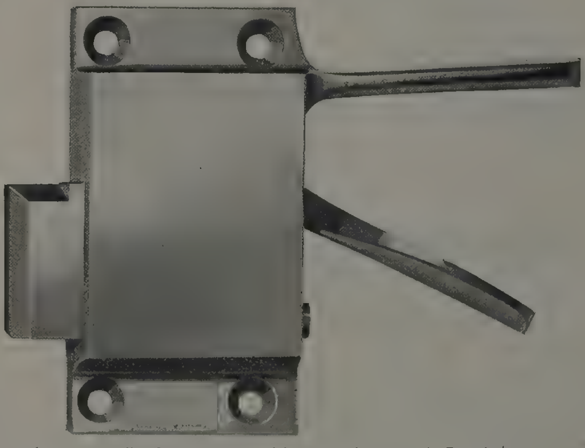


Fig. 1910—Universal No. 24 Wedging Sash Lock.

McCord Manufacturing Company.

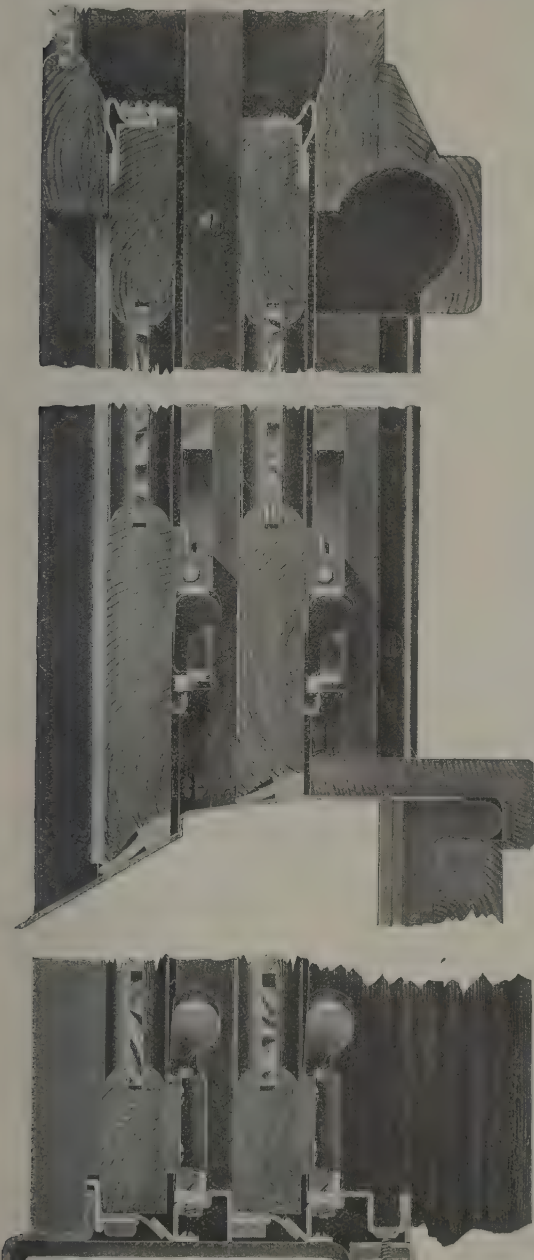


Fig. 1911—Application of Universal Weather Stripping, No. 10 Gravity Wedging Locks and Racks.

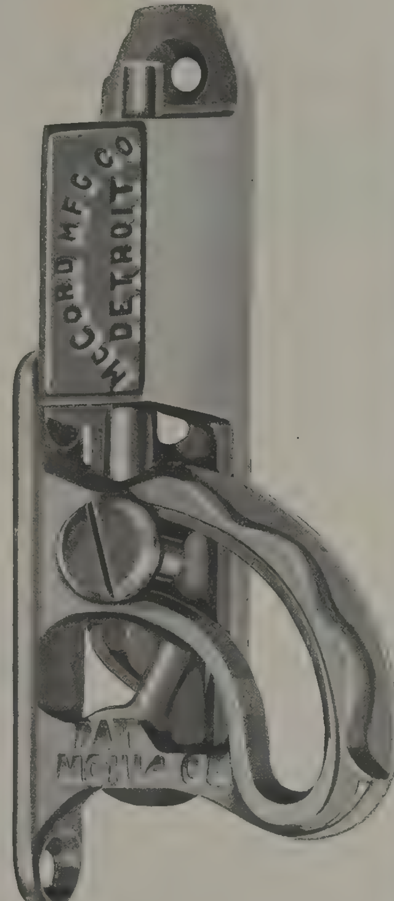


Fig. 1912—Universal Malleable Iron Deck Sash Ratchet.

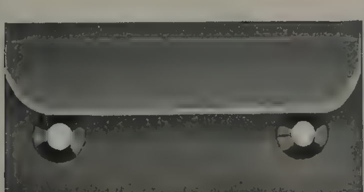


Fig. 1913—Universal No. 5 Plain Sash Lift.

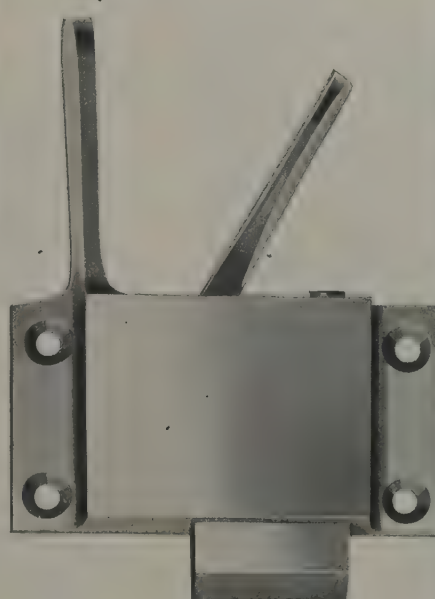


Fig. 1914—Universal No. 10 Gravity Wedging Lock and Rack.

McCord Manufacturing Company.

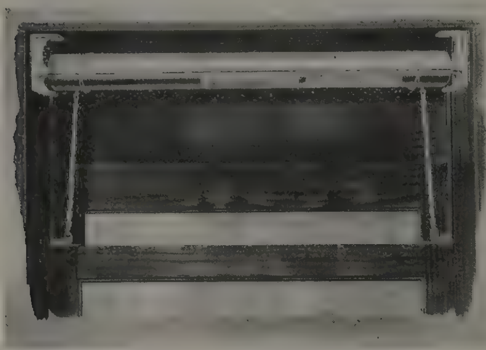


Fig. 1915—Universal Metal Roller Sash Balance with Positive Chain Adjusting Connections.

Fig. 1916—Universal Wedging Racks.

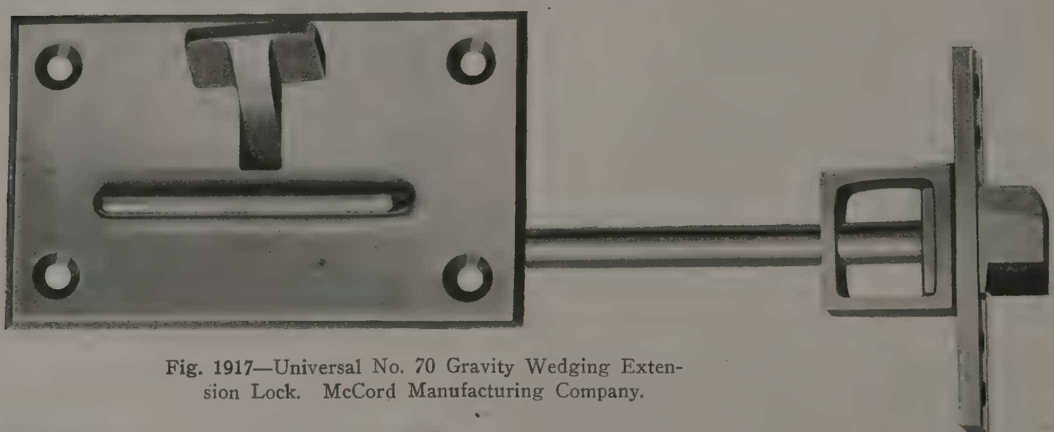


Fig. 1917—Universal No. 70 Gravity Wedging Extension Lock. McCord Manufacturing Company.

Fig. 1918 — Universal Side Weather Stripping, DB Design. McCord Manufacturing Company.

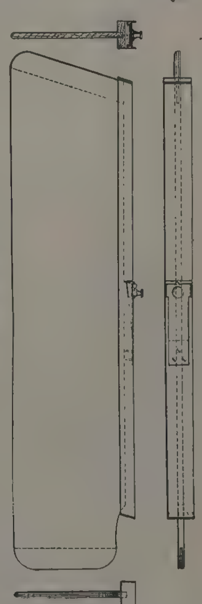


Fig. 1919—Window Dust Guard or Deflector.

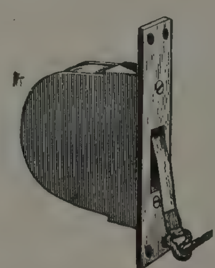


Fig. 1920—Caldwell Window Sash Balance.

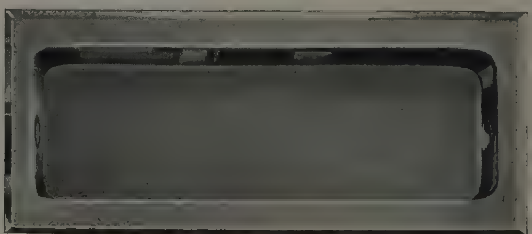


Fig. 1921—Universal No. 15 Flush Sash Lift. McCord Manufacturing Company.

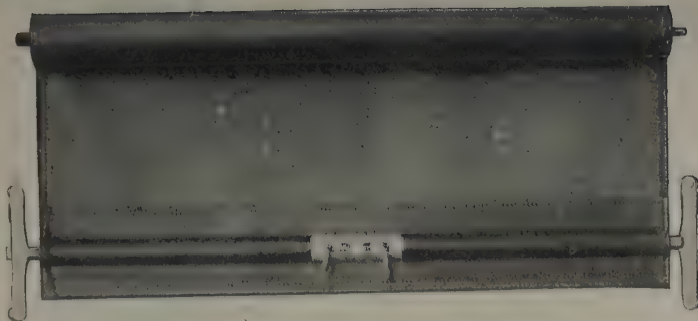


Fig. 1922—Sta-rite Curtain with Fool-proof Fixture. Railway Supply & Curtain Company.

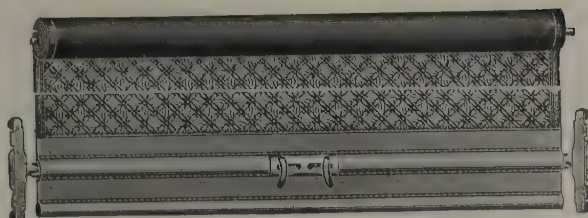


Fig. 1923—Comsate Curtain with Fool-proof Fixture. Railway Supply & Curtain Company.

Fig. 1925 Handless Curtain and Fixture. Railway Supply & Curtain Company.

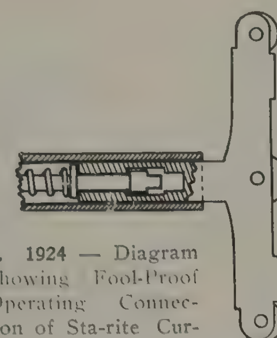


Fig. 1924 — Diagram Showing Fool-Proof Operating Connection of Sta-rite Curtain Fixture. Railway Supply & Curtain Company.

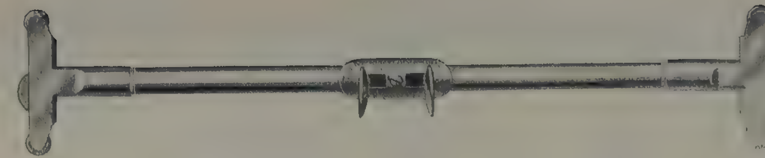


Fig. 1926—National Cam Curtain Fixture in Holding Position. National Lock Washer Company.

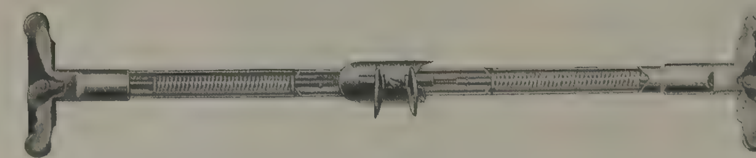


Fig. 1927—National Cam Curtain Fixture in Release Position. National Lock Washer Company.

Fig. 1928—Ring Fixture with Short Tip for Small Open Grooves. The Curtain Supply Company.

Fig. 1929—Ring Fixture with Short Tip for Small Enclosed Grooves. The Curtain Supply Company.

Fig. 1930—Rycco All-Metal Curtain Roller. Railway Supply & Curtain Company.

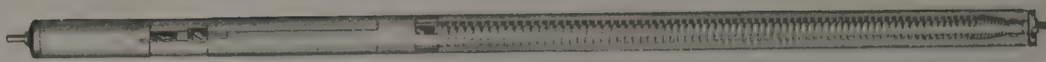


Fig. 1931—Rex All-Metal Roller for Window Curtains, with Extension Sleeve and Lock.

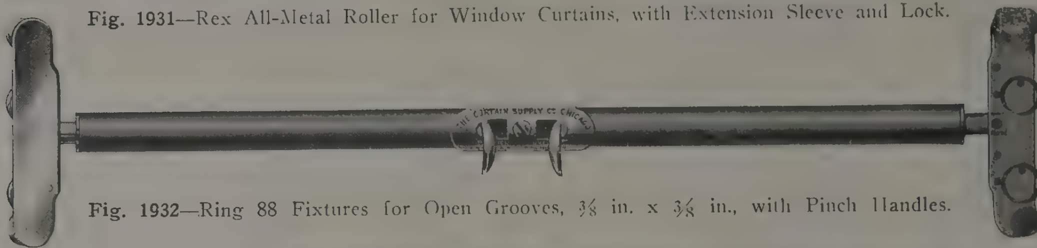
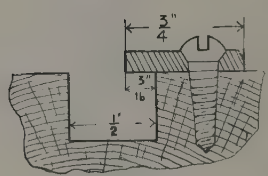


Fig. 1932—Ring 88 Fixtures for Open Grooves, 3/8 in. x 3/8 in., with Pinch Handles.



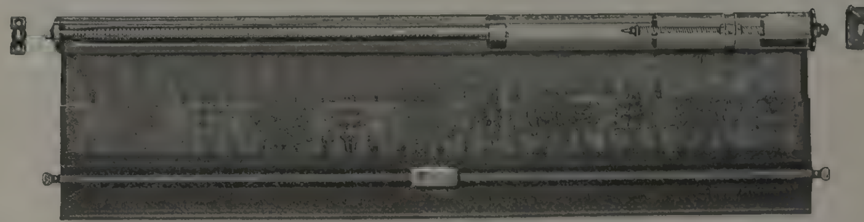


Fig. 1933—Curtain Equipped with Rex Friction Roller Complete with Bottom Bar

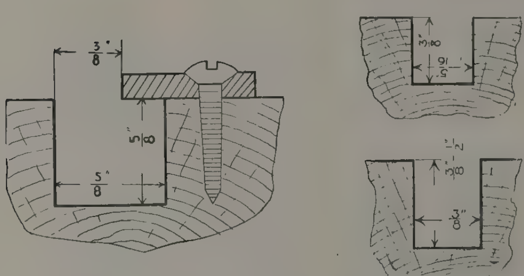


Fig. 1935—Ring Fixtures for Open Grooves, 3/8 in. by 3/8 in., Without Pinch Handles.

Fig. 1934—Standard Size Grooves for Ring Fixtures.

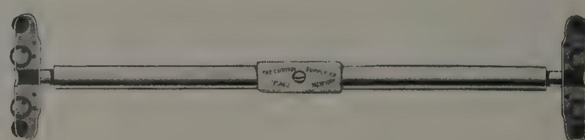


Fig. 1936—Ring Fixtures with Flanges for Enclosed Grooves, 5/8 in. by 5/8 in., Without Pinch Handles.

Fig. 1938—Rex Sash Balance and Attachments.

Fig. 1937—Ring Fixtures with Flanges for Enclosed Grooves, 5/8 in. by 5/8 in., with Pinch Handles.

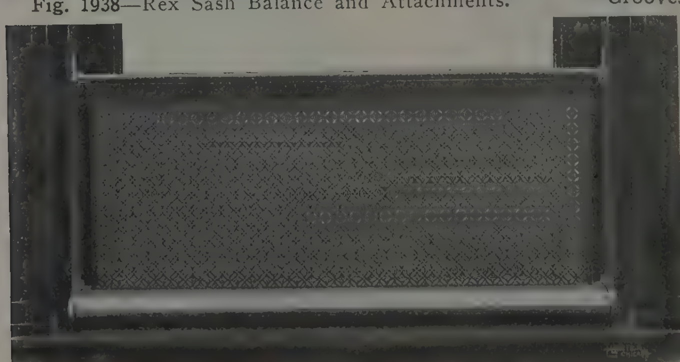


Fig. 1939—Saloon Window Curtain with Rex All-Metal Roller, Brass Curtain Box and Rod Holders.

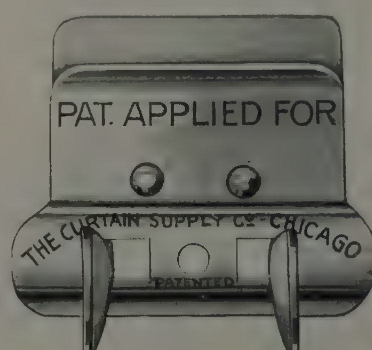


Fig. 1940—Ticket Holder for Ring Fixtures.

Curtain Supply Company.

Adams & Westlake Company. James L. Howard & Company. Adams & Westlake Company.

Fig. 1941—Mortise Sash Lifts.

Fig. 1942—Sash Lifts. Dayton Manufacturing Company.

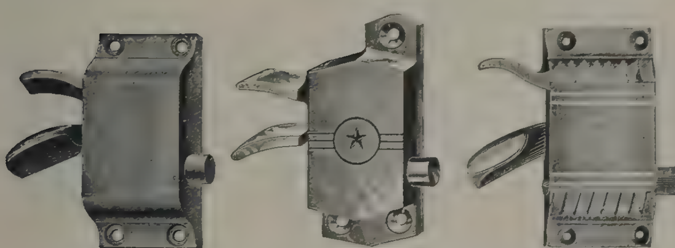


Fig. 1943—Window Sash Locks. James L. Howard & Company.

Fig. 1944—No. 83 Ratchet Sash Lock and Stop. James L. Howard & Company.

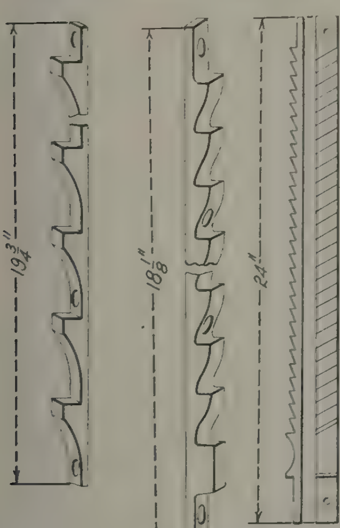


Fig. 1945—Sash Lock Racks or Stop Bars. Dayton Manufacturing Company.

Fig. 1946—No. 763 Sash Lock. Adams & Westlake Company.

A.&W.Co. A.&W.Co. D. M. Co.

Fig. 1947—Window Blind Pulls.

Fig. 1948—Sash Lock Racks. A. & W. Co.

Fig. 1949 Sash Locks. Adams & Westlake Company.

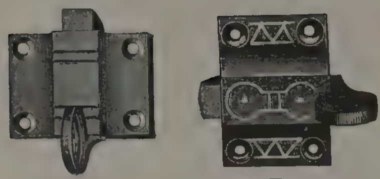
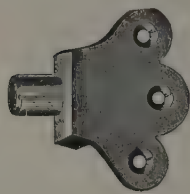


Fig. 1950—Deck Sash and Transom Catches. Adams & Westlake Company.



A. & W. Co. Fig. 1951—Deck Sash Pivots.

Fig. 1952—Deck Sash Pulls. Adams & Westlake Company.

Fig. 1953—Deck Sash Pivot. Jas. L. Howard & Co.

Fig. 1954—Deck Sash Pivots. Dayton Manufacturing Company.

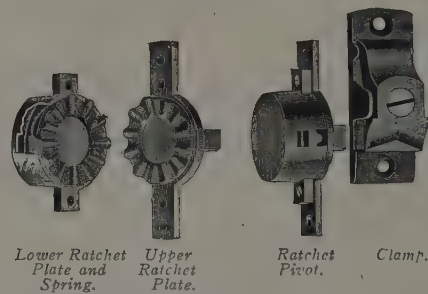


Fig. 1955—Morgan Automatic Deck Sash Pivot and Clamp. Adams & Westlake Company.

Fig. 1956—Monitor Deck Sash Pivot and Ratchet Catch.

Fig. 1957—Sash Bars.

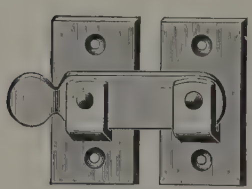


Fig. 1958—Window Bars. R. & E. Manufacturing Company.

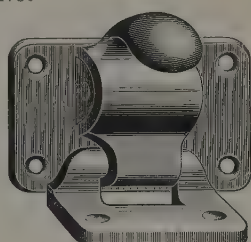


Fig. 1959—Sash Fastener and Latch. Russel & Erwin Manufacturing Company.

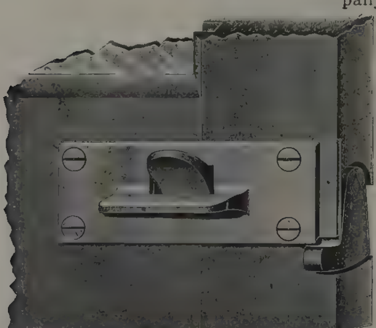


Fig. 1960—Depensafe Sash Lock. Railway Supply & Curtain Company.

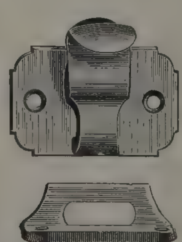


Fig. 1961 — Sash Fastener and Lift. R. & E. Manufacturing Company.

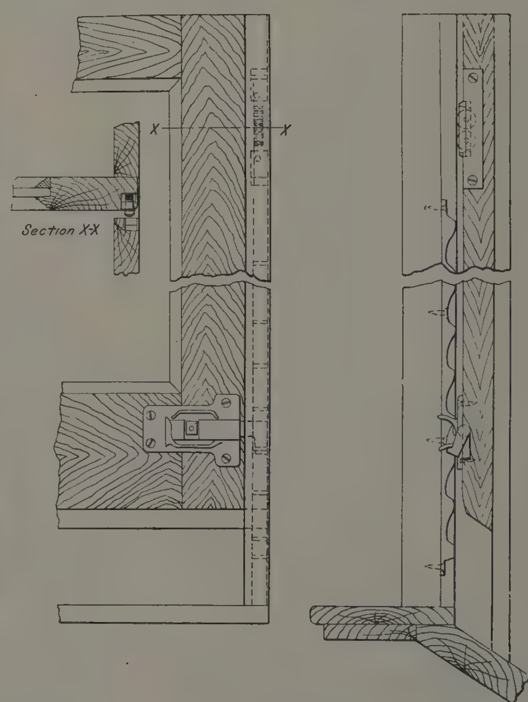


Fig. 1962—No. 177 Lock Applied to Sash. Dayton Manufacturing Company.

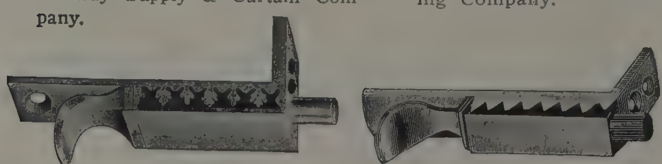


Fig. 1963—Window Blind Bolts. Adams & Westlake Company.

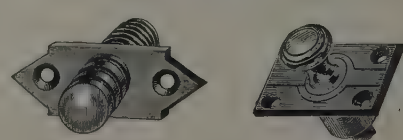


Fig. 1964—End Door Sash Bolts. Adams & Westlake Company.

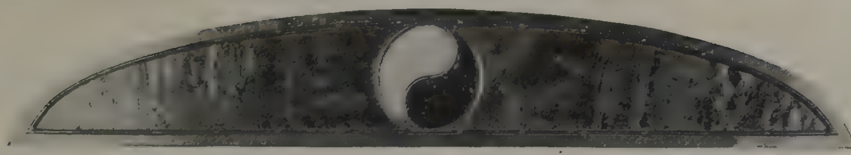


Fig. 1965—Art Glass Deck Light. Adams & Westlake Company.

Fig. 1966—Hart's Combined Deck Sash Ratchet, Pivot and Stop. D. M. Co.

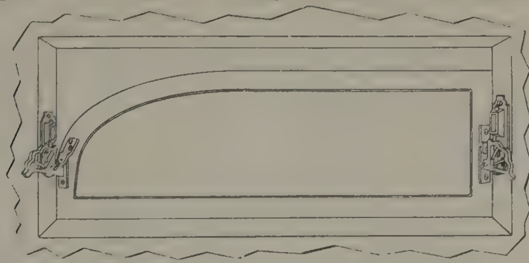


Fig. 1967—Hart's Deck Sash Ratchet Applied to Deck Sash. Dayton Manufacturing Company.

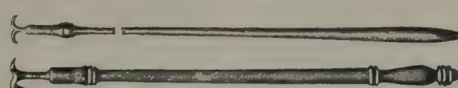


Fig. 1968—Deck Sash Openers. Adams & Westlake Company.

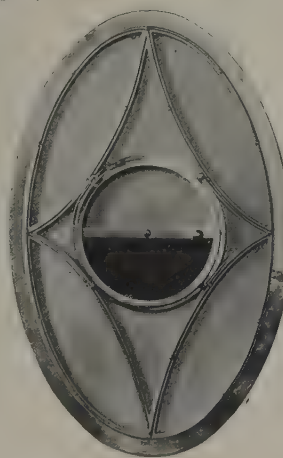


Fig. 1969—Art Glass Oval Sash, with Ventilator, for Saloons. Adams & Westlake Company.

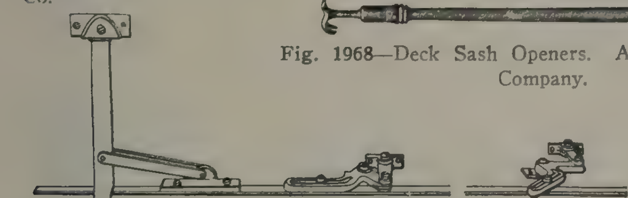
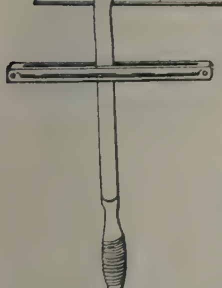



Fig. 1970—Continuous Deck Sash Opener. Adams & Westlake Company.

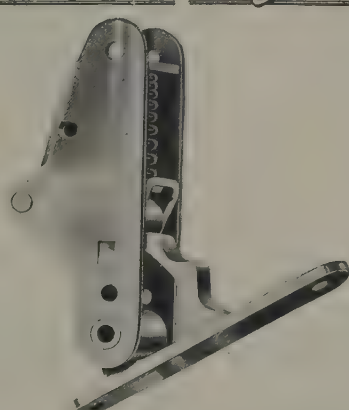


Fig. 1971—Eclipse Deck Sash Ratchet. Tuco Products Corporation.

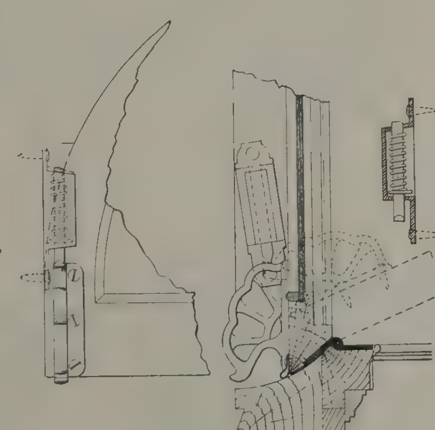
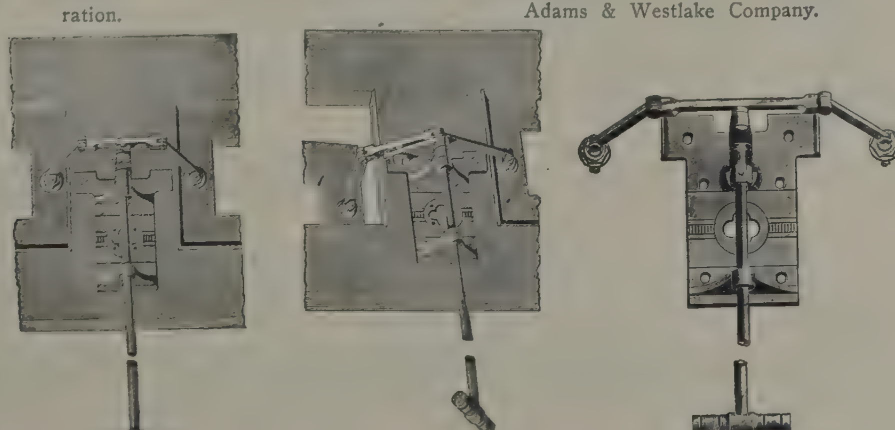


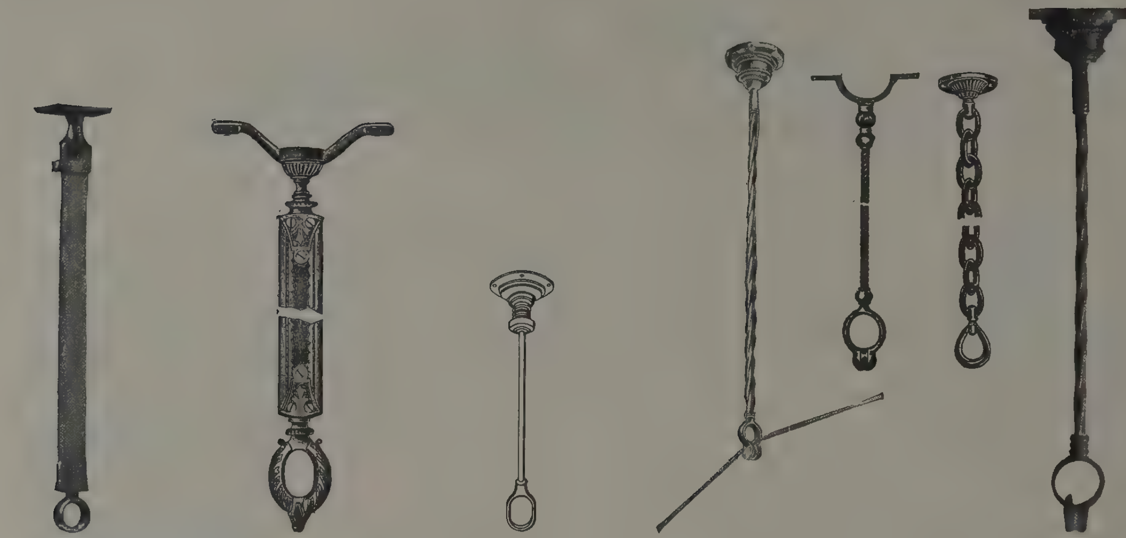
Fig. 1972—Deck Sash Pivot and Ratchet Catch Adams & Westlake Company.

Fig. 1973—Deck Sash and Transom Openers. Adams & Westlake Company.



Windows Closed *One Window Open.* *Opener Complete.*

Fig. 1974—Mansfield Deck Sash Opener. Adams & Westlake Company.



Jas. L. Howard & Company. Dayton Manufacturing Company. Adams & Westlake Company.

Fig. 1975—Signal Cord Hangers.

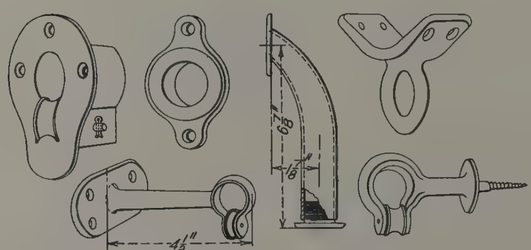
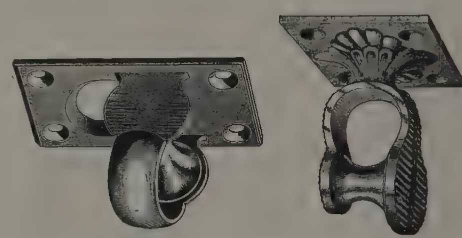


Fig. 1976—Signal Cord Bushings. Dayton Manufacturing Company.



A. & W. Co. D. M. Co.

Fig. 1977—Angle Signal Cord Guides.

Fig. 1978 — Overhead Guide. D. M. Co.

Fig. 1979—Corner Guide. A. & W. Co.

Fig. 1980 — Side Pulley Guide. A. & W. Co.

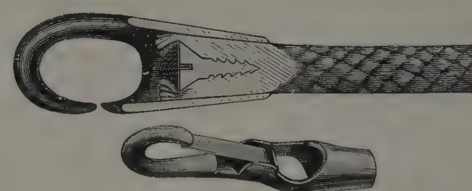


Fig. 1981—Signal Cord Couplings. Samson Cordage Works.

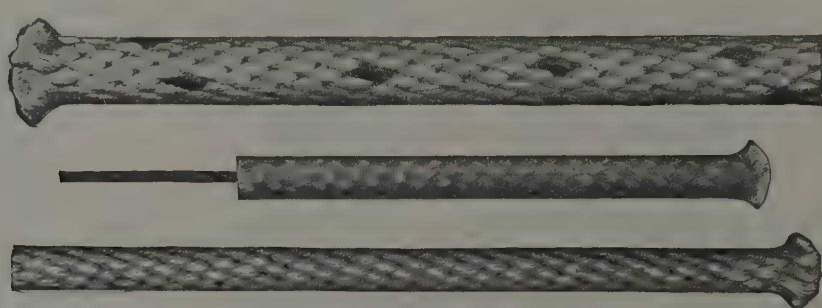


Fig. 1982—Signal Cords. Samson Cordage Works.

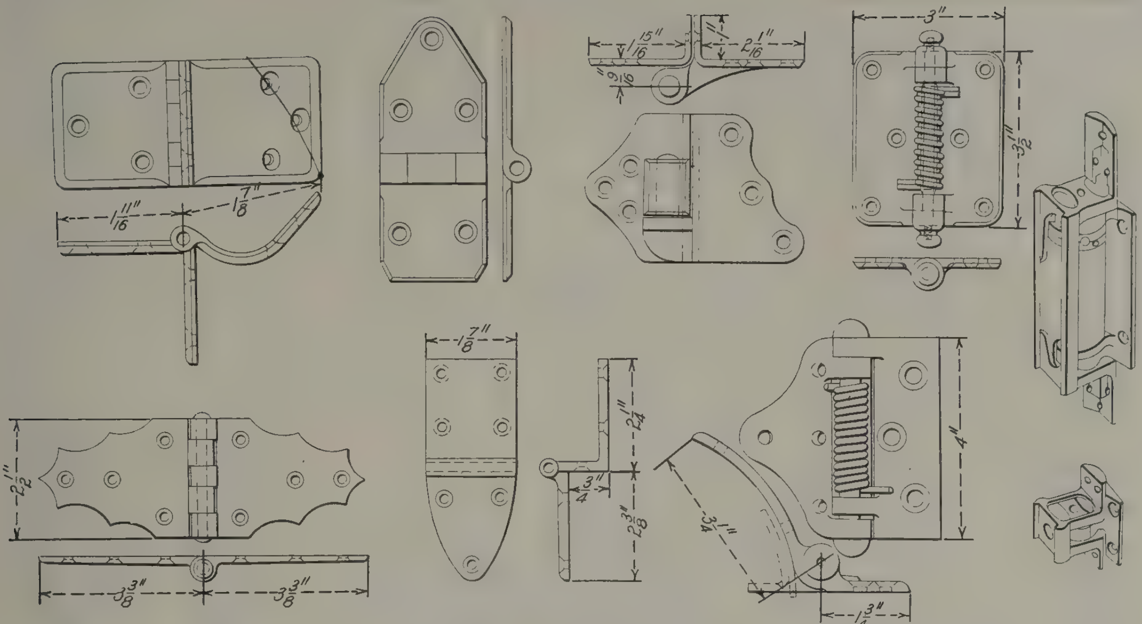


Fig. 1983—Miscellaneous Plain and Spring Hinges. Dayton Manufacturing Company

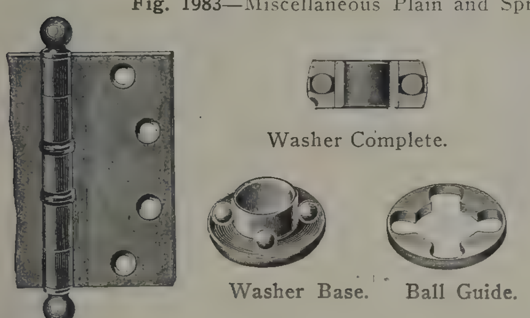


Fig. 1984—Loose Pin Butt Hinge with Ball Bearing Washer. R. & E. Manufacturing Company.

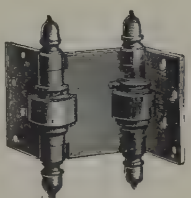


Fig. 1985—Double Acting Spring Hinge. A. & W. Co.

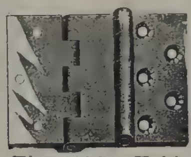


Fig. 1986—Table Hinge. A. & W. Co.

Adams & Westlake Company.

Dayton Manufacturing Company

Fig. 1987—Brass Covered Vestibule Door Hinges.

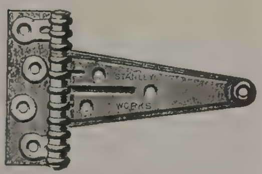


Fig. 1988—T Hinge.

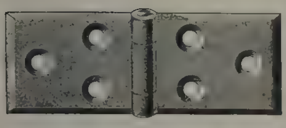


Fig. 1989—Riveted Joint Butt Hinge.

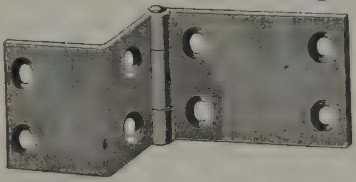


Fig 1990—Offset Riveted Joint Butt Hinge.

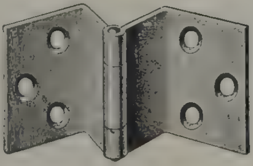


Fig. 1991—Pocket Hinge.

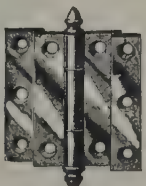


Fig. 1992—Rabbeted Door Hinge. A. & W. Co.

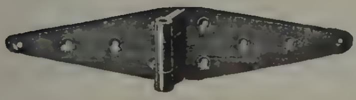


Fig. 1993—Distributing Table Hinge for Postal Cars. D. M. Co.

Fig. 1994—Lamp House Hinges. D. M. Co.

Fig. 1995—Refrigerator Door Hinge. D. M. Co.

Fig. 1996—Lamp House Hinge. D. M. Co.

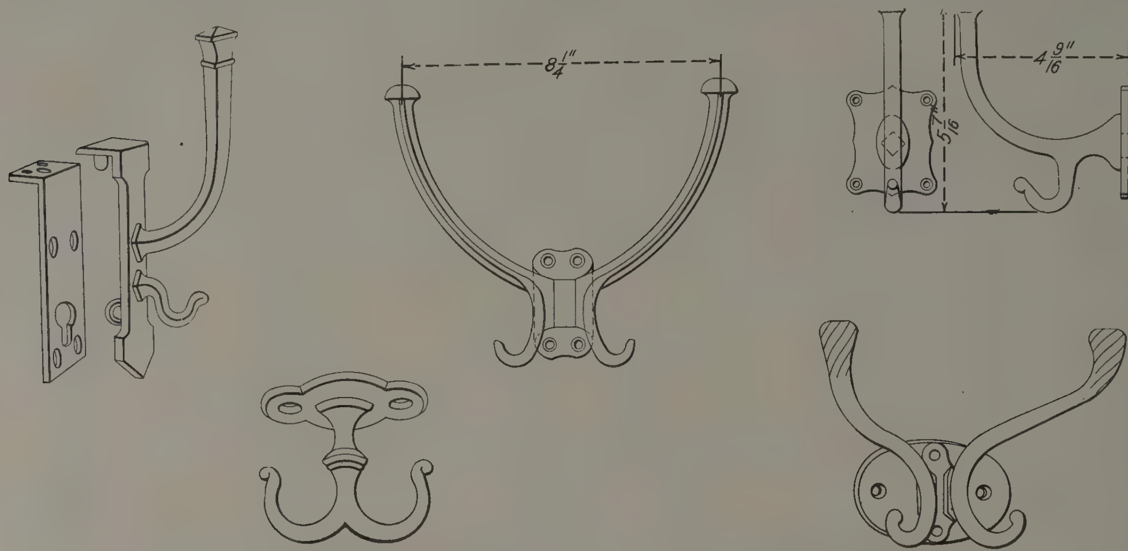
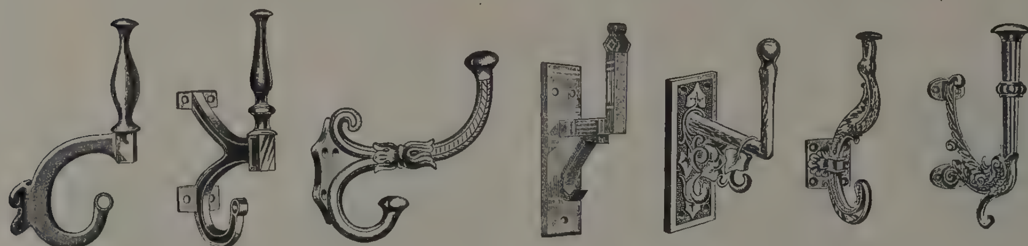


Fig. 1997—Miscellaneous Coat and Hat Hooks. Dayton Manufacturing Company.



D. M. Co. Adams & Westlake Company.

Fig. 1998—Miscellaneous Coat and Hat Hooks.

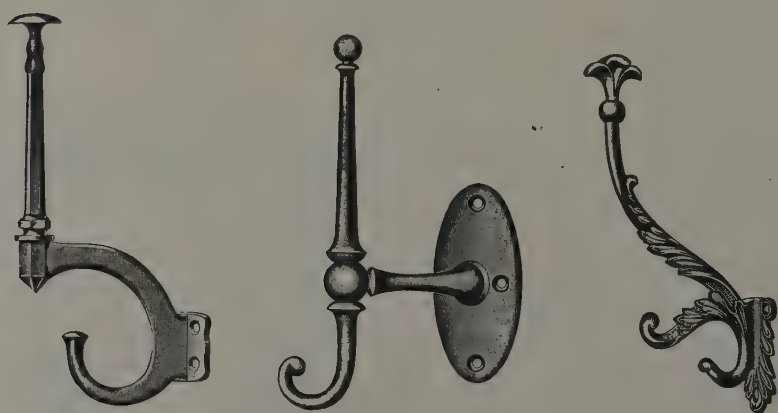


Fig. 1999—Coat and Hat Hooks. Russell & Erwin Manufacturing Company.

Fig. 2000—Ceiling Hook. R. & E. Mfg. Co.

Fig. 2001—Wardrobe Hook. R. & E. Mfg. Co.

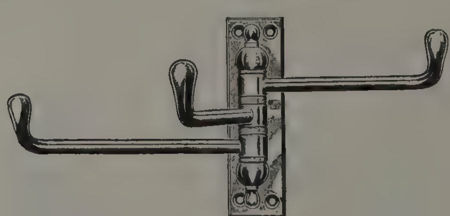


Fig. 2002—Folding Coat Hook. Adams & Westlake Company.

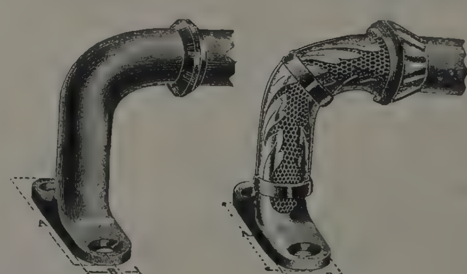
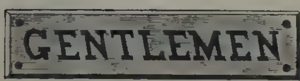


Fig. 2003—Window Rod Brackets. Adams & Westlake Company.

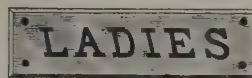
Size, 2 by 6½ ins.

Size, 3⅞ by 11⅝ ins.

Adams & Westlake Company.



Size, 2⅜ by 11 ins.



Size, 2⅜ by 8⅝ ins.

Size, 2⅜ by 9 ins.

Fig. 2004—Notice Plates. Dayton Manufacturing Company.

Fig. 2008—Pen Rack. D. M. Co.

Fig. 2005—Cast Grilles. A. & W. Co.

Fig. 2006—Cuspidor.

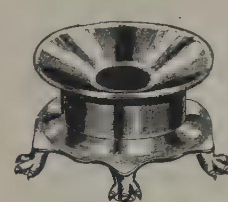


Fig. 2007—Cast Cuspidor.

Dayton Manufacturing Company.

Fig. 2009—Upper and Lower Gromets for Carpet Eyelets. Adams & Westlake Company.

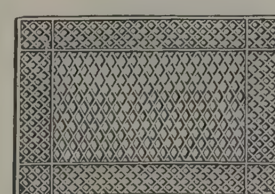


Fig. 2010—Perforated Rubber Floor Mat.

Fig. 2011—Telegraph Blank Rack. Adams & Westlake Company.

Fig. 2012—Match Strikers. Adams & Westlake Company.

Fig. 2013—Match Box Holder and Match Safe. Adams & Westlake Company.

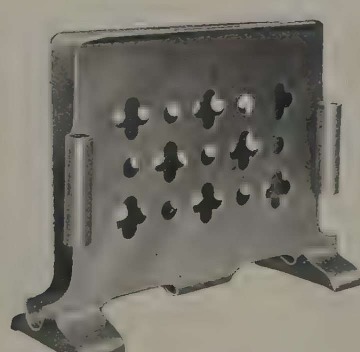


Fig. 2014—Menu Card Holder for Dining Cars. Dayton Mfg. Co.

Fig. 2015—Ash Receiver. A. & W. Co.

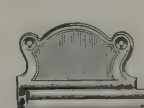


Fig. 2016 — Match Striker and Cigar Holder A. & W. Co.

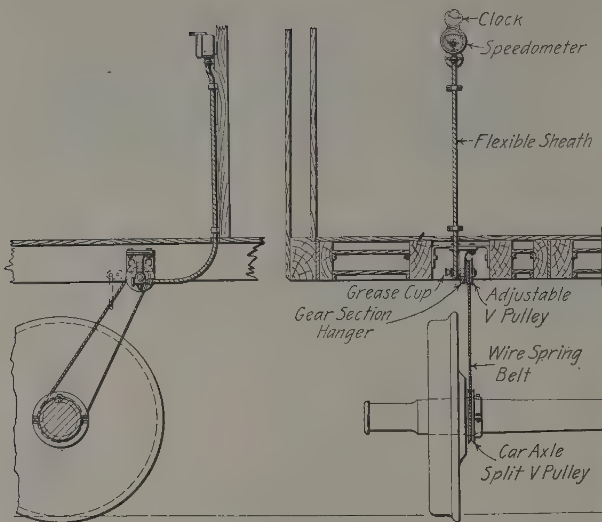


Fig. 2017—Jones Speedometer and Recorder. H. W. Johns-Manville Company.

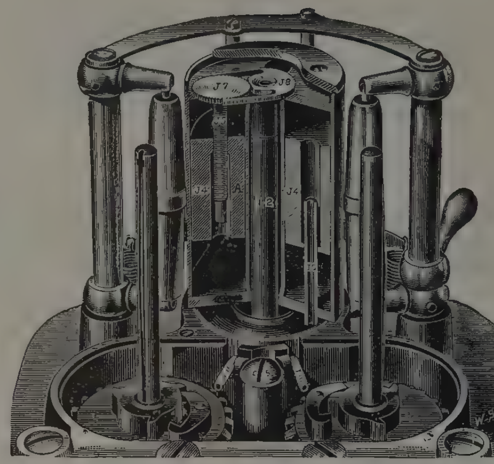


Fig. 2018—Paper Drum of Boyer Speed Recorder. Chicago Pneumatic Tool Company.

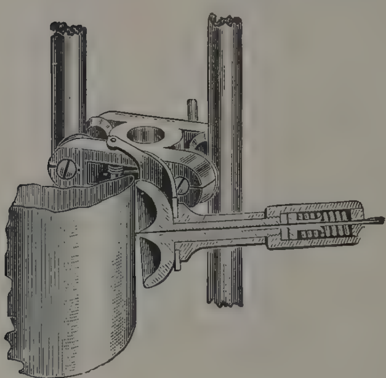


Fig. 2019—Pencil Holder for Boyer Speed Recorder. Chicago Pneumatic Tool Company.

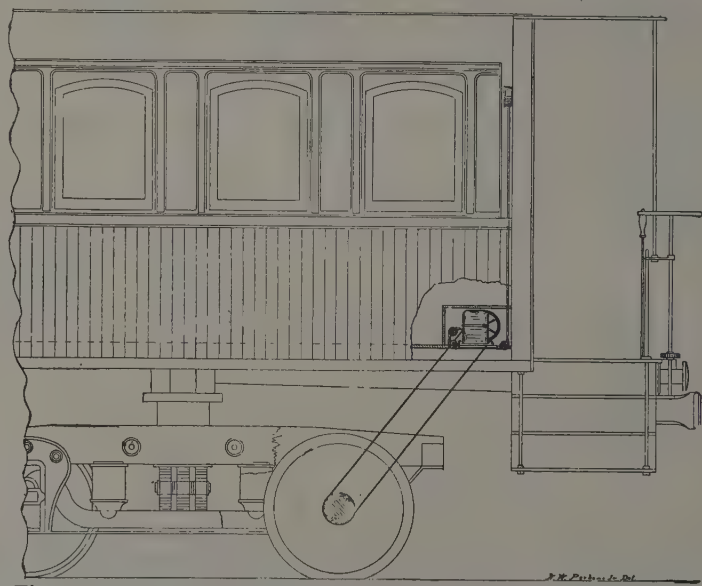


Fig. 2020—Boyer Speed Recorder Applied to Car. Chicago Pneumatic Tool Company.

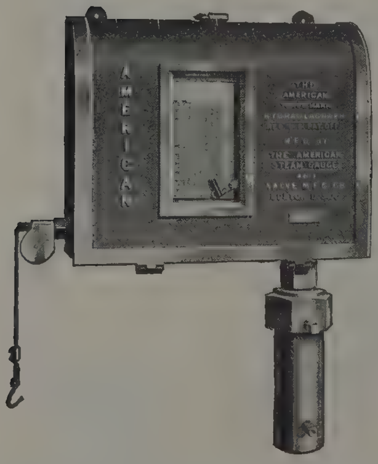


Fig. 2021—Wheel Press Recording "Hydraulagraph." American Steam Gauge & Valve Manufacturing Company.

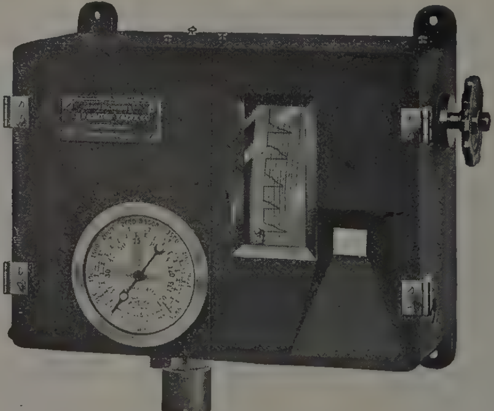


Fig. 2022—Ashton Wheel Press Recording Gage. The Ashton Valve Company.

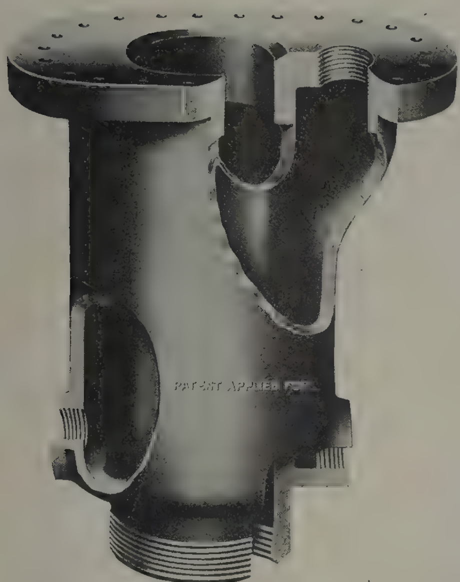


Fig. 2023—Steam Jacketed 6 in. Outlet Valve for Tank Cars. American Car & Foundry Company.

Fig. 2024—J-M Fire Extinguisher. H. W. Johns-Manville Company.

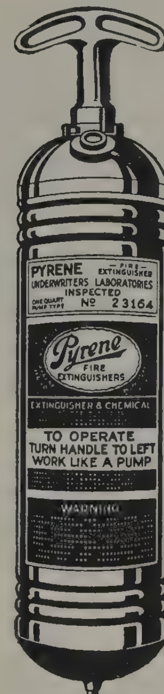


Fig. 2025 — Pyrene Fire Extinguisher. Pyrene Manufacturing Company.

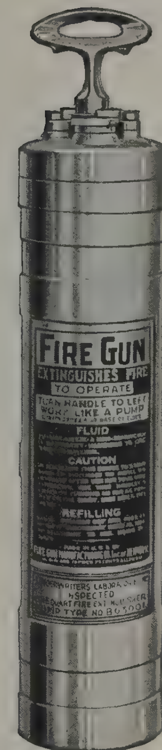


Fig. 2026—Fire-Gun Extinguisher. Fire-Gun Manufacturing Company.

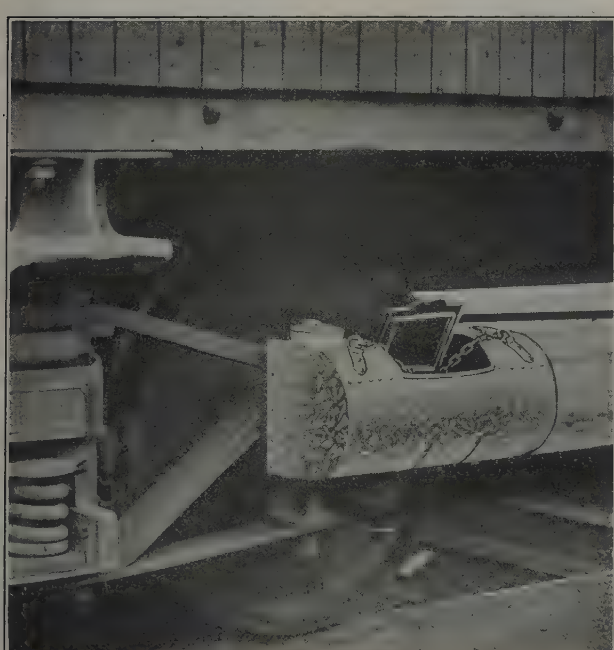


Fig. 2027—Journal Box Cooler. The Gustin-Bacon Company.

Fig. 2028—Electric Vacuum Car Cleaner. Railway Utility Company.

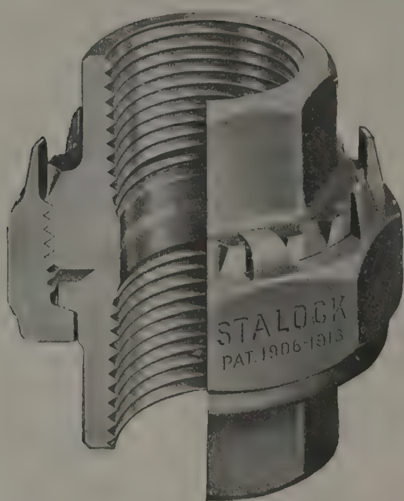


Fig. 2029—"Stalock" Union. Standard Union Company.

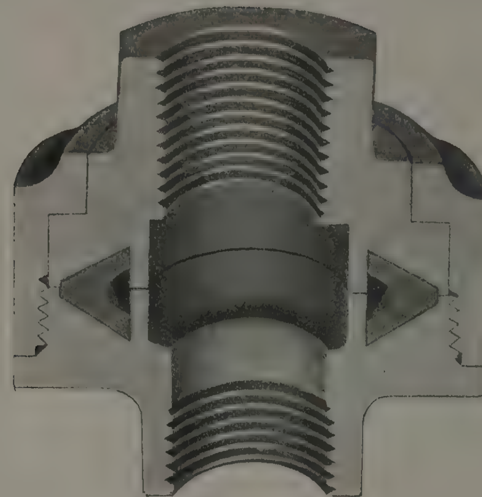


Fig. 2030—"Flexo" Union. The Durbin Company.

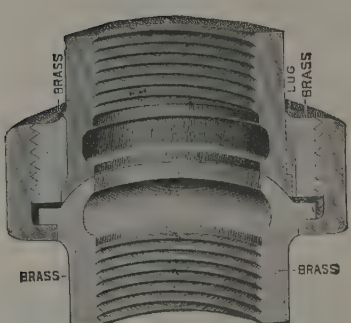


Fig. 2031—Nokoros Union. Illinois Malleable Iron Company.

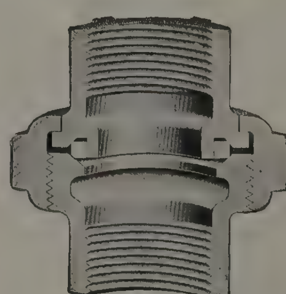


Fig. 2032—Compression Disc Union. Illinois Malleable Iron Company.

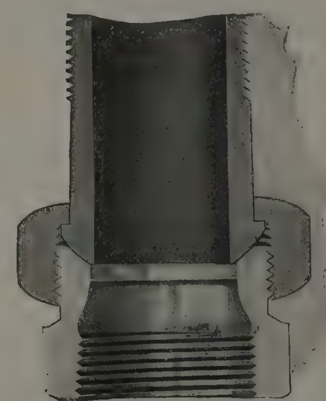


Fig. 2033—Section of Kewanee Male and Female Union. Walworth Manufacturing Company.

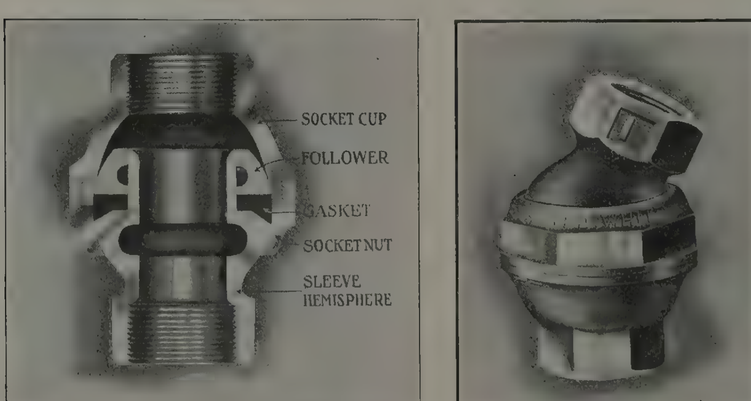


Fig. 2034—Section and Bent Position of Auto-tite Flexible Pipe Joint. The International Couplers Co.

Fig. 2035—Kewanee Male and Female Union. Walworth Manufacturing Company.

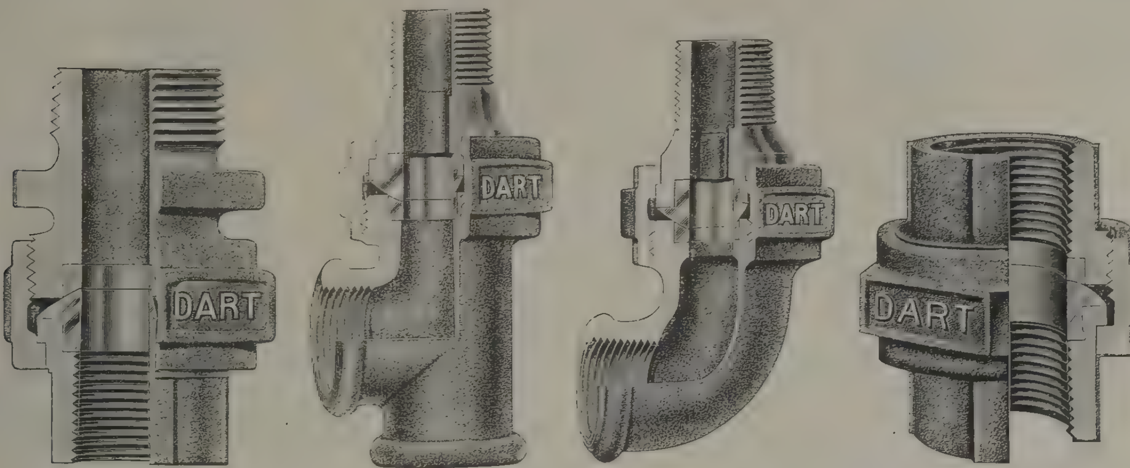


Fig. 2036—Dart Unions. E. M. Dart Manufacturing Company.

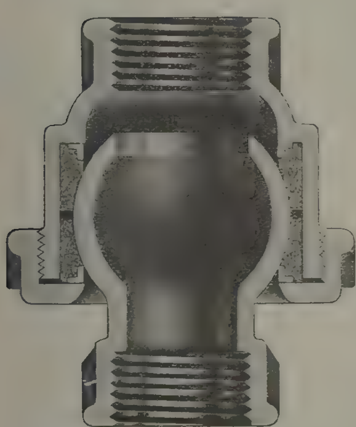


Fig. 2037—Flexible Joint. Barco Brass & Joint Company.

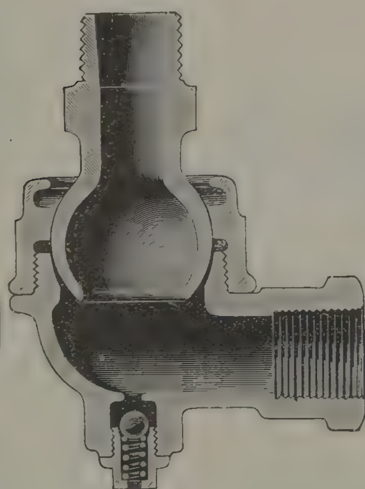


Fig. 2038—Flexible Metallic Joint. Moran Flexible Steam Joint Company.

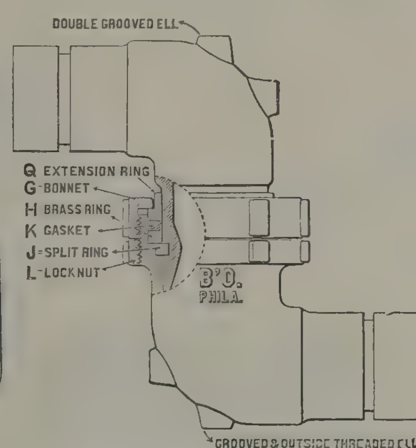


Fig. 2039—Swing Joint. L. J. Bordo Company.

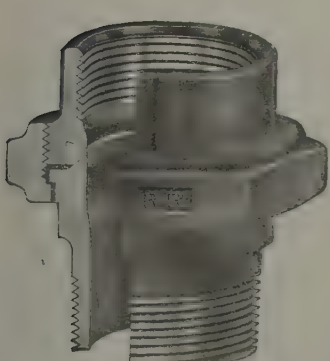


Fig. 2040—Crane Union with Outside and Inside Thread. The Crane Company.

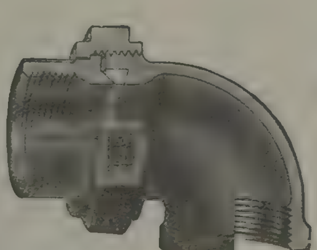


Fig. 2041—Crane Union Elbow. The Crane Company.

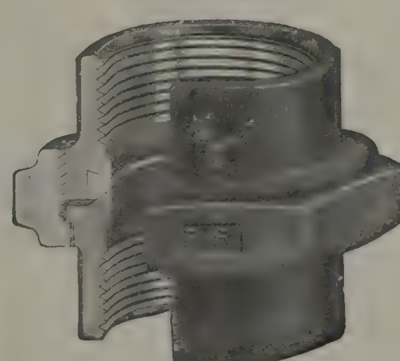


Fig. 2042—Crane Union with Inside Thread. The Crane Company.

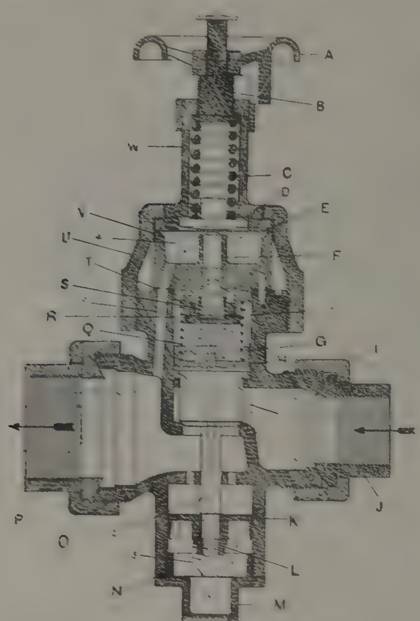


Fig. 2043—Cross Section of Greenlaw Steam Pressure Regulator shown in Fig. 2044.

Names of Parts of Fig. 2043.

A *Handwheel*
B *Adjusting Screw*
C *Adjusting Spring*
D *Diaphragm Button*
E *Diaphragm*
F *Auxiliary Piston*
G *Main Piston*
H *Body*
I *Inlet Union Nut*
J *Inlet Union End*
K *Dash Pot Piston*
L *Dash Pot Piston Nut*
M *Dash Pot Chamber Nut*
N *Lower Gasket*
O *Outlet Union Nut*
P *Outlet Union End*
Q *Main Piston Spring*
R *Auxiliary Spring Cap*
S *Auxiliary Piston Spring*
T *Upper Gasket*
U *Bonnet*
V *Auxiliary Piston Case*
W *Spring Case*

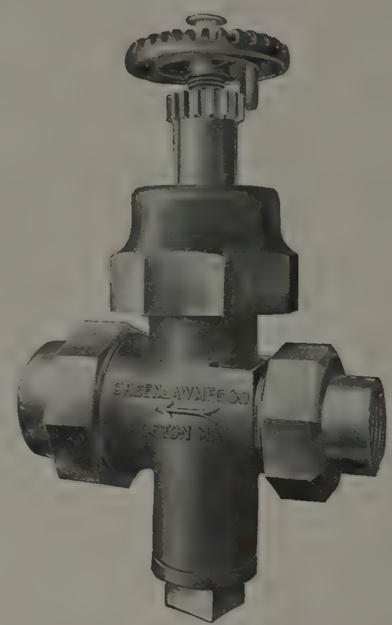


Fig. 2044—Car Heating Steam Pressure Regulator. Greenlaw Mfg. Co.

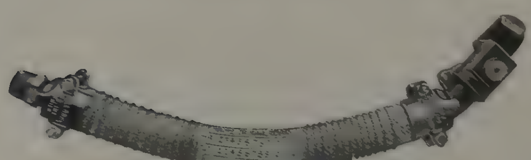


Fig. 2045—"Dynamite" Flexible Metallic Steam Heat Hose. Mulconroy & Company.

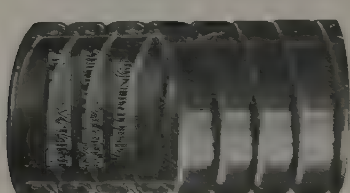


Fig. 2046—Interlocking Metal Hose. Pennsylvania Flexible Metallic Tubing Company.

Fig. 2047—Metallic Flexible Steam Hose, Couplers and Lock. Greenlaw Manufacturing Company.

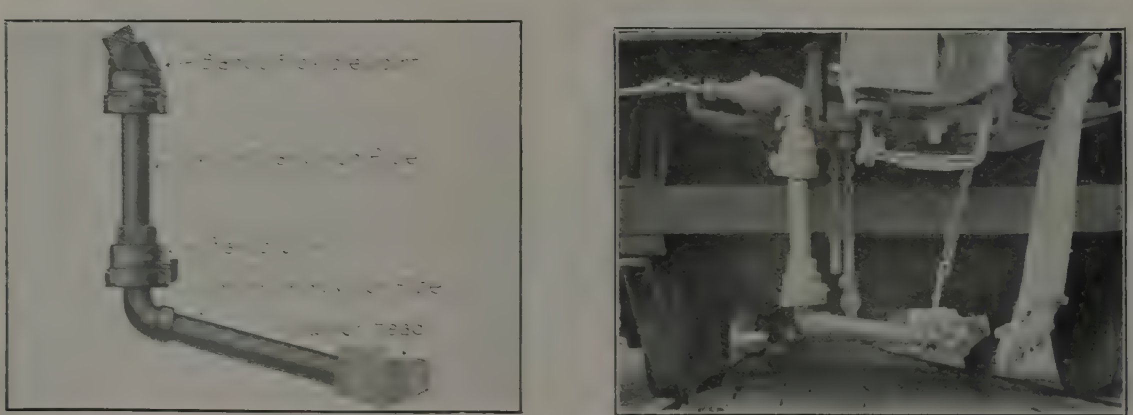


Fig. 2048—Details and Application of the Barco Flexible Joint. The Barco Manufacturing Company.

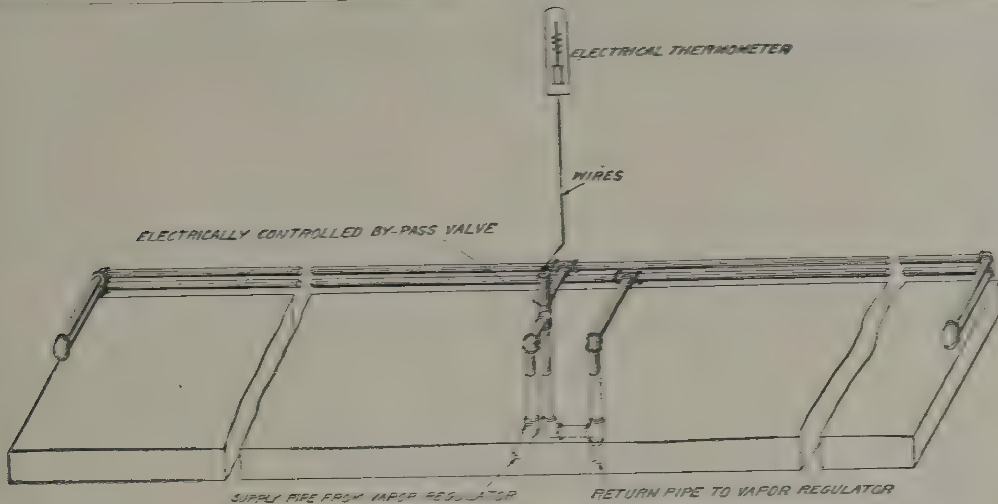


Fig. 2049—Diagram Showing Railway Utility Company's Direct Electrically Controlled By-Pass Valve for Temperature Regulation of Passenger Cars.

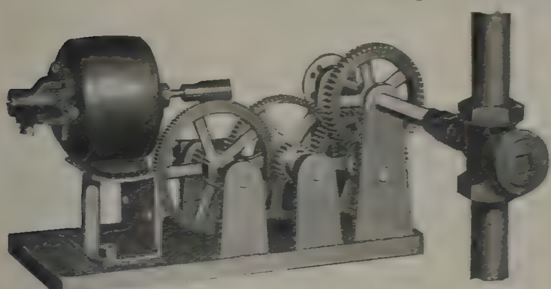


Fig. 2050—Electric Motor and Mechanism Controlling Steam Inlet Valve for Temperature Regulation of Passenger Cars. Railway Utility Company.

Fig. 2051—Temperature Regulating Apparatus Applied to Parlor Car. Railway Utility Company.

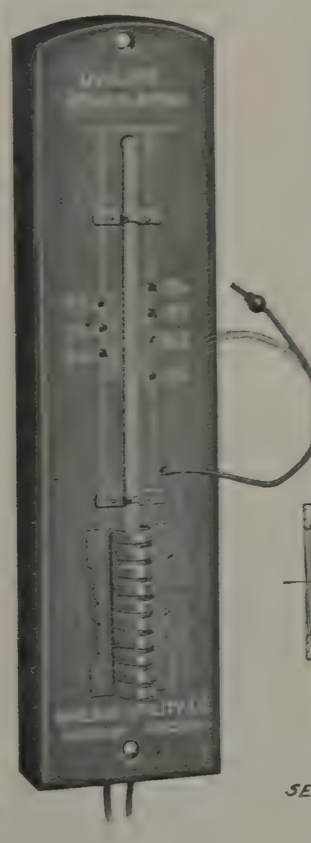


Fig. 2052—Electric Thermostat for Automatic Control of Motor Shown in Fig. 2050.

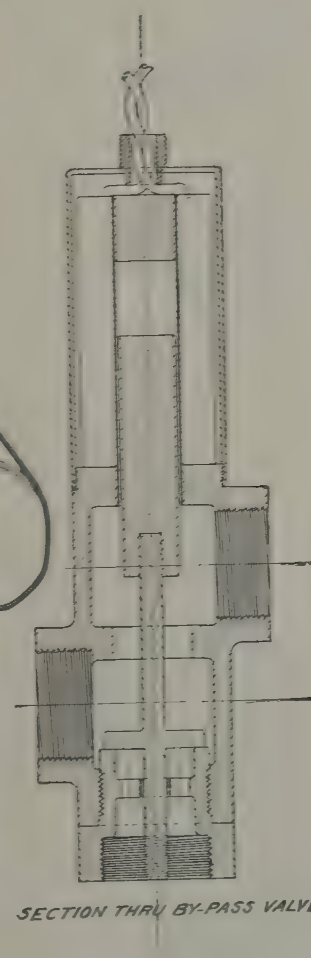


Fig. 2053—Section Through By-Pass Valve Controlled Direct from Thermostat by Solenoid. Railway Utility Company.

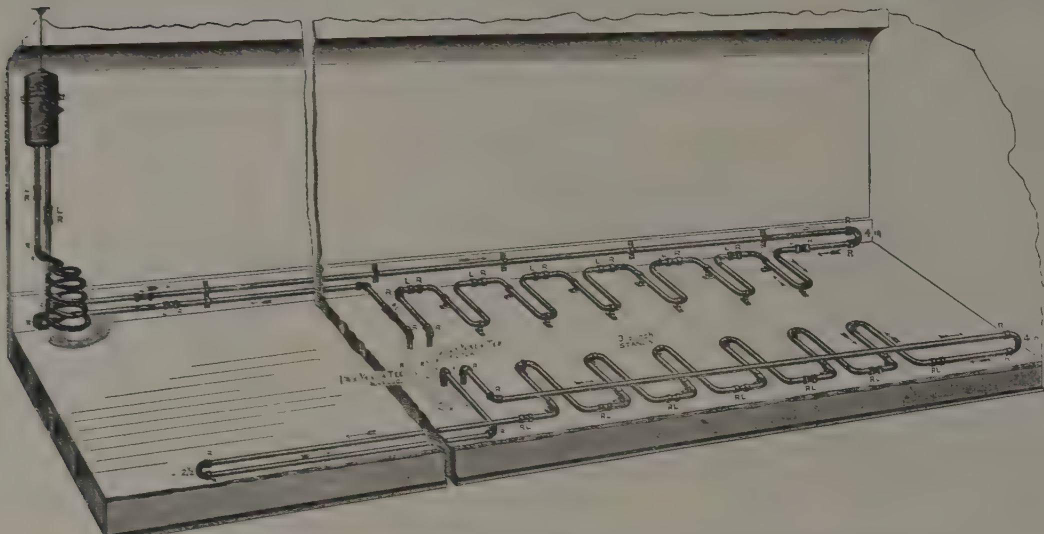


Fig. 2054—Arrangement of Pipings for Passenger Cars Heated with the Baker Heater.

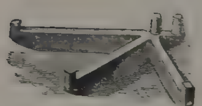


Fig. 2055—Fire Grate Support.

Fig. 2056—Coal Feed Chute.

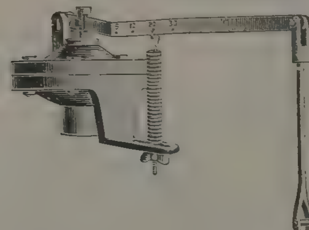


Fig. 2057—Automatic Fire Regulator and Pressure Indicator Combined for Baker's Fire-Proof Heater.

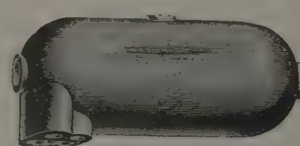


Fig. 2058—Circulating Drum for Baker's Improved Two-Coil Fire-Proof Heater.

Fig. 2059—Mighty Midget Heater.

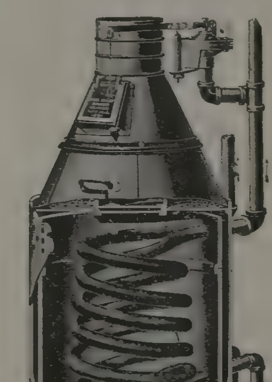


Fig. 2060 — Double-Coil Fire-Proof Heater with Solid Steel Shell.

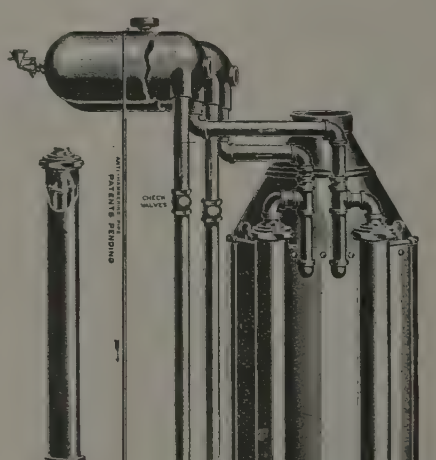


Fig. 2061—Baker Heater with Steam Attachment.

The Peter Smith Heater Company.

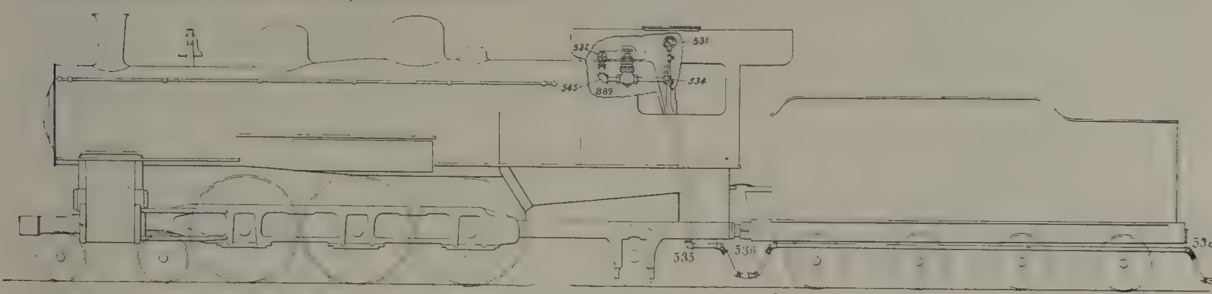


Fig. 2062—Arrangement of Gold Heating Apparatus on Locomotive and Tender.

Parts of Locomotive Equipment, Fig. 2062.

804S *Steam Hose and Couplers*
889 *Pressure Regulator*
531 *Steam Gage*
532 *Starting Valve*
545 *1½-in. Elbow*
534 *2 in. by ¼ in. by 2 in. Tee*
535 *2-in. Elbow*
536 *2 in. by 1½ in. 65 Deg. Elbow*
2-in. R. & L. Coupling
Pipe
Pipe Covering

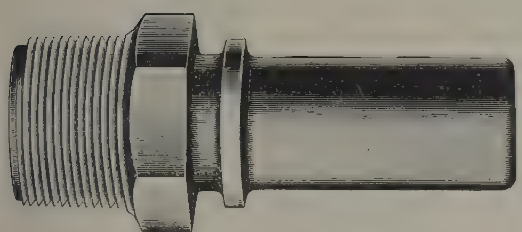


Fig. 2063—Steam Hose Nipple.

Parts of Valve, Fig. 2065.

A *Body*
B *Dome*
C *Spring Case*
D *Lock Nut*
E *Adjusting Screw*
F *Bottom Plug*
G *Outlet Union Nut*
H *Outlet Union Nipple*
I *Inlet Union Nut*
J *Inlet Union Nipple*
K *Main Valve*
L *Lower Diaphragm Plate*
M *Controlling Valve Plug*
N *Top Diaphragm Plate*
O *Top Spindle*
P *Bottom Strainer*
Q *Main Diaphragm*
R *Controlling Diaphragm*
S *Controlling Valve*
T *Bottom Spring*
U *Controlling Valve Spring*
V *Regulating Spring*
W *Hand Wheel*
X *Hand Wheel Nut*
Y *Top Strainer*
Z *Vent Plug*
ZI *Bolts and Nuts*

Fig. 2064—Gold Steam Hose Clamp.

Nipples and Clamps. See Figs. 2063-2064.

Interior Diameter of Hose	Nipple No.	Clamp No.
1¼ in.	855	856
1⅜ in.	801A	803
1½ in.	801B	803
1⅝ in.	526A	1035

Clamps made in two styles.
A—without eye.
B—with eye.

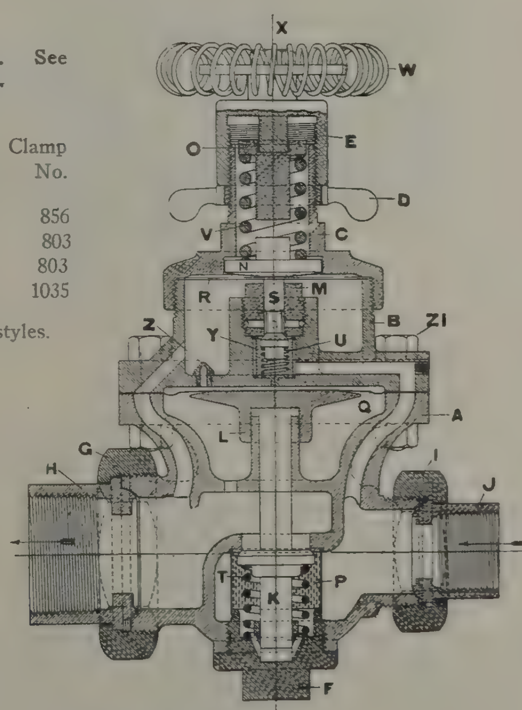


Fig. 2065—Gold Ideal Pressure Regulators.

Gold Car Heating & Lighting Company. No. 874—1x1½ inch.
889—1½x2 inch.

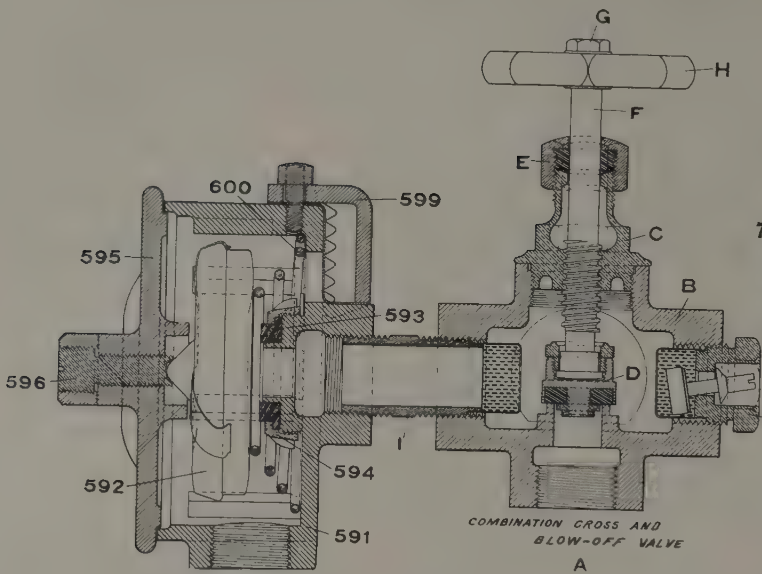


Fig. 2066—Gold Horizontal or Tee-Trap, No. 590.

Parts of Trap, Fig. 2066.

591	*Body*	A	*Complete Valve Section*
595	*Cover*	B	*Body Only*
599	*Ventilator*	C	*Bonnet Only*
596	*Set Screw and Nut*	D	*Disc Holder Complete*
594	*Collar*	E	*Packing Nut*
593	*Seat*	F	*Spindle*
600	*Spring*	G	*Spindle Nut*
592	*Diaphragm*	H	*Hand Wheel*
		I	*Strainer Nipple*

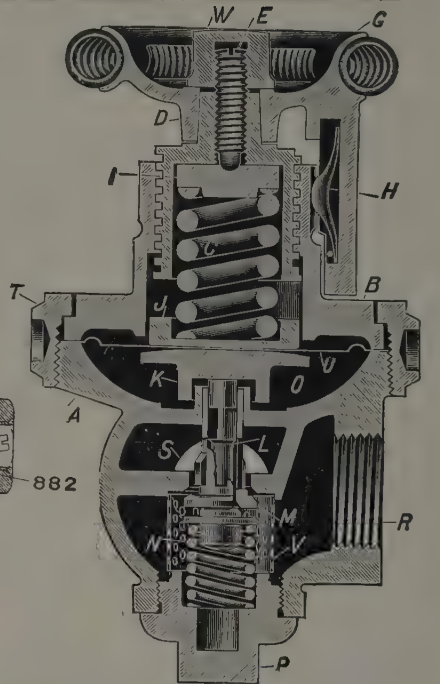


Fig. 2067—Gold Stop Valve Car Pressure Regulator, No. 737.

Parts of Regulator, Fig. 2067.

A	*Body of Regulator*	K	*Bottom Flange*
B	*Dome of Regulator*	L	*Auxiliary Valve Spindle*
C	*Top Spring*	M	*Main Valve Spindle*
D	*Regulating Screw*	N	*Bottom Spring*
E	*Set Screw*	P	*Bottom Plug*
G	*Wheel*	T	*Spanner Nut*
H	*Indicator Spring*	U	*Diaphragm*
I	*Washer*	V	*Strainer*
J	*Top Flange*	W	*Lock Nut*

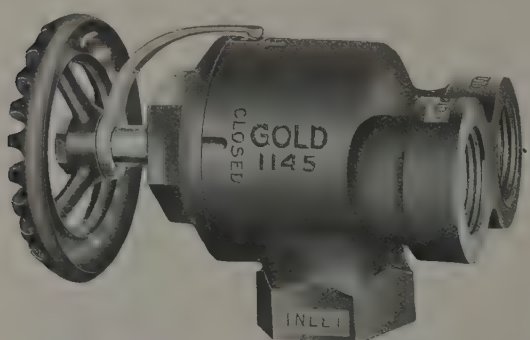


Fig. 2068—Packless Twin Supply Valve, No. 1145.

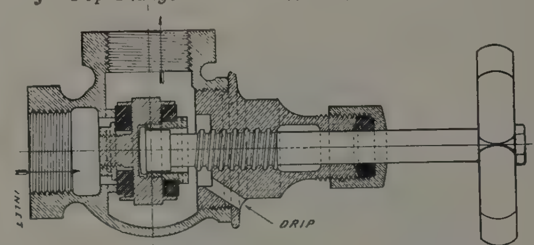


Fig. 2069—Gold Drip Valve, No. 870.

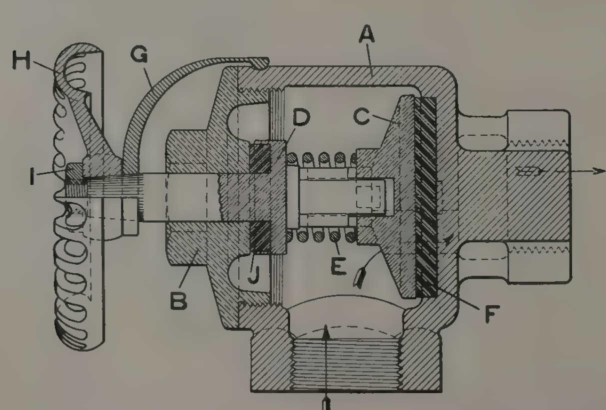


Fig. 2070—Section Through Valve Shown in Fig. 2068.

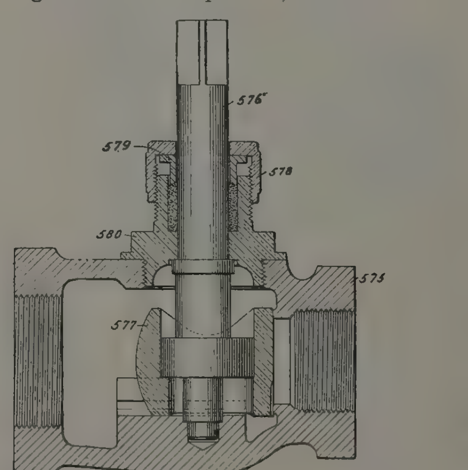


Fig. 2071—End Valve, No. 574.

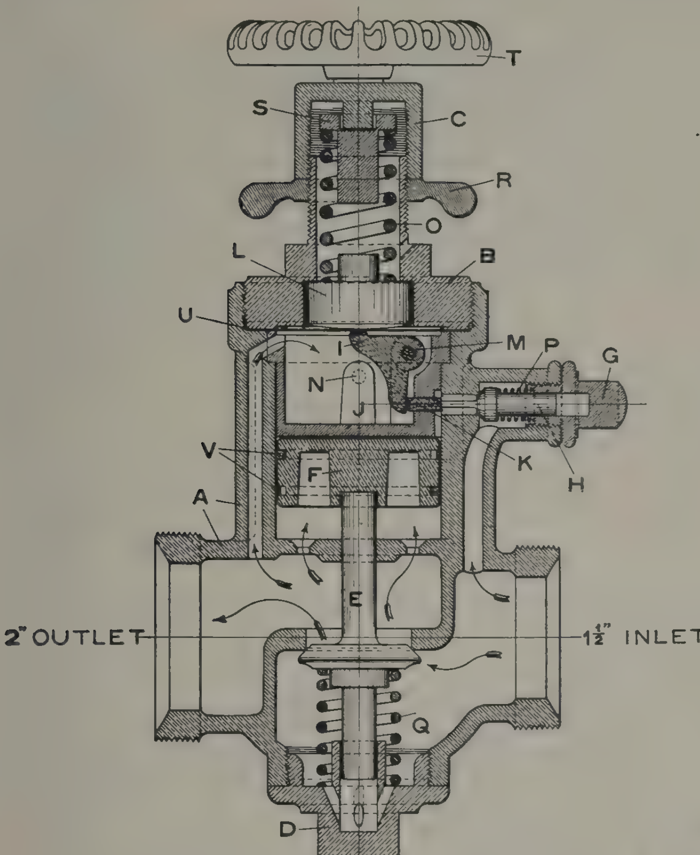


Fig. 2072—Gold Pressure Regulator, No. 1014.

Parts of Regulator, Fig. 2072.

A *Body*
B *Dome*
C *Adjusting Screw*
D *Bottom Plug*
E *Main Valve*
F *Piston*
G *Control Valve Cap*
H *Control Valve Stem*
I *Bell Crank*
J *Bell Crank Case*
K *Valve Pin*
L *Diaphragm Plate*
M *Bell Crank Screw*
N *Stop Screw*
O *Regulating Spring*
P *Control Valve Spring*
Q *Bottom Spring*
R *Lock Nut*
S *Top Spindle*
T *Hand Wheel*
U *Diaphragm*
V *Piston Rings*

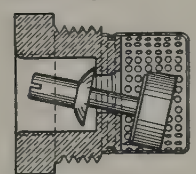


Fig. 2073—Gold Gravity Safety Trap No. 882.

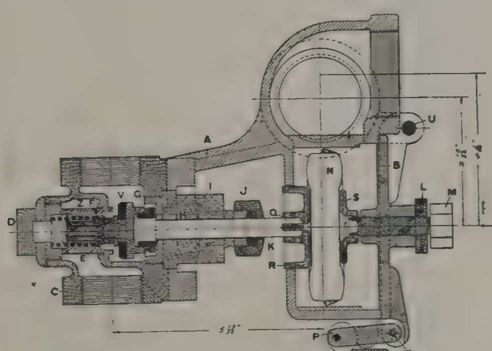


Fig. 2076—Gold Vapor Valve, No. 887.

Parts of Valve, Fig. 2076.

A *Body*
B *Door*
C *Valve Body*
D *Bottom Plug*
E *Screen*
F *Disc Nut*
G *Disc Holder*
H *Valve Seat Nut*
I *Bonnet*
J *Packing Nut*
K *Valve Stem*
L *Lock Nut*
M *Adjusting Screw*
N *Diaphragm*
O *Cam*
P *Link*
Q *Valve Stem Screw*
R *Diaphragm Plate*
S *Adjusting Screw*
T *Rivets*
U *Hinge Pin*
V *Disc*
W *Body Bolt Nuts*
X *Body Bolts*
Y *Cotters*
Z *Spring*

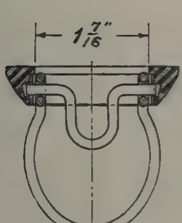


Fig. 2074—Gold Steam Coupler Gasket, No. 403B.

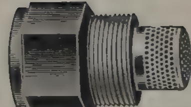


Fig. 2075—Strainer Nipple, No. 840.

Fig. 2077—Gold Steam Hose Coupler, No. 804S.

Gold Car Heating & Lighting Company.

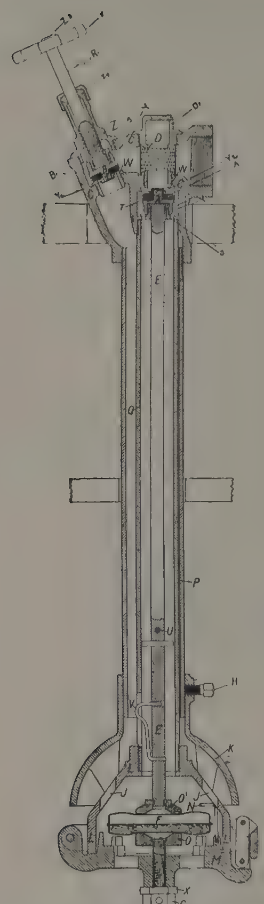
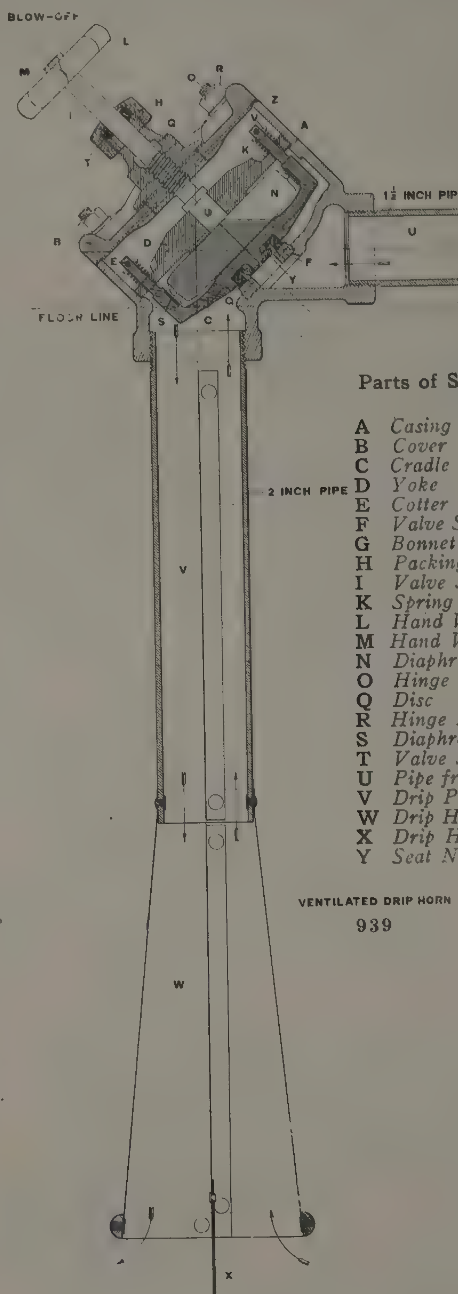


Fig. 2078—Gold Vertical Trap, No. 606.

Parts of Vertical Trap, Fig. 2078.

A *Automatically Operated Valve*
A_1 *Disc for Automatic Valve*
B *Blow-off Valve*
B_1 *Disc for Blow-off Valve*
C *Cast Iron Trap Head*
C_1 *Trap Head Complete*
D *Strainer to Protect Valve "A"*
D_1 *Trap Head Cap*
E *Valve Stem*
E_1 *Valve Stem Complete*
F *Expansion Diaphragm (containing Expansive Fluid) for Operating Automatic Valve A*
G *Set Screw for Adjusting Trap*
H *Set Screw*
I *Cam Lock for Locking Cover M of Trap*
J *Hand Wheel*
K *Shield to Direct Course of Blow-off Discharge*
L *Cast Iron Casing*
M *Hinged Cover to Trap Casing*
N *Hooks to Prevent Diaphragm Shifting*
N_1 *Bottom Casing Complete*
O *Bottom Plate*
O_1 *Top Plate*
P *Outside Tube*
Q *Inside Tube*
R *Valve Stem for Blow-off*
S *Stem Nut*
T *Guides to Automatic Valve*
U *Guides to Automatic Valve Stem*
V *Spring Catch to Prevent Valve Stem Falling Out when Cover is Opened*
W *Brass Valve Seats Screwed into Iron body*
X *Lock Nut*
Y *Disc Holder*
Y_2 *Disc Nut*
Z *Bonnet of Blow-off Valve*
Z_1 *Blow-off Valve Bonnet without Disc and Disc Holder*
Z_2 *Blow-off Valve Bonnet Complete*
Z_3 *Valve Stem Nut*
Z_4 *Packing Nut*



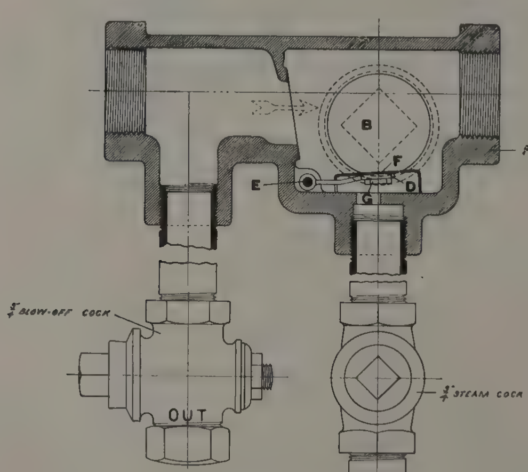
Parts of Steam Trap, Fig. 2079.

A *Casing*
B *Cover*
C *Cradle*
D *Yoke*
E *Cotter*
F *Valve Seat*
G *Bonnet*
H *Packing Nut*
I *Valve Stem*
K *Spring*
L *Hand Wheel*
M *Hand Wheel Nut*
N *Diaphragm*
O *Hinge Bolt*
Q *Disc*
R *Hinge Bolt Nut*
S *Diaphragm Clip*
T *Valve Stem Packing*
U *Pipe from Radiator*
V *Drip Pipe*
W *Drip Horn*
X *Drip Horn Diaphragm*
Y *Seat Nut*

VENTILATED DRIP HORN

939

Fig. 2079—Gold Duplex Ventilated Steam Trap, No. 912.



923 925

Fig. 2080—Gold Filling Device, No. 631.

Fig. 2081—Expansion Drum, No. 615.

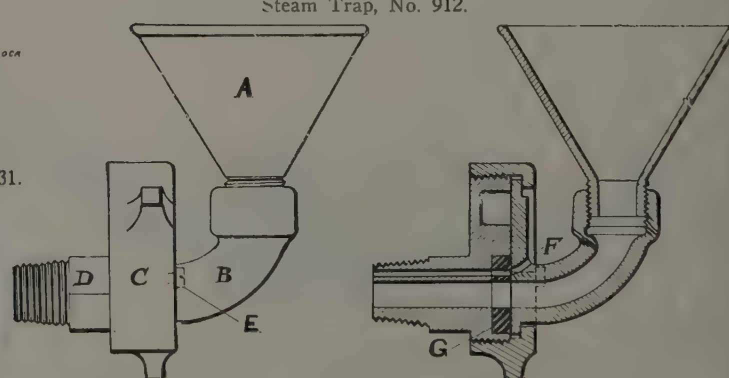


Fig. 2082—Gold Filling Cocks, No. 628

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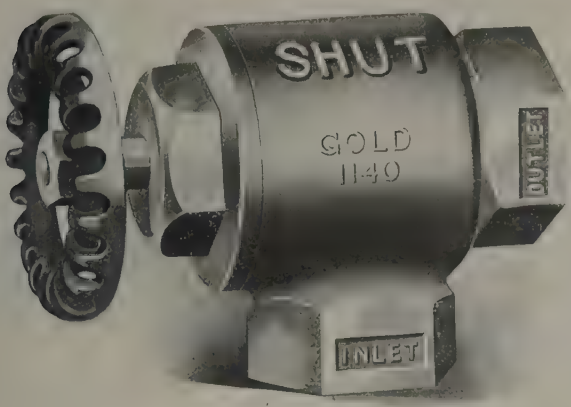

Fig. 2083—Gold Packless Inlet Valve, No. 1140

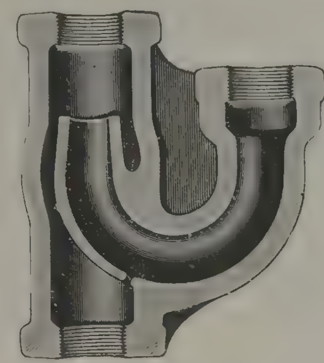

Fig. 2084—Gold Sealed Jet Accelerator, No. 616.

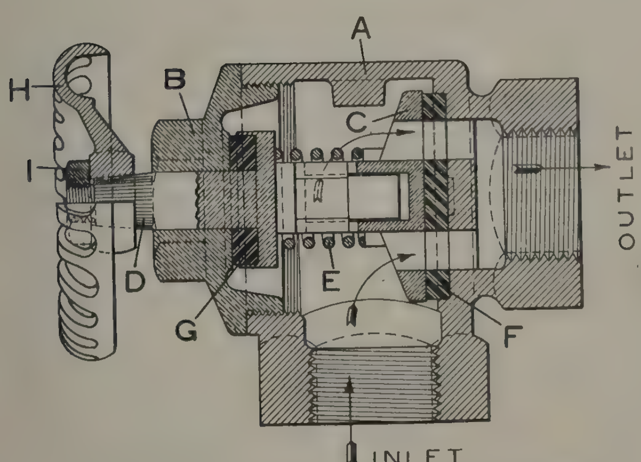

Fig. 2085—Section Through Valve Shown in Fig. 2083

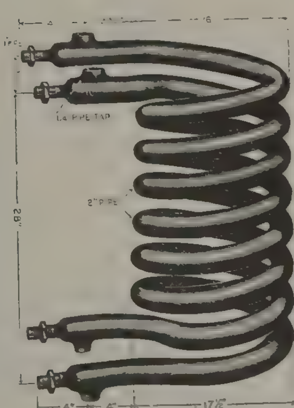

Fig. 2086—Gold Duplex Coil with Welded Ends; 2 in., No. 608A.

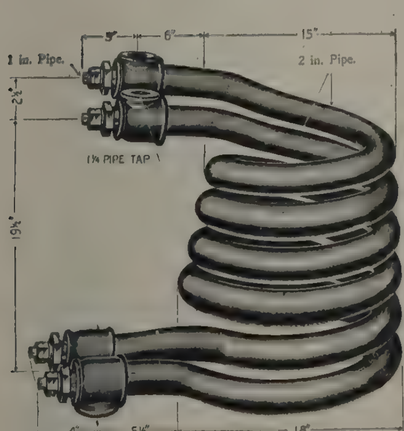

Fig. 2087—Gold Double Duplex Coil (low); 2 in., No. 608.

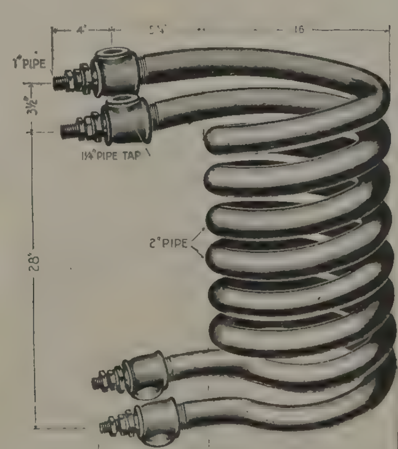

Fig. 2088—Gold Double Duplex Coil (high); 2 in., No. 609.

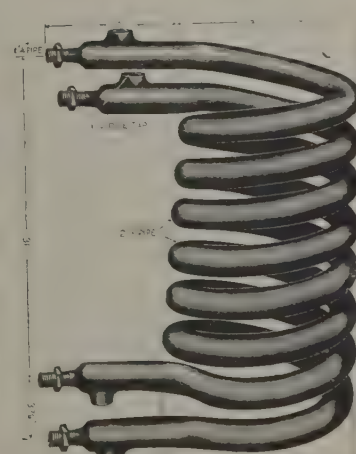

Fig. 2089—Gold Double Duplex Coil with Welded Ends; 2½ in., No 609A.

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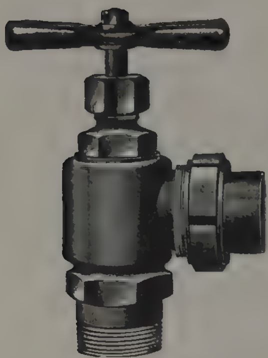

Fig. 2090.—Gold Locomotive Steam Heat Starting Valve No. 532, Size 2 x 1½ inch.

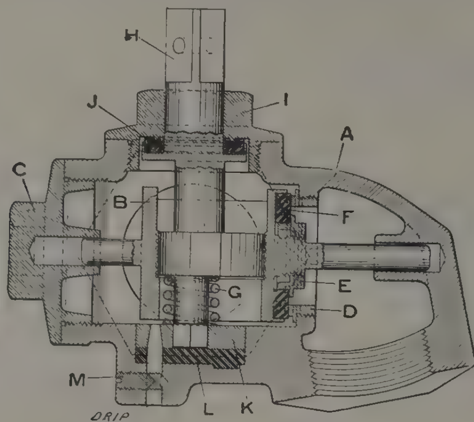

Fig. 2091—Gold Acme End Valve No. 1126—Sectional View.

Fig. 2092—Gold Acme End Valve No. 1126.

List of Parts, Fig. 2091.

A	*Body*	G	*Drip Screw*
B	*Piston*	H	*Spindle*
C	*End Guide Nut*	I	*Bonnet*
D	*Seat Bushing*	J	*Packing Nut*
E	*Seat Retaining Nuts*	K	*Gland*
F	*Composition Seats*		

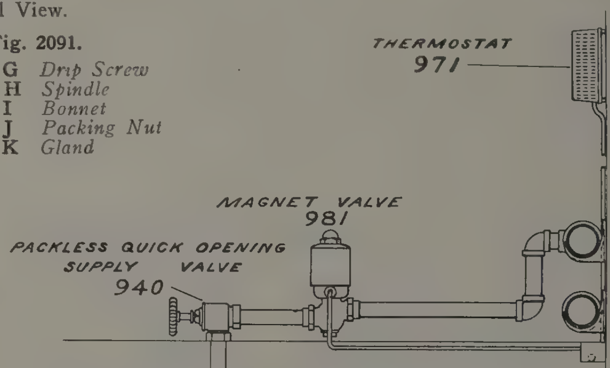

Fig. 2094—Application of Gold Steam Thermostatic Control to a Straight Steam Equipment.

Fig. 2093—Gold Pop-off Safety Valve No. 1137.

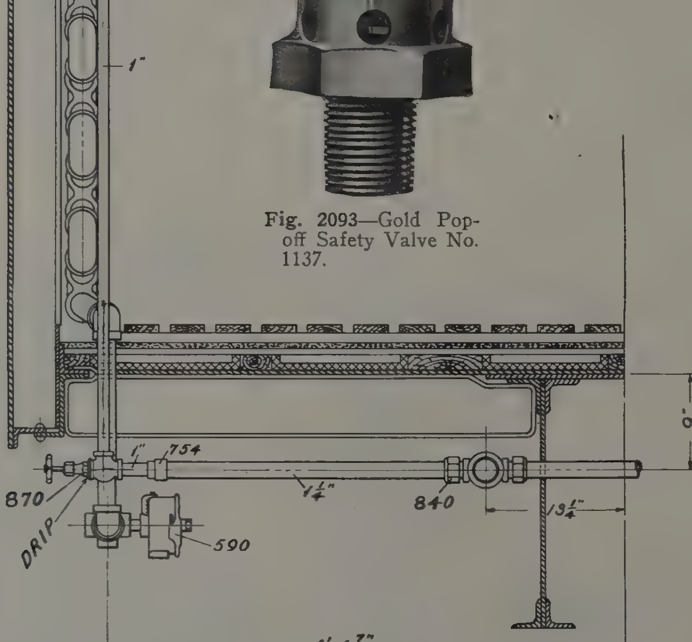

Fig. 2095—Application of Drip Valve, No. 870, to Express Car.

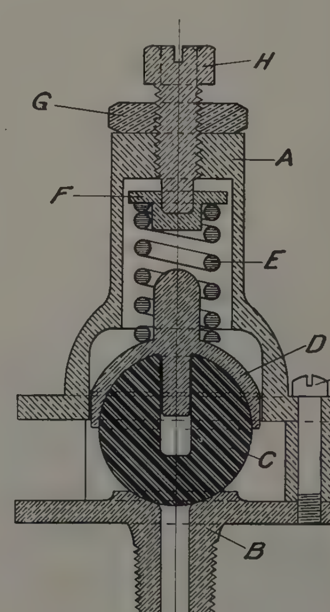

Fig. 2096—Safety Valve, No. 993.

Parts of Safety Valve, Fig. 2096.

A	*Cap*	D	*Cup*	G	*Lock Nut*
B	*Body*	E	*Spring*	H	*Adjusting Screw*
C	*Ball*	F	*Spring Abutment*		

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Fig. 2097—Gold Vapor Valve No. 1112 for Application Inside of Car.

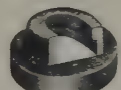

Fig. 2098—Combined Renewable Disc Holder and Disc; Gold's Vapor Valve No. 1112.

Fig. 2099—Gold Vapor Valve No. 1112 with Self-Contained Inlet Valve.

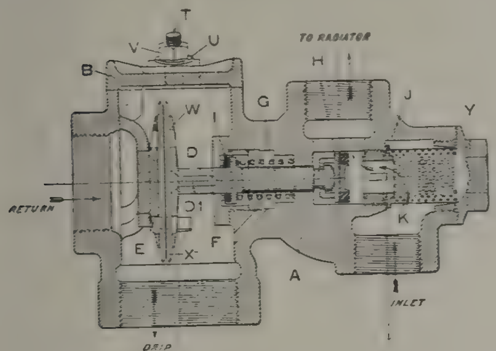

Fig. 2100—Sectional View Gold Vapor Valve No. 1112.

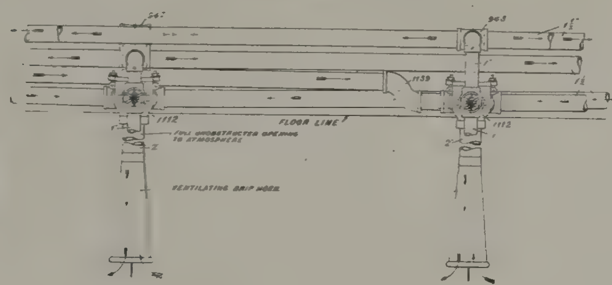

Fig. 2101—Application of Gold Vapor Valve No. 1112 to Passenger Coach Giving Individual Circuit Control. (Note Self Contained Inlet Valves.)

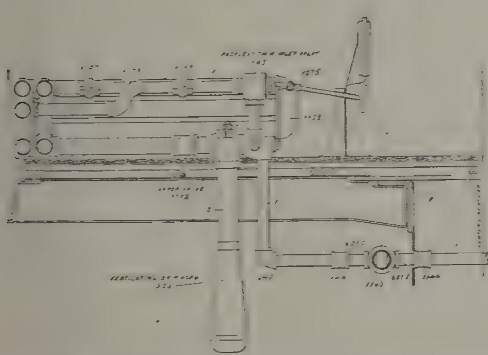

Fig. 2102—Application of Gold Vapor Valve No. 1112 to Passenger Coach, Showing Ventilating Drip Horn No. 939.

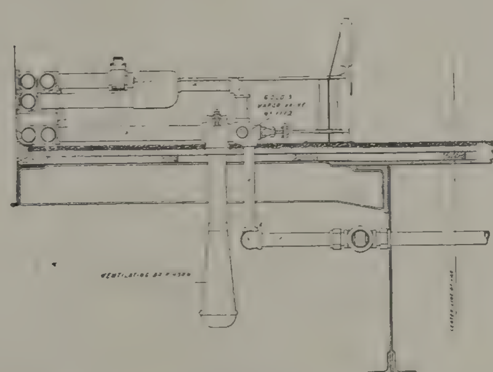

Fig. 2103—Application of Gold Vapor Valve No. 1112 to Existing Piping.

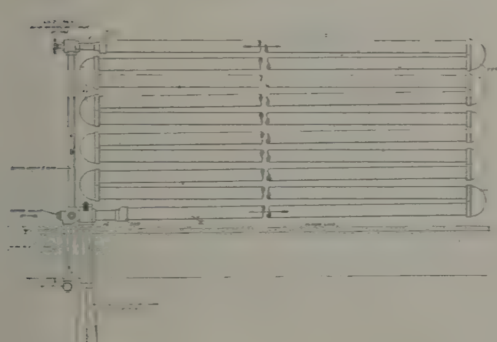

Fig. 2104—Application of Gold Vapor Valve No. 1112 to Baggage or Mail Car Coil.

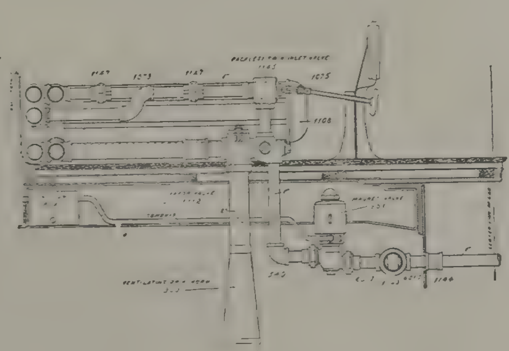

Fig. 2105—Application of Gold Thermostatic Control Valve to System Using Vapor Valve No. 1112.

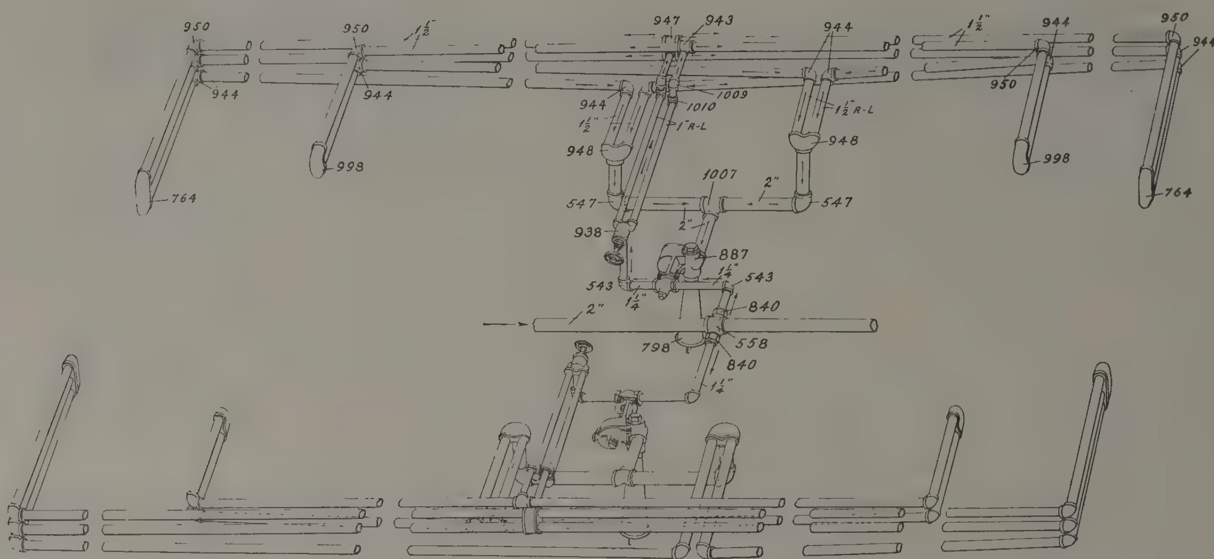

Fig. 2106—Gold Vapor System for Steel Passenger Cars.

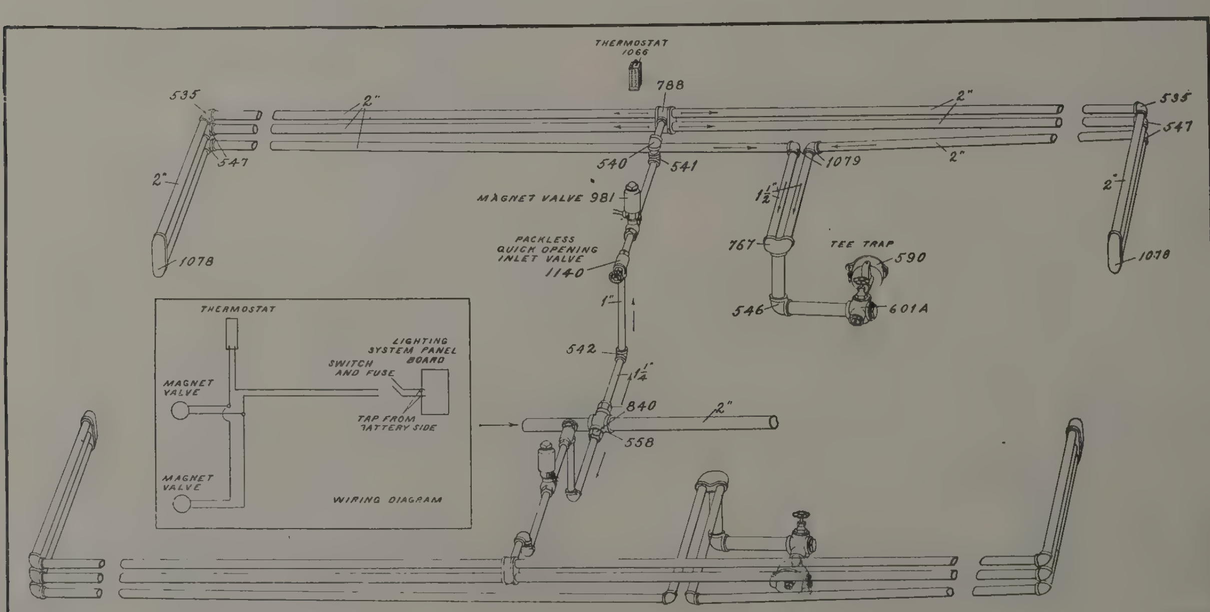

Fig. 2107—Gold Straight Steam System with Thermostatic Control for Steel Passenger Cars.

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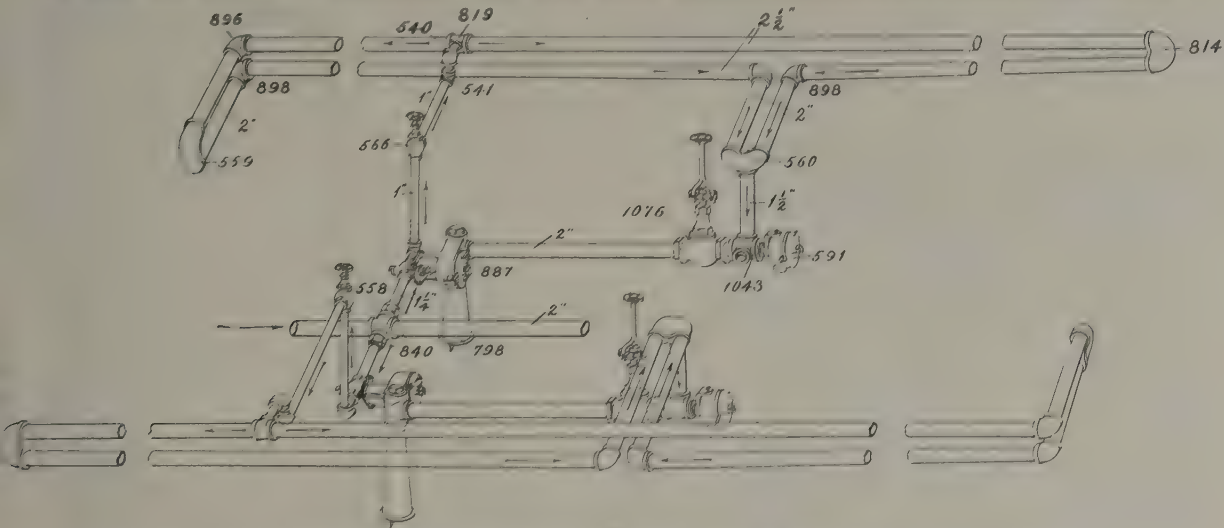


Fig. 2108—Gold Combination Vapor and Pressure System, Type B, as Applied to Steel Coaches.

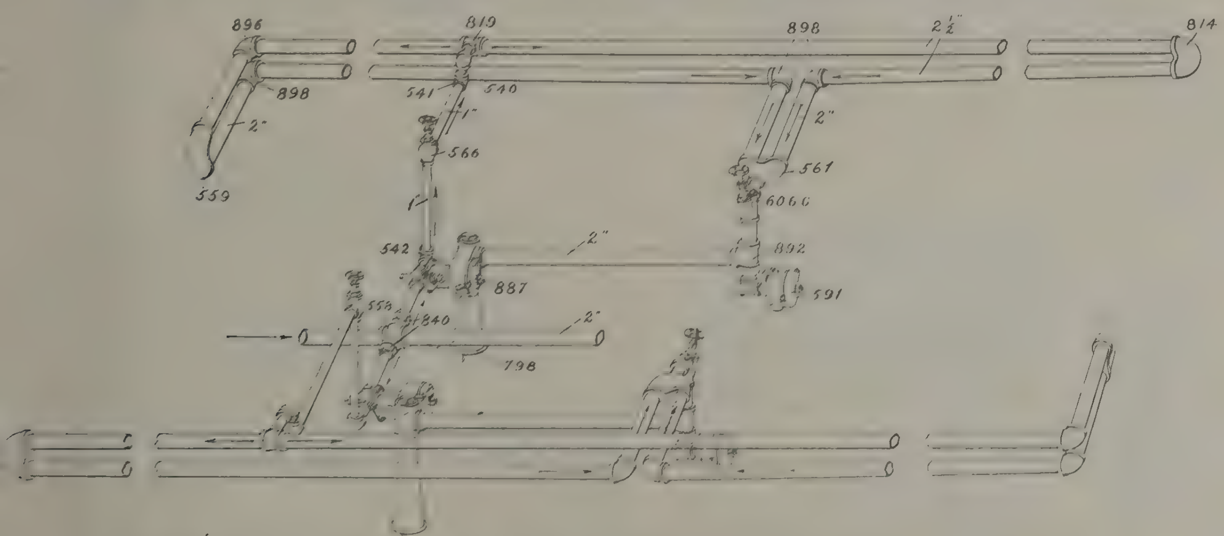
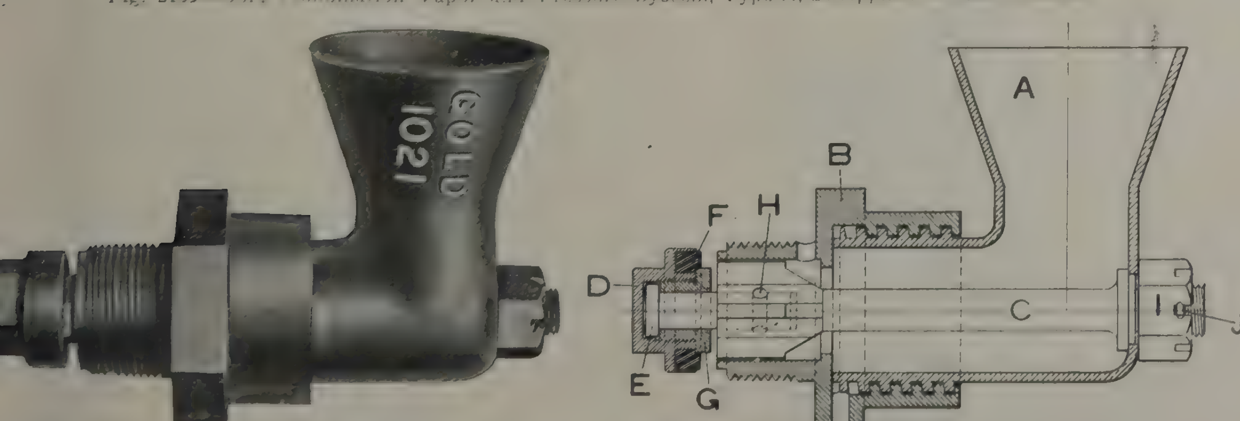


Fig. 2109—Gold Combination Vapor and Pressure System, Type A, as Applied to Steel Coaches.



List of Parts.

A.—Funnel
B.—Body
C.—Valve Stem
D.—Disc Holder
E.—Seat Swivel
F.—[illegible]
G.—Disc Nut
H.—Pin
I.—Castle Nut
J.—Cotter Pin

Fig. 2110—Gold Funnel Cock for Hot Water Circulating Apparatus.

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Fig. 2111—Hose Chains No. 527, Type A, for Hooking Through Coupler or Hose Clamp Eye.

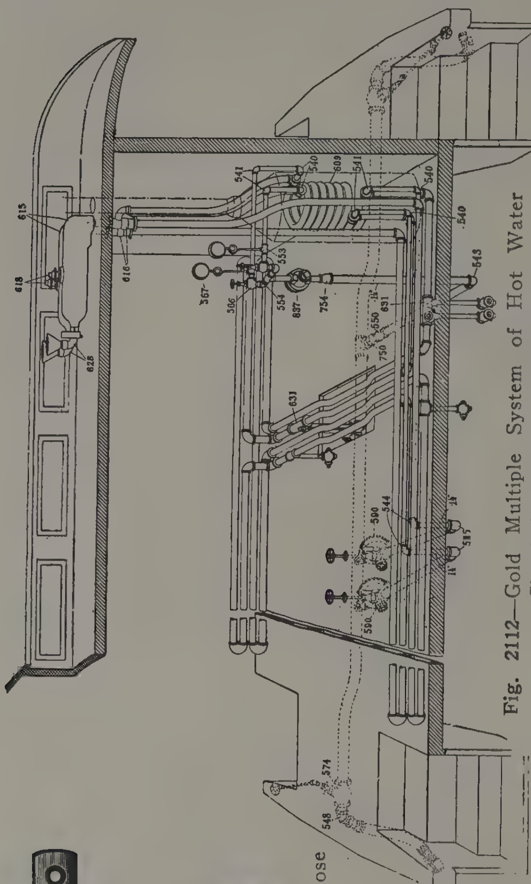

Fig. 2112—Gold Multiple System of Hot Water Circulation with Car Pressure Regulator and Tee Traps.

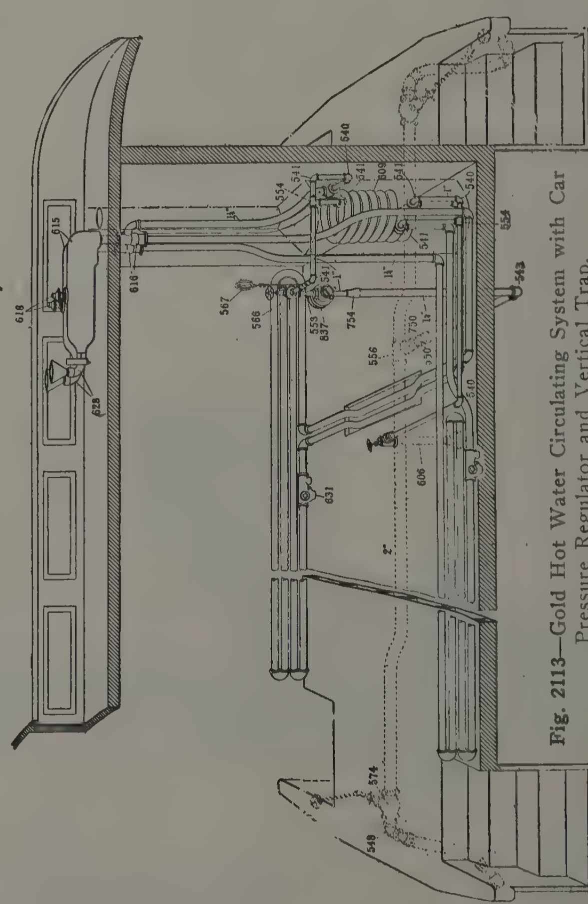

Fig. 2113—Gold Hot Water Circulating System with Car Pressure Regulator and Vertical Trap.

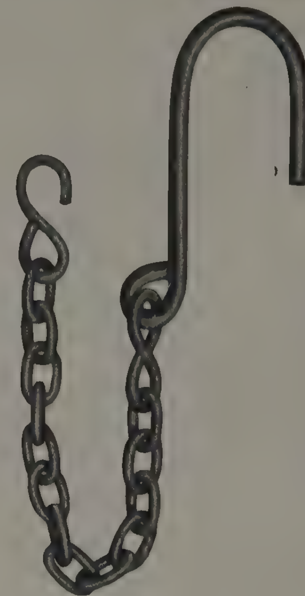

Fig. 2114—Gold Coupler Supporting Chains No. 527, Type B, for Hooking Around Hose Nipple.

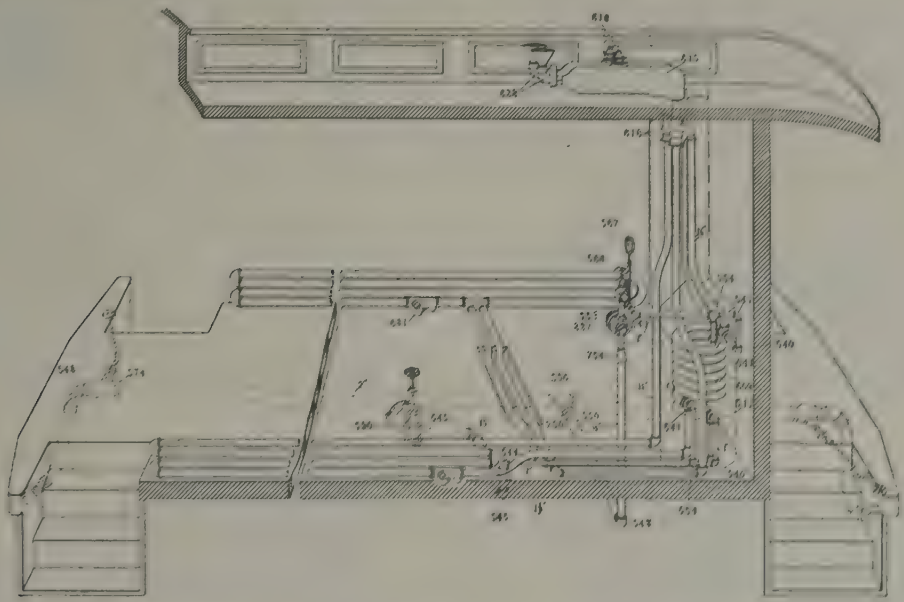

Fig. 2115—Gold Hot Water Circulating System with Car Pressure Regulator and Tee Trap.

Fig. 2116—Gold Interchangeable Deflector Cross-Seat Heater No. 405E. End View Without End Plate Showing Method of Attaching Service Wires. (See Note.)

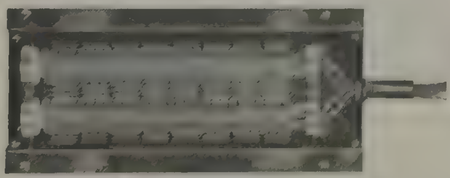

Fig. 2117—Gold Interchangeable Deflector Cross-Seat Heater No. 405E Interior View, Deflector Removed. (See Note.)

Fig. 2118—Application of Gold No. 405E Heater to Cross-Seat.

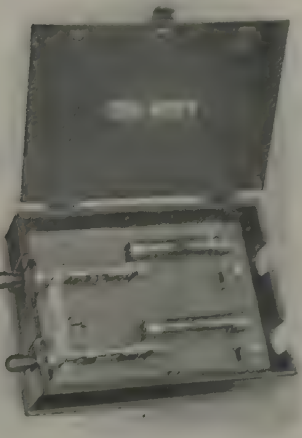

Fig. 2119—Gold Electric Heater Switch, No. 114-E.

NOTE—The Heating Element in Gold Interchangeable Heaters are Standardized and Interchangeable.

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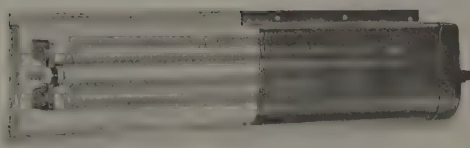

Fig. 2120—Two-Coil Electric Truss Plank Heater, No. 199-E.

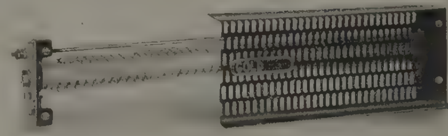

Fig. 2121—One-Coil Electric Truss Plank Heater, No. 206-E.

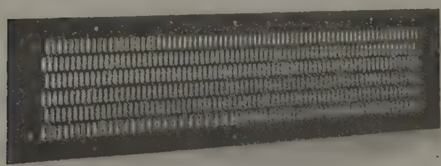

Fig. 2122—Panel Heater, Front Style, No. 177-E.

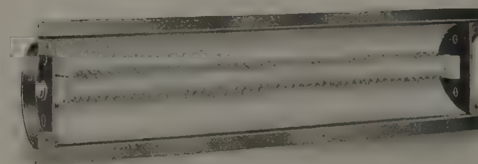

Fig. 2123—One-Coil Electric Panel Heater, No. 212-E.

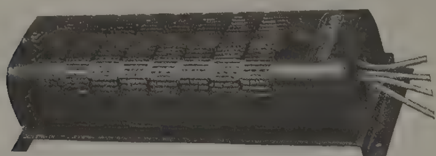

Fig. 2124—Interchangeable Heater No. 417-E, for Installation Under Longidudinal Seats Without Risers (See Note).

Fig. 2125—Ventilated Porcelain Core Supports Used in Electrical Heater.

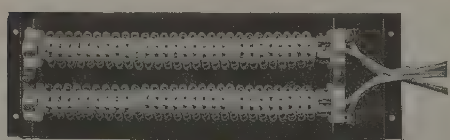

Fig. 2126—Heater No. 417-E, Interior View.

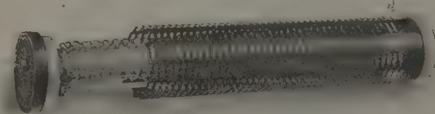

Fig. 2127—One-Coil Electric Cylinder Heater, No. 120-E.

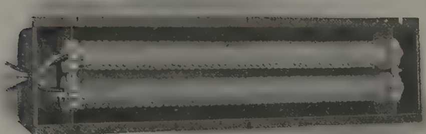

Fig. 2128—Two-Coil Electric Panel Heater, No. 322-E.

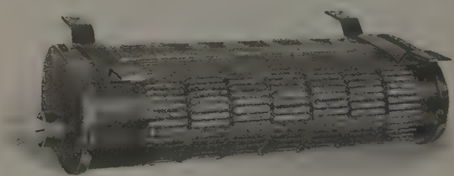

Fig. 2129—Two-Coil Electric Cross Seat Heater, No. 145-E, Type C.

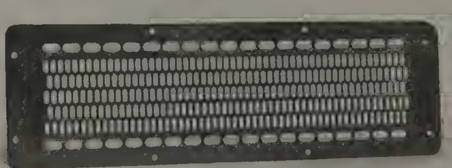

Fig. 2130—Panel Heater, Front Style, No. 329-E.

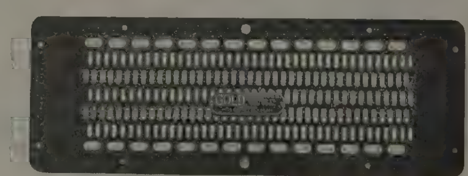

Fig. 2131—Panel Heater Front No. 414-EA for Heater No. 414-E.

Fig. 2132—New Type Support and Coil for Older Type of Electric Heaters.

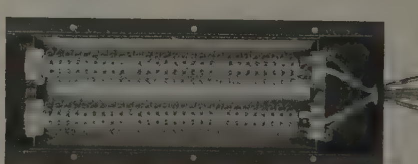

Fig. 2133—Interchangeable Panel Heater No. 414-E.

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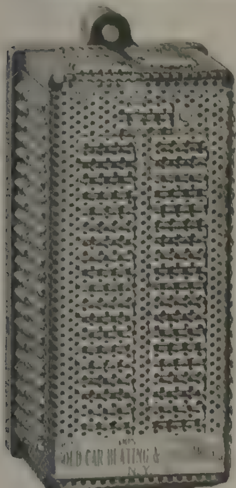

Fig. 2134—Gold Electric Thermostat No. 1066.

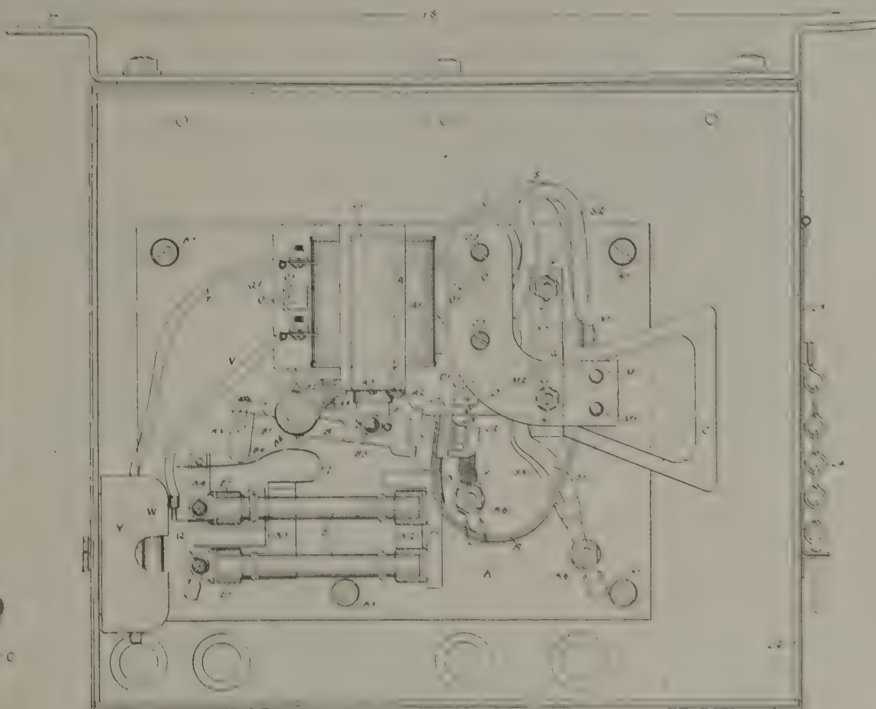

Fig. 2137—Gold Magnetic Switch No. 1015 (Heavy Duty Type) Used with Thermostat No. 1066 for Controlling Electric Heaters.

Fig. 2135—Gold Electric Thermostat (Interior View).

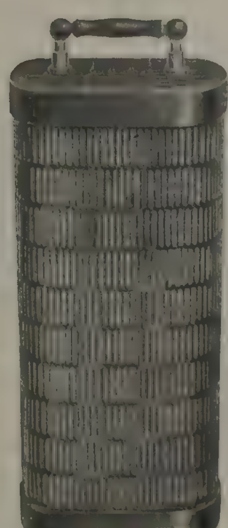

Fig. 2138—Gold Six-Coil Electric Heater No. 360-E.

Fig. 2136—Gold Electric Thermostat with Night and Day Setting.

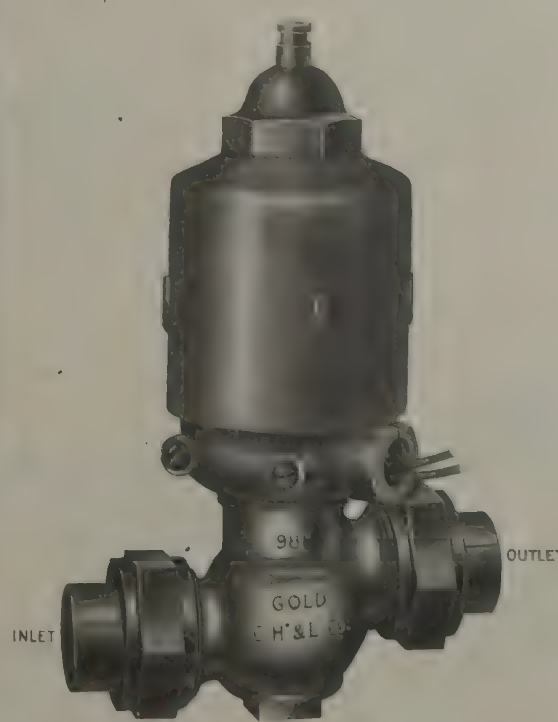

Fig. 2139—Gold Electro-Magnetic Valve No. 981 for Controlling Steam Heat.

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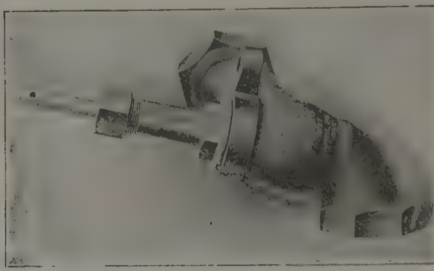


Fig. 2140—End Train Pipe Valve No. 200.

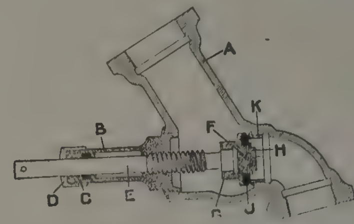


Fig. 2141—End Train Pipe Valve No. 200.

Parts of Valve, Fig. 2141.

A	*Body Casting*	200*A*	D	*Gland Nut*	133*GD*	H	*Gasket Nut*	133*GJ*
B	*Bonnet*	195*B*	E	*Stem*	133*GE*	J	*Gasket*	133*GK*
C	*Gland*	133*GC*	F	*Swivel Head*	133*GG*	K	*Brass Seat*	195*D*
			G	*Swivel Head Nut*	133*GH*			

Parts of Steam Trap, Fig. 2142.

A	*Body Casting*	138*RA*	L	*Swivel Head Gasket*	138*CL*
B	*Upper Basket Casting*	138*RB*	M	*Spring*	138*CM*
C	*Lower Basket Casting*	138*CU*	N	*Cap for Valve Stem*	138*CR*
D	*Brass Seat for Thermostatic Valve*	138*RC*	O	*Lower Spider Plate*	138*CW*
E	*Curved Nipple for Blow-off*	138*RD*	P	*Bonnet*	100*B*
F	*Strainer*	138*LC*	Q	*Valve Stem*	100*C*
G	*Stem or Rod*	138*LD*	R	*Swivel Head*	100*D*
H	*Diaphragm*	138*CA*	S	*Swivel Head Nut*	100*E*
I	*Upper Spider Plate*	138*CE*	T	*Gasket*	100*G*
J	*Swivel Head*	138*CJ*	U	*Nut for T*	100*H*
K	*Swivel Heat Nut*	138*CK*	V	*Gland*	100*J*
			W	*Gland Nut*	100*K*
			X	*Hand Wheel*	7*R*

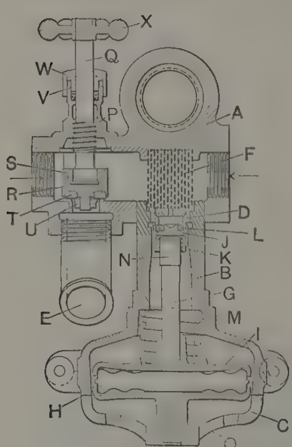


Fig. 2142—Section Through Steam Trap No. 138R

Fig. 2143—No. 33TD Steam Coupler with Two-Piece Hose Clamp.

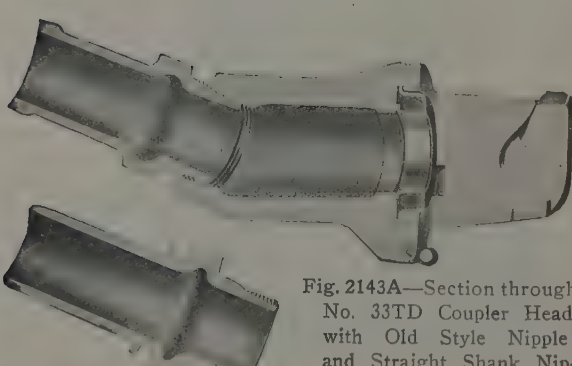


Fig. 2143A—Section through No. 33TD Coupler Head, with Old Style Nipple; and Straight Shank Nipple for Two-Piece Hose Clamp.

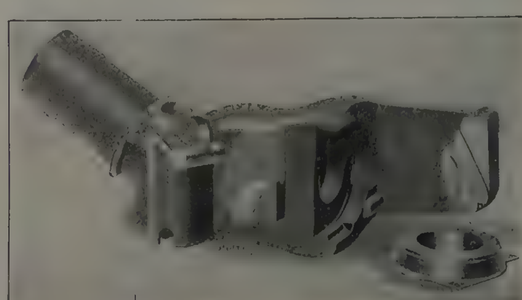


Fig. 2144—Consolidated Steam Coupler No. 33.

Consolidated Car Heating Company.

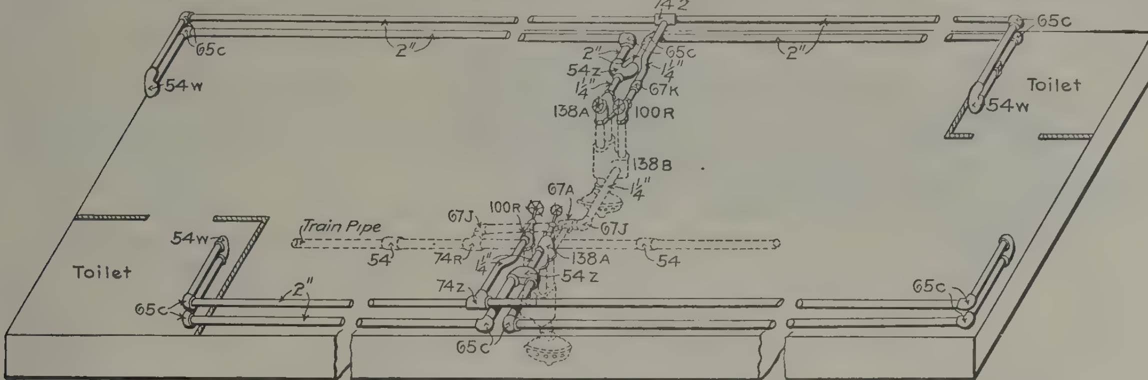


Fig. 2145—Arrangement of Piping for Standard Direct Steam System with Two Traps No. 138.

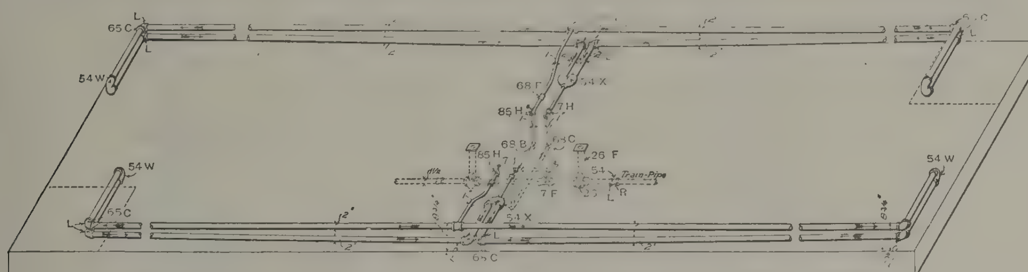


Fig. 2146—Arrangement of Piping for Direct Steam System No. 2, with Special Tee and Cock.

Parts of Heating Apparatus, Figs. 2145-2148.

20	*Sewall Coupler*	67K	*R. & L. Couplings*	85AD	*Return Tee*
45A	*1½ in. Pipe Clamp*	67M	*Elbow*	100R	*Graduating Steam Valve*
54	*Coupling, R. & L.*	68B	*Elbow*	133G	*End Train Pipe Valve*
54W	*Return Bend*	68C	*R. & L. Elbow.*	138	*Steam Trap*
54Z	*Return Bend with Eccentric Outlet.*	68F	*R. & L. Coupling*	138A	*Steam Trap*
55L	*Expansion Bracket*	74R	*Tee*	138B	*Steam Trap*
67A	*Tee*	74Z	*Tee*	138C	*Steam Trap*
67J	*R. & L. Elbow*	85AB	*Three-Pipe Manifold*	138L	*Steam Trap*
		85AC	*Center Tee*		

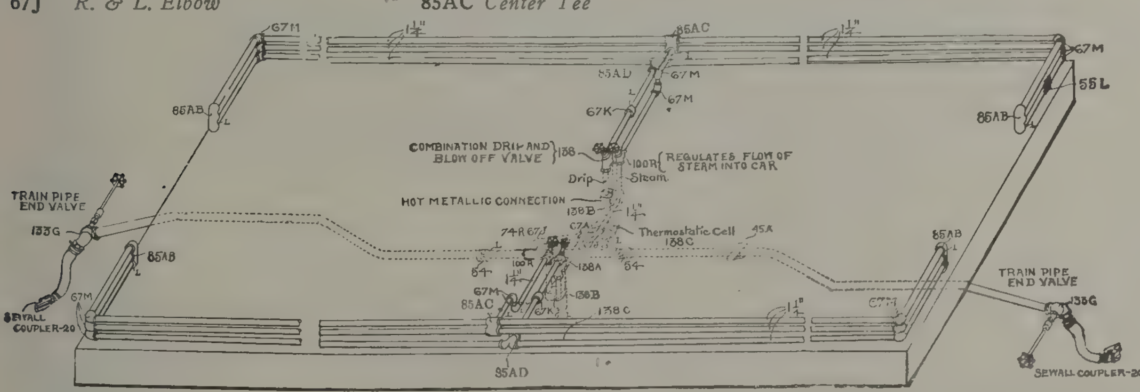


Fig. 2147—Piping for Direct Steam System C, Showing 3-Pipe System with Two Traps No. 1381.

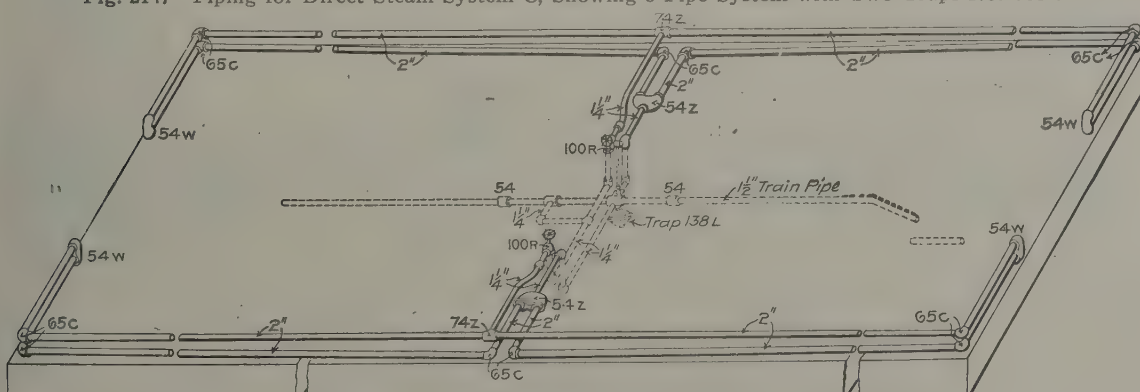


Fig. 2148—Piping for Direct Steam System B, with One Thermostatic Trap No. 138L.

Consolidated Car Heating Company.

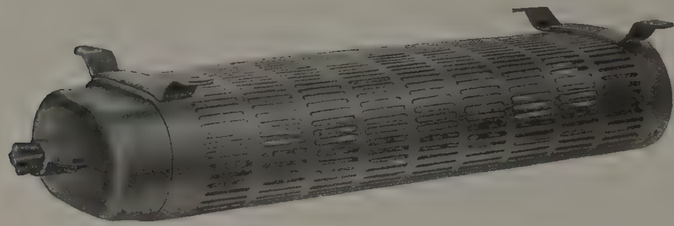


Fig. 2149—Electric Cross Seat Heater.

Fig. 2150—Steam Trap No. 138L.

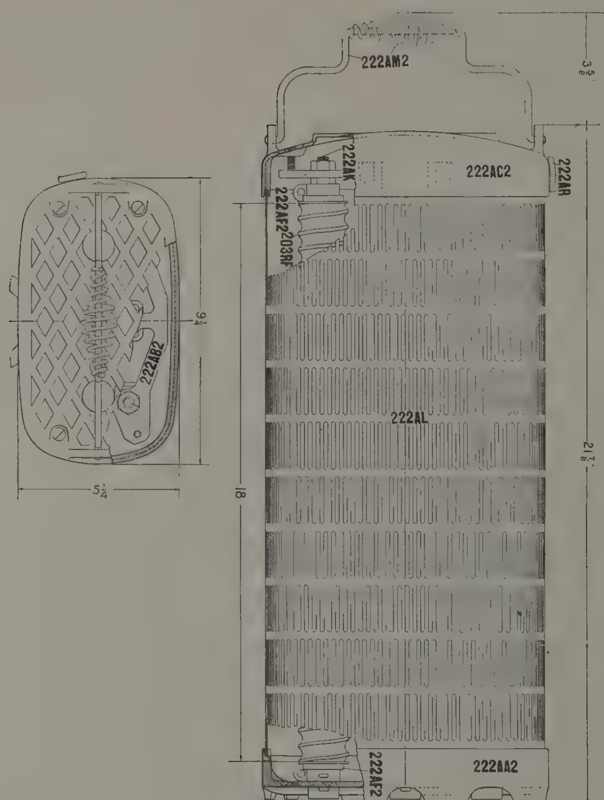


Fig. 2151—Electric Cab Heater.

Fig. 2152—Steam Inlet Valve No. 100L.

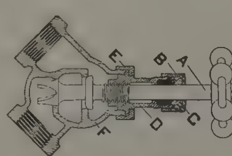


Fig. 2153 — Graduating Steam Valve No. 85H.

Fig. 2154—Safety Valve No. 59C.

Fig. 2155—Graduating Steam Valve No. 85H.

Fig. 2156—End Train Pipe Valve No. 133G.

Fig. 2157—Filler Cock No. 121.

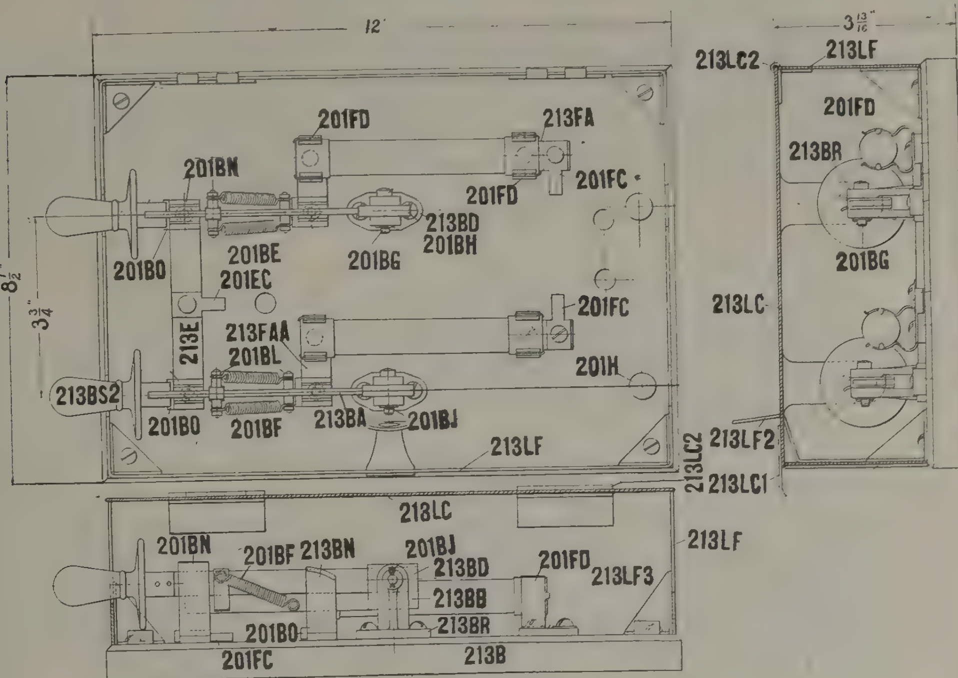


Fig. 2158—Heater Switch.

Fig. 2159—Electric Panel Heater.

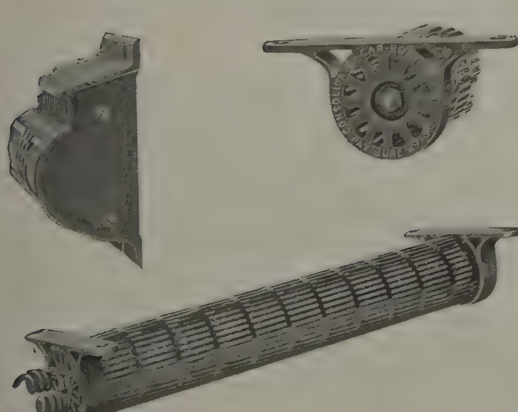


Fig. 2160—Single Coil Electric Heater, Drop Pattern. No. 192, for Cross Seats.

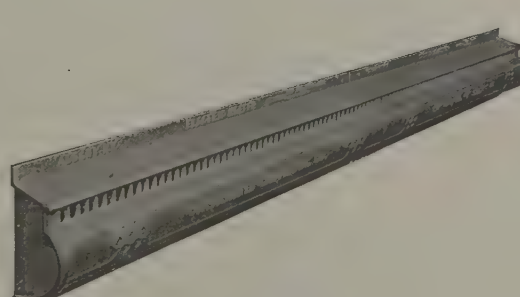


Fig. 2161—Continuous Panel, Single Coil, Electric Heater No. 93T.

Consolidated Car Heating Company.

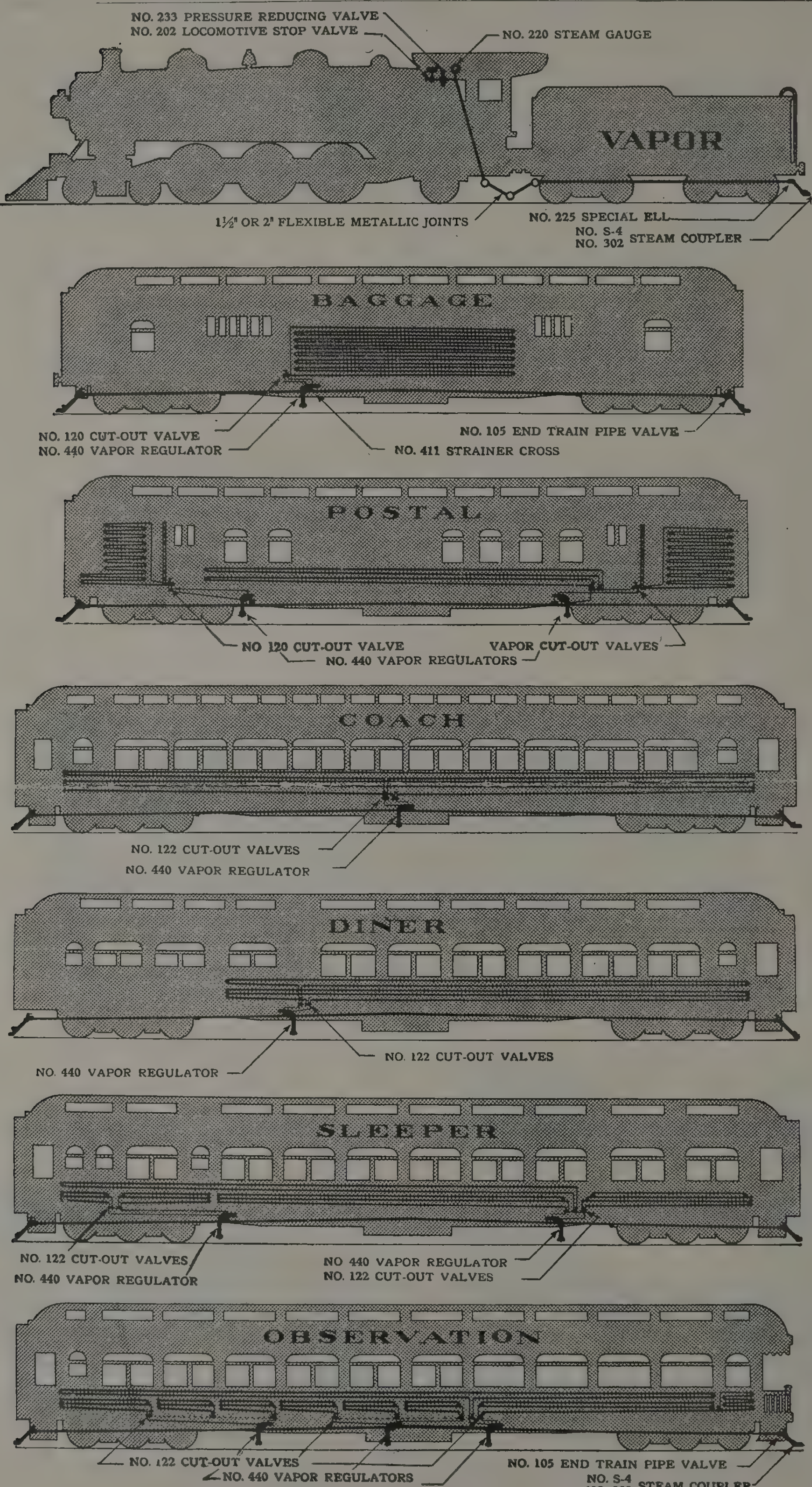


Fig. 2162—Complete Passenger Train Equipped with Vapor Heating System.

Vapor Car Heating Company.

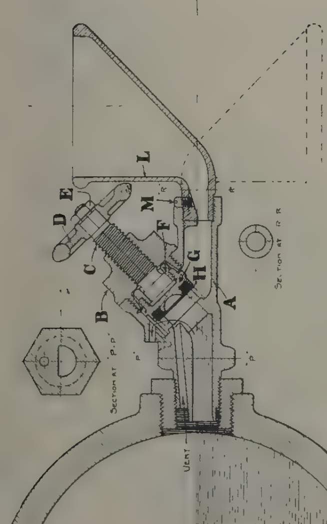


Fig. 2163—Combination Valve for Expansion Drum of Hot Water Circulating System.

Fig. 2164—Combination Valve for Hot Water Heating System.

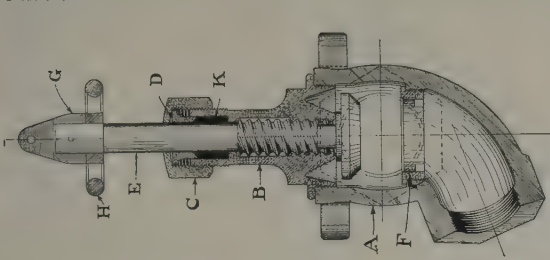


Fig. 2165 — Screw Type End Train Pipe Valve.

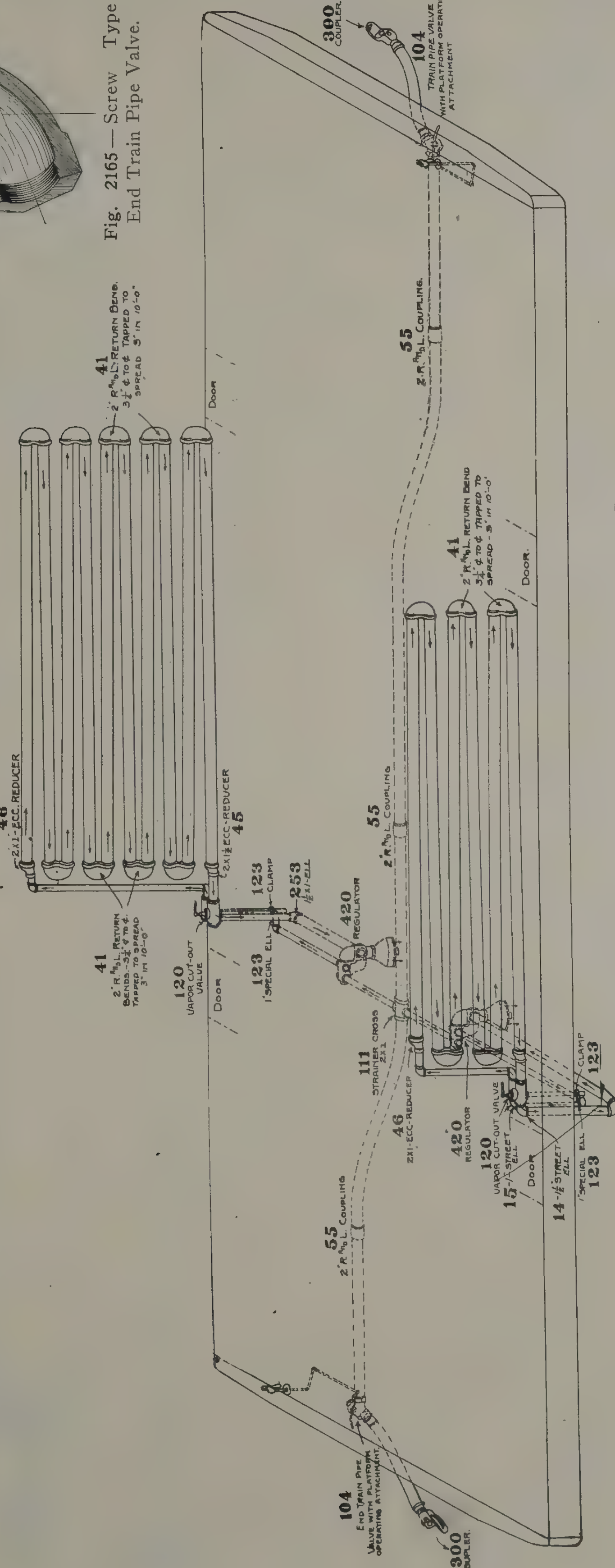


Fig. 2166—Vapor Heating System Installation in Baggage Car.
Vapor Car Heating Company.

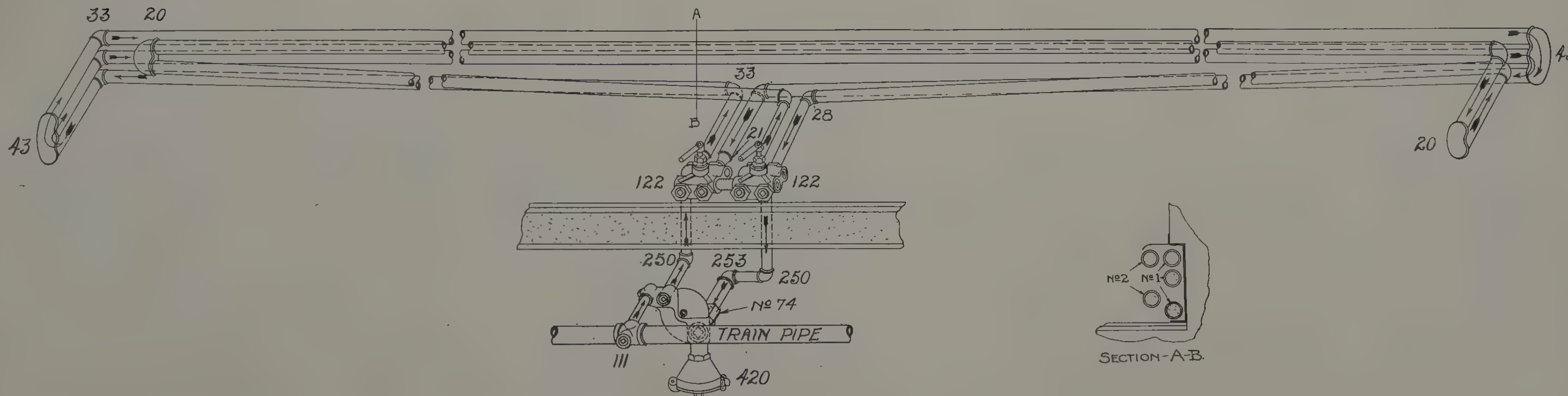


Fig. 2167—Piping Arrangement for Multiple Regulation of Vapor System in Passenger Car.

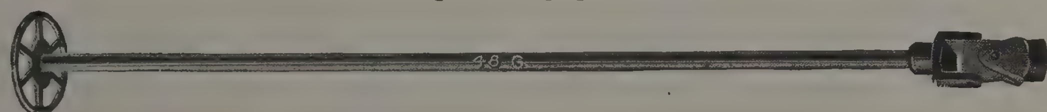


Fig. 2168—Extension Handle for No. 106 Valve.

Fig. 2169—No. 1 Style Vapor and Drain Valve.

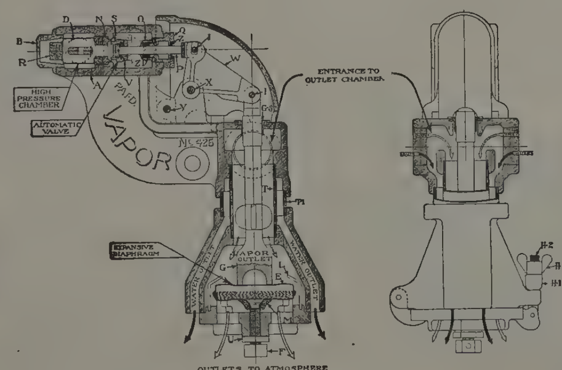


Fig. 2170—Cross Section of Short Type Vapor Regulator.

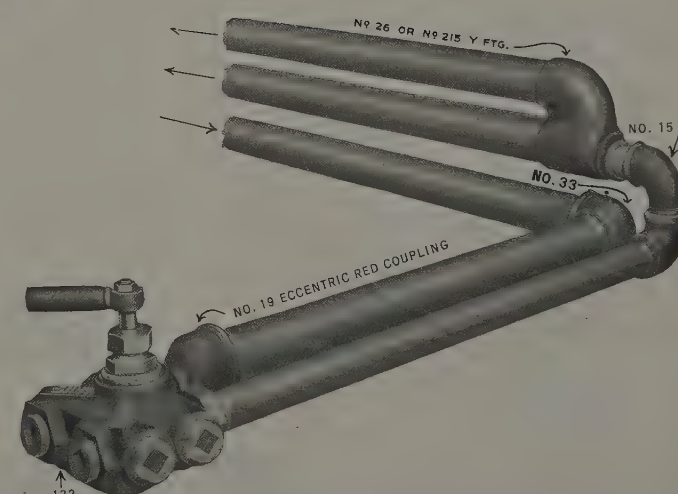


Fig. 2171—One Method of Connecting a Three-Pipe Coil Feeding at the end.

Vapor Car Heating Company.

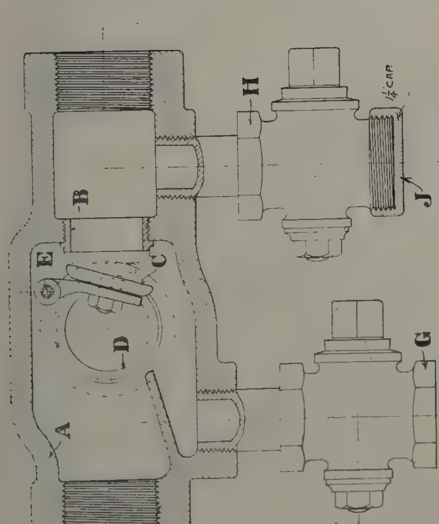


Fig. 2172– Section Through Hot Water Filling Device.

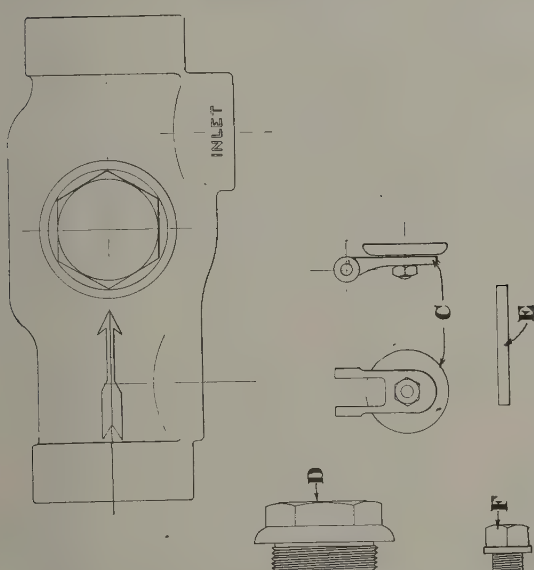


Fig. 2173—Filling Device for Hot Water Heating System.

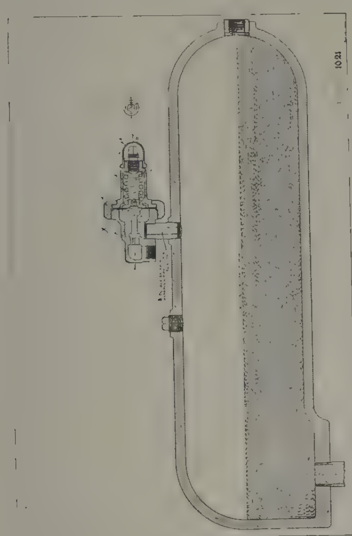


Fig. 2174—Expansion Drum with No. 510 Safety Valve.

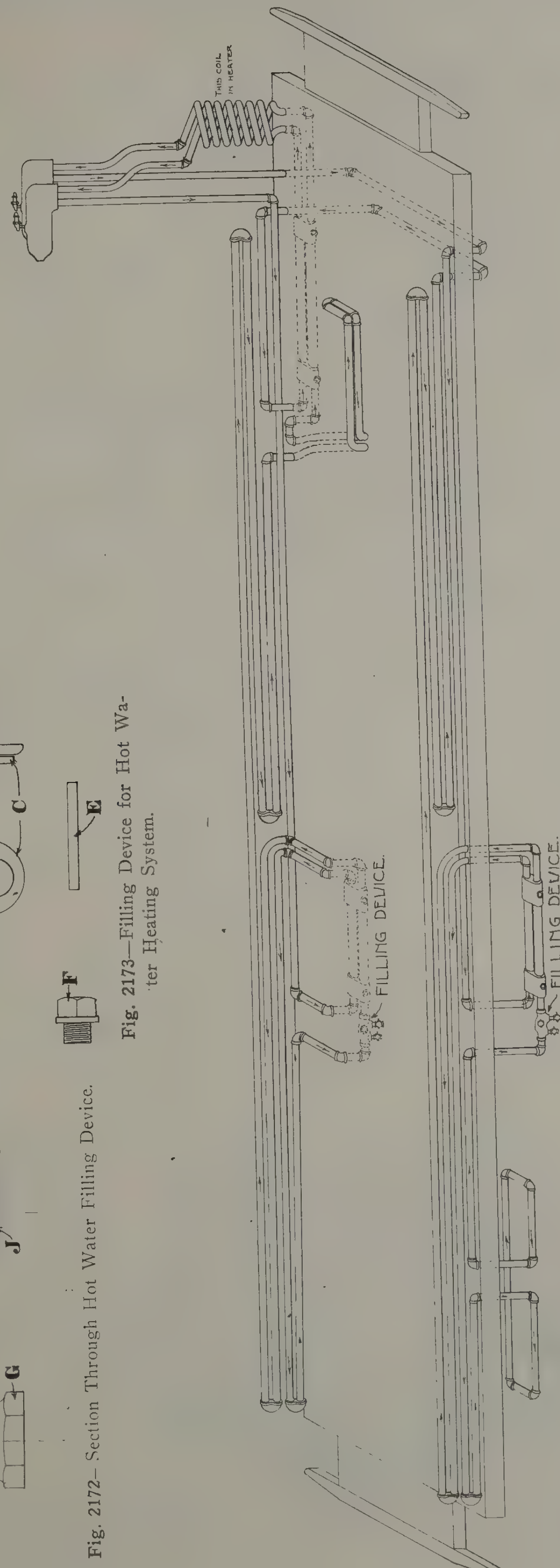


Fig. 2175—Hot Water System Installation.

Vapor Car Heating Company.

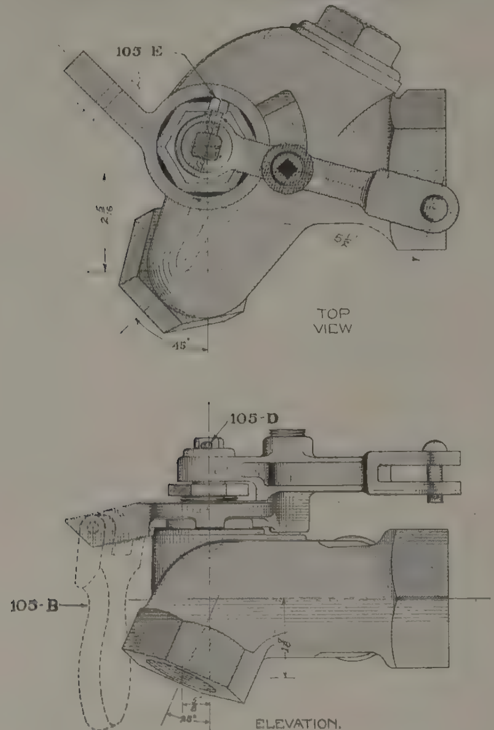


Fig. 2176—End Train Pipe Valve.

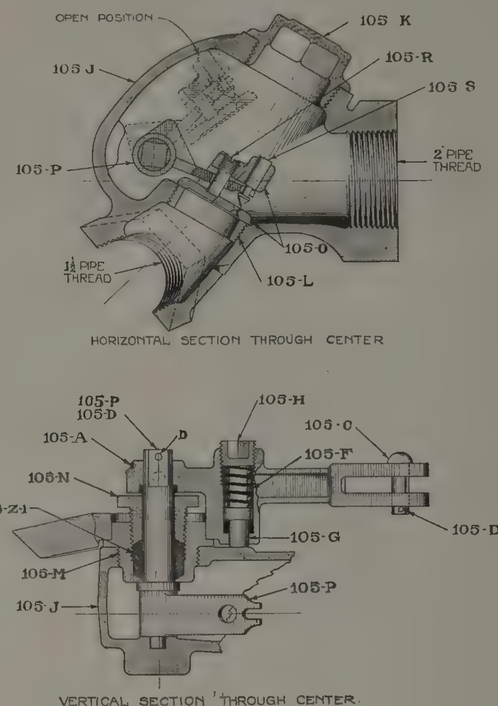


Fig. 2177—End Train Pipe Valve Cross Sections.

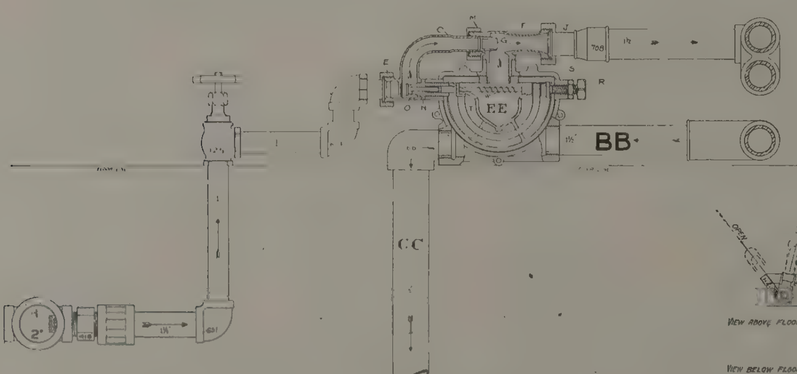


Fig. 2178—Application and Cross Section of Unotherm.

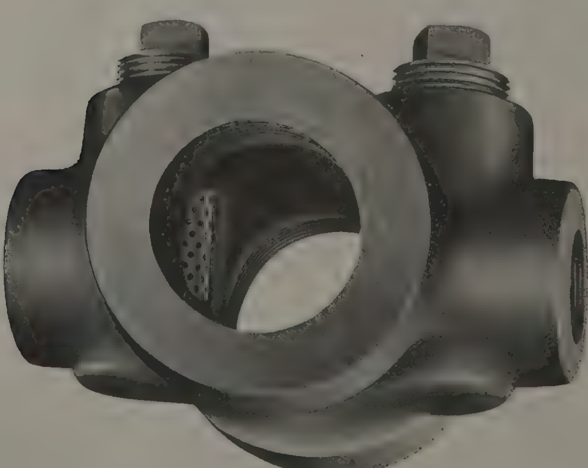


Fig. 2179—Train-Pipe Strainer Cross.

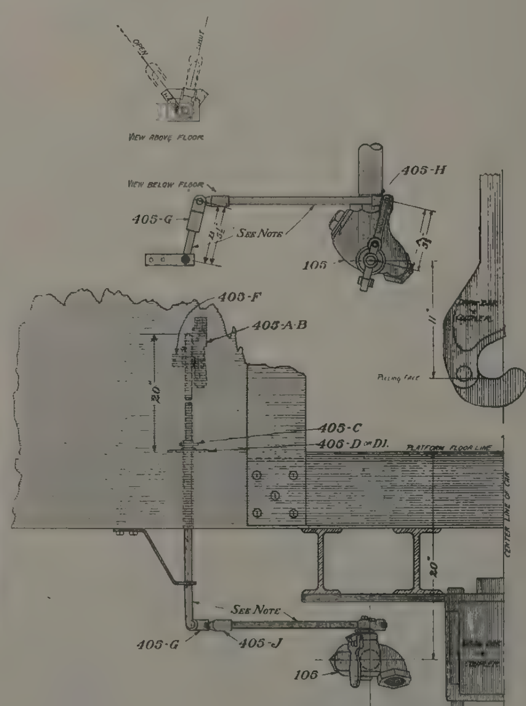


Fig. 2180—Method of Operation of No. 105 End Valve from Car Platform.

Vapor Car Heating Company.

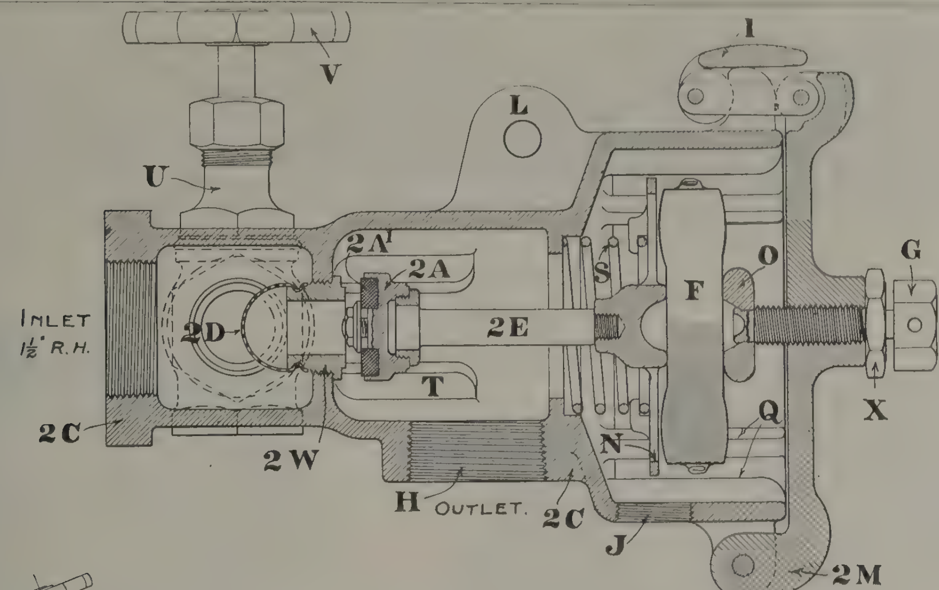


Fig. 2181—Horizontal Steam Trap.

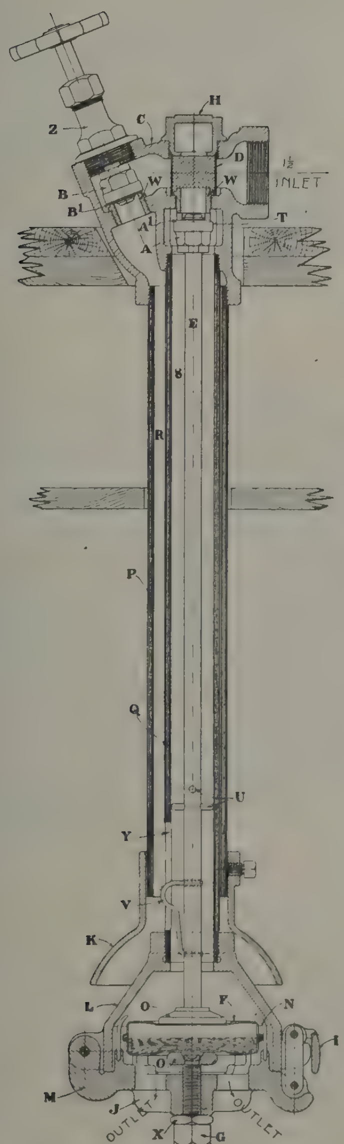


Fig. 2182—Vertical Steam Trap.

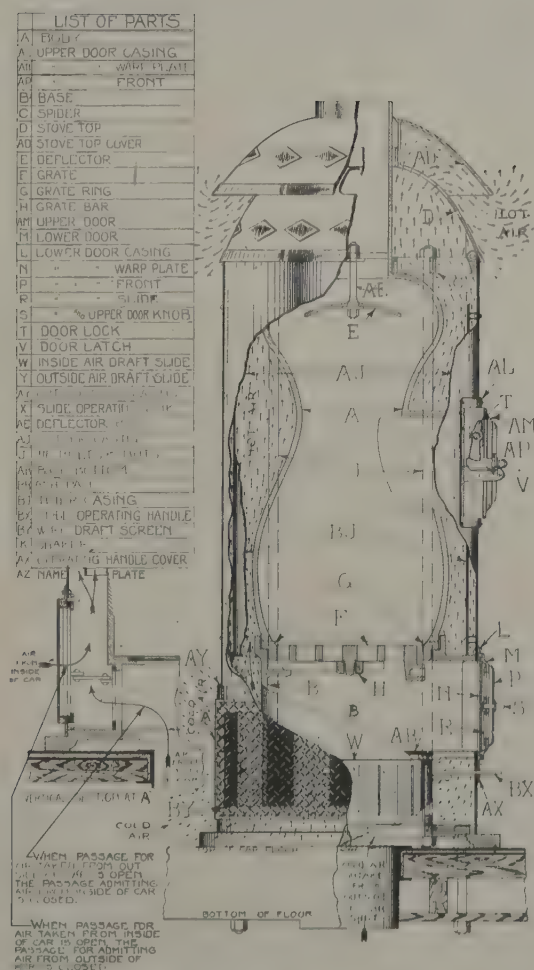


Fig. 2183—Emergency Heating Stove.

Vapor Car Heating Company.

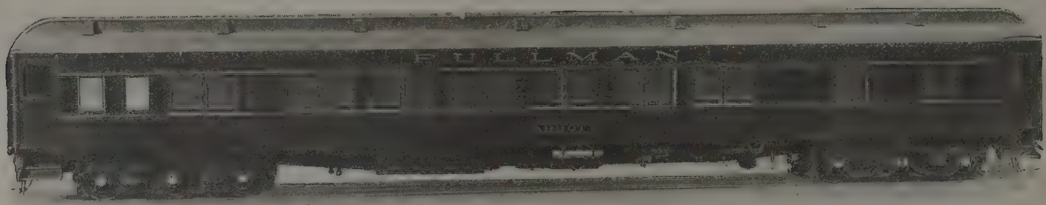


Fig. 2184—Car Equipped with Mudge-Peerless Ventilators.

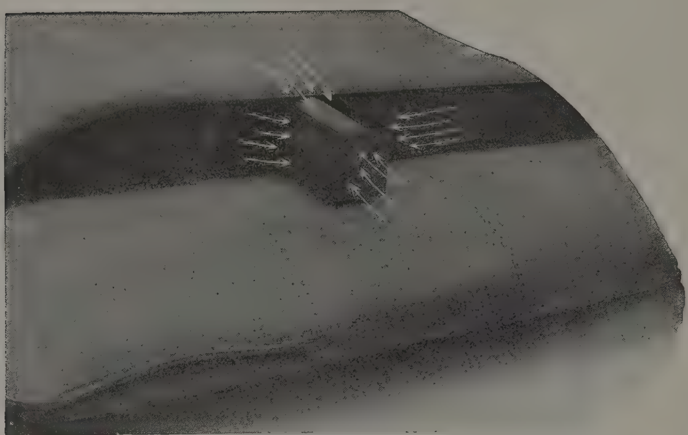


Fig. 2184a—Mudge-Peerless Pullman Standard Type Ventilator. Air currents from any direction create exhaust action.

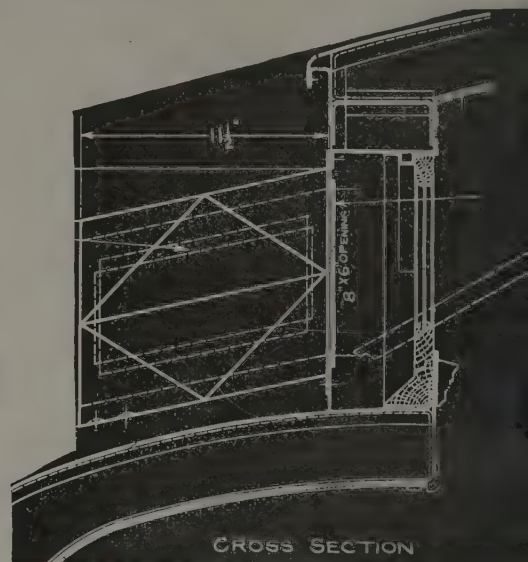


Fig. 2184b—Showing Application Details of Mudge-Peerless Ventilators.

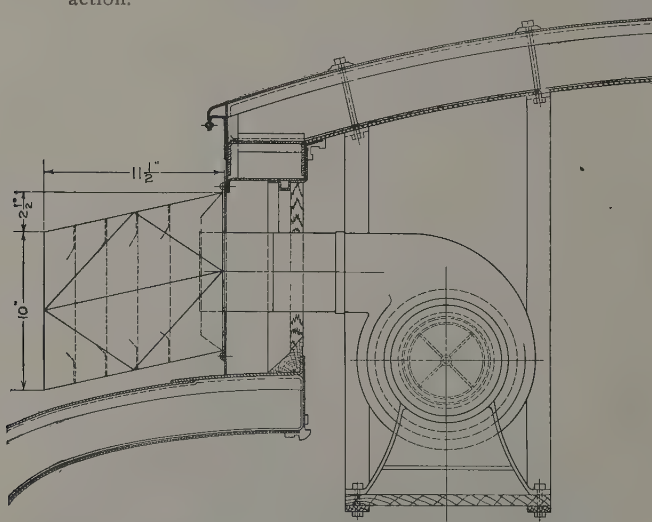


Fig. 2184c—Cross-section showing application of Mudge Blower and Blower Ventilator for Dining and Private Cars.

Fig. 2184d—Mudge Volume Blower.

Fig. 2184e—Floor Plan of Diner with Recommendations for Mudge-Peerless Ventilators and Blowers.

Mudge & Company.

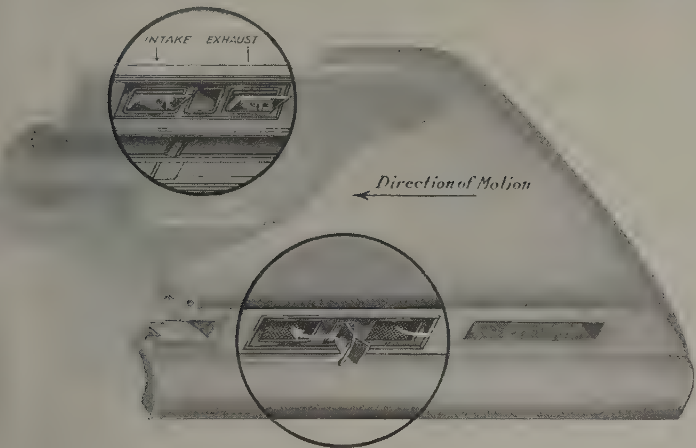


Fig. 2185—Automatic Intake-and-Exhaust Ventilator Showing Interior Diffuson Boxes and Exterior Deflectors.

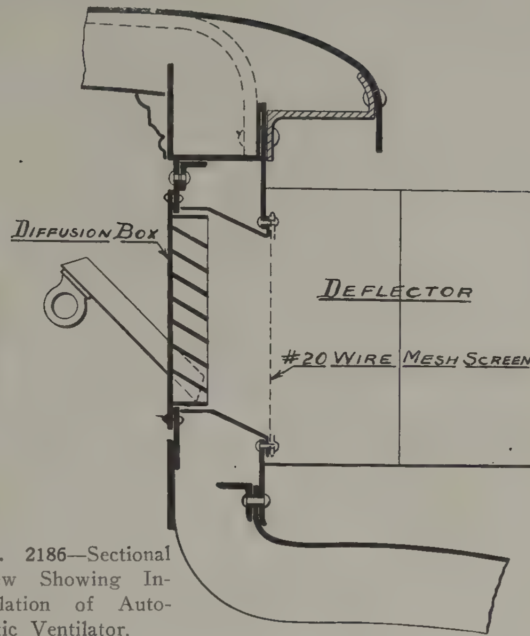


Fig. 2186—Sectional View Showing Installation of Automatic Ventilator.

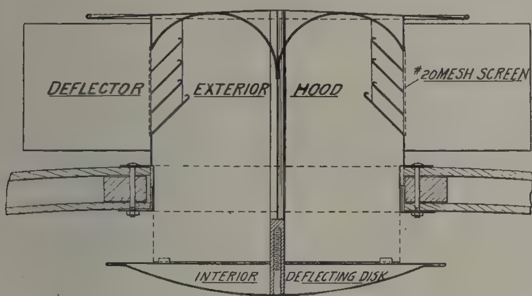


Fig. 2187—Automatic Ventilator Applied at Crown of Arch Roof.

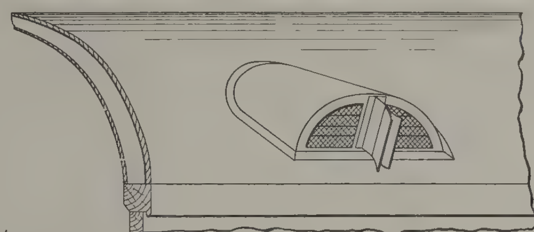


Fig. 2188—Appearance of Automatic Ventilator Hood on Car Roof.

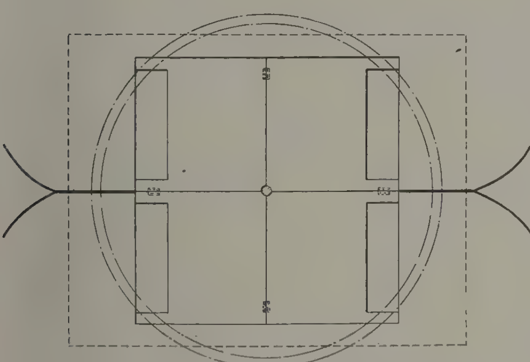


Fig. 2189—Cross Section Through Double Exterior Hood of EB Type Automatic Ventilator.

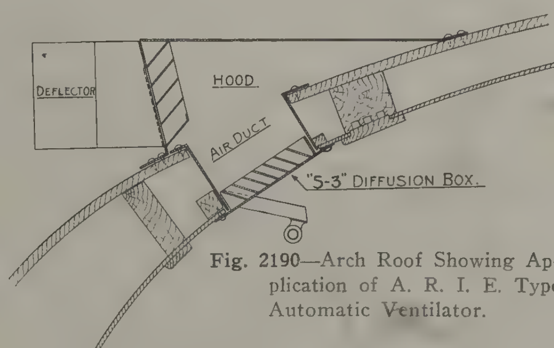


Fig. 2190—Arch Roof Showing Application of A. R. I. E. Type Automatic Ventilator.

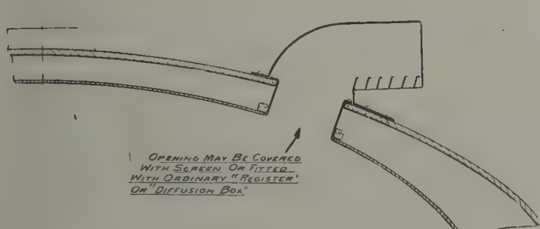


Fig. 2191—W. W. A. R. Type Exhaust Ventilator for Arch Roof Cars.

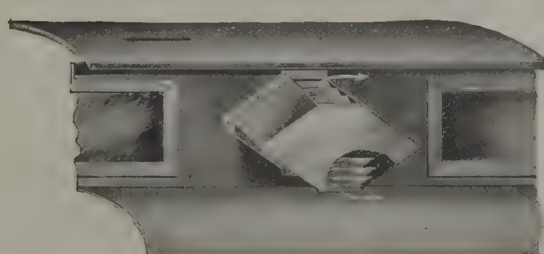


Fig. 2192—Diamond Type Exhaust Ventilator for Monitor Roof Cars.

Automatic Ventilator Company.

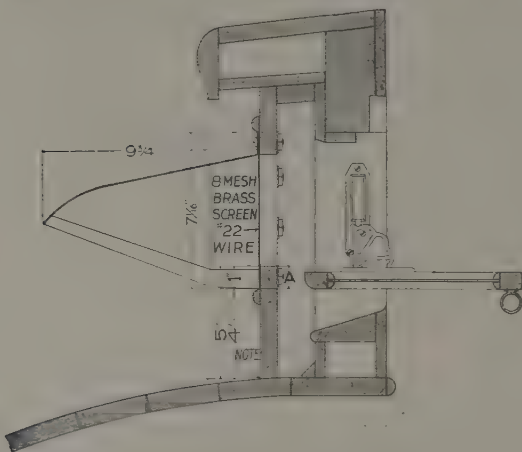


Fig. 2193—Ventilation Hood, Cross Section of Wood Car. Vapor Car Heating Company.

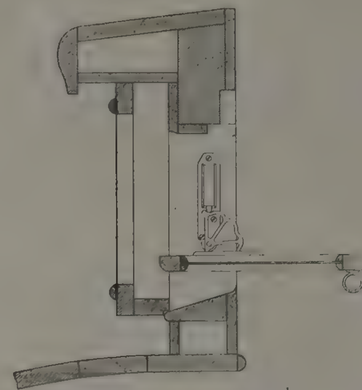


Fig. 2194—Fresh Air Intake, Cross Section of Wood Car. Vapor Car Heating Company.

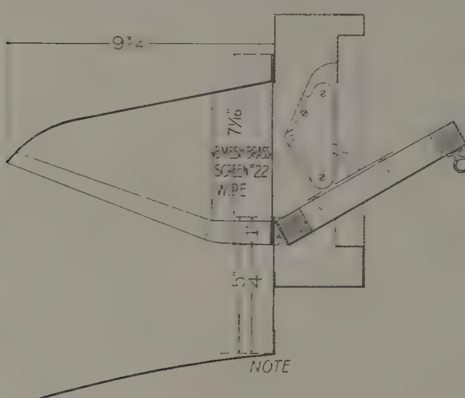


Fig. 2195—Ventilating Hood, Cross Section of Steel Car. Vapor Car Heating Company.

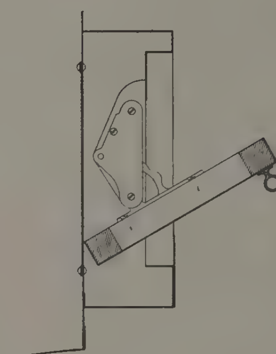


Fig. 2196—Fresh Air Intake, Cross Section of Steel Car. Vapor Car Heating Company.

Fig. 2197—Register for Ventilator Pipe. James L. Howard & Company.

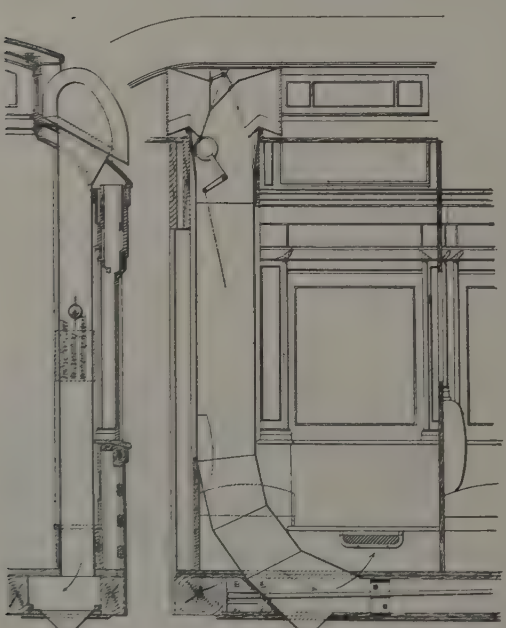


Fig. 2198—Pennsylvania Railroad Ventilating Apparatus for Passenger Train Cars.

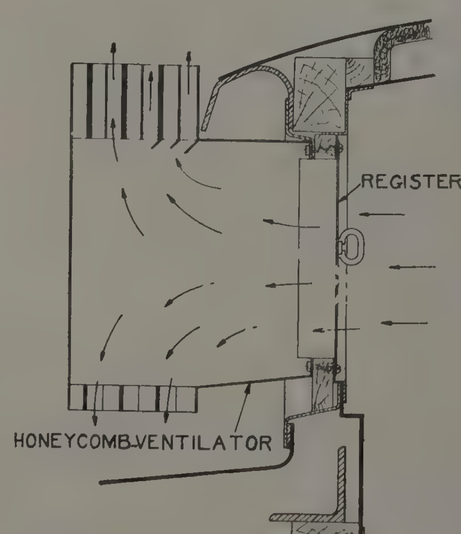


Fig. 2199—Utility Honeycomb Ventilator, Railway Utilities Company.

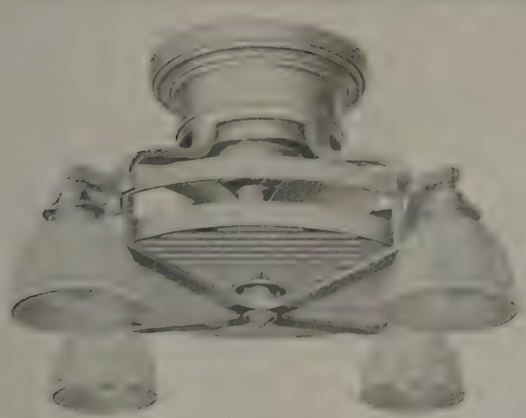


Fig. 2200—Safety Combination Fan and Lighting Fixture No. 19140-C. Safety Car Heating & Lighting Company.

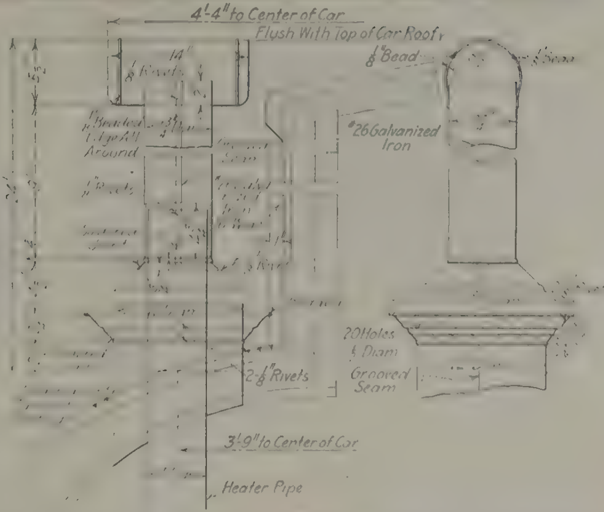


Fig. 2202 Heater Smoke Jack for Canadian Northern Dining Cars.

Fig. 2201—Safety Fan No. 19140. Safety Car Heating & Lighting Company.

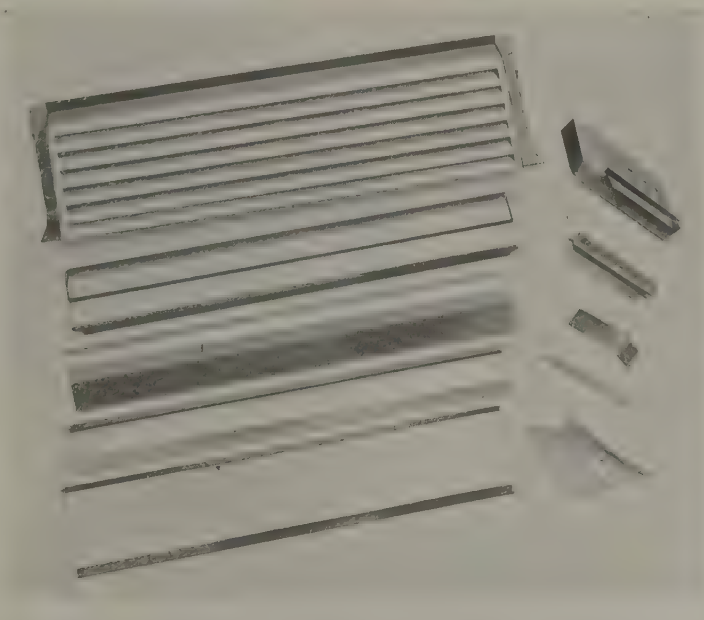


Fig. 2204—Rust Proof Sheet Metal Corner Ventilator. Peter Gray & Sons.

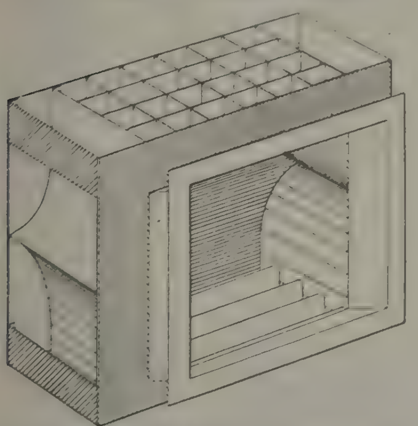
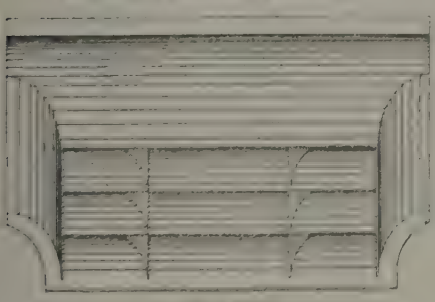


Fig. 2203 Garland Honeycomb Ventilator. Garland Ventilator Company.



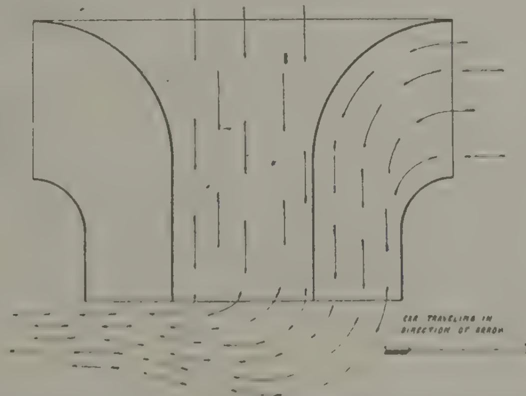


Fig. 2205—Garland Ventilator, Showing Construction and Direction of Air Currents. Garland Ventilator Company

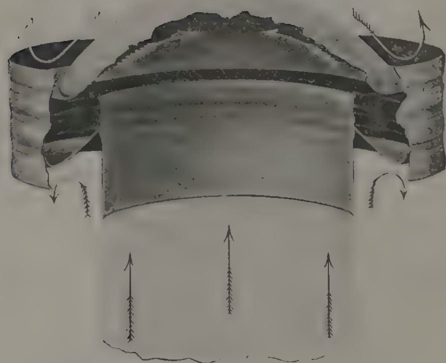


Fig. 2206—The Globe Ventilator. Globe Ventilator Company.

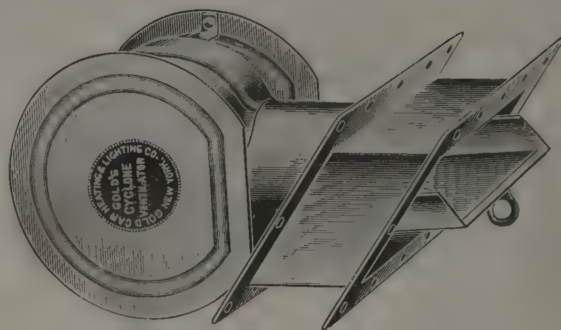
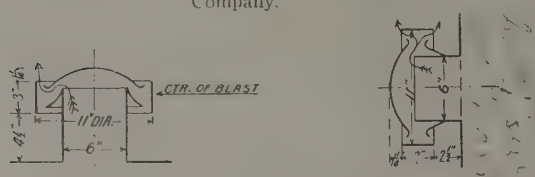


Fig. 2207—Application of Ventilator to Oval Deck Cars. Gold Car Heating & Lighting Company.



Erect. Horizontal.

Fig. 2208—Two Types of Globe Ventilators. Globe Ventilator Company.

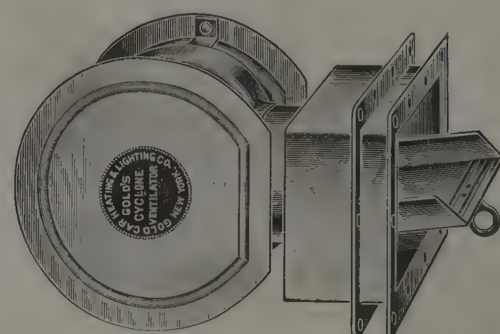


Fig. 2210—Application of Ventilator to Straight Deck Cars. Gold Car Heating and Lighting Company.

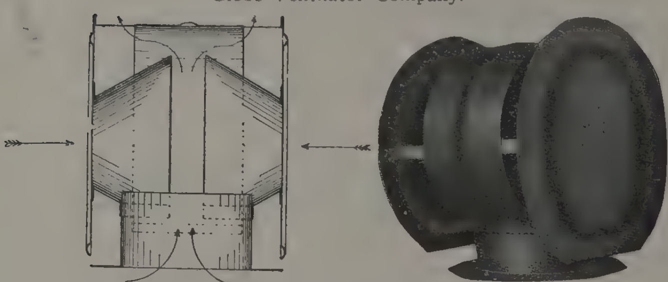


Fig. 2209 — Gold Cyclone Ventilator. Gold Car Heating & Lighting Company.

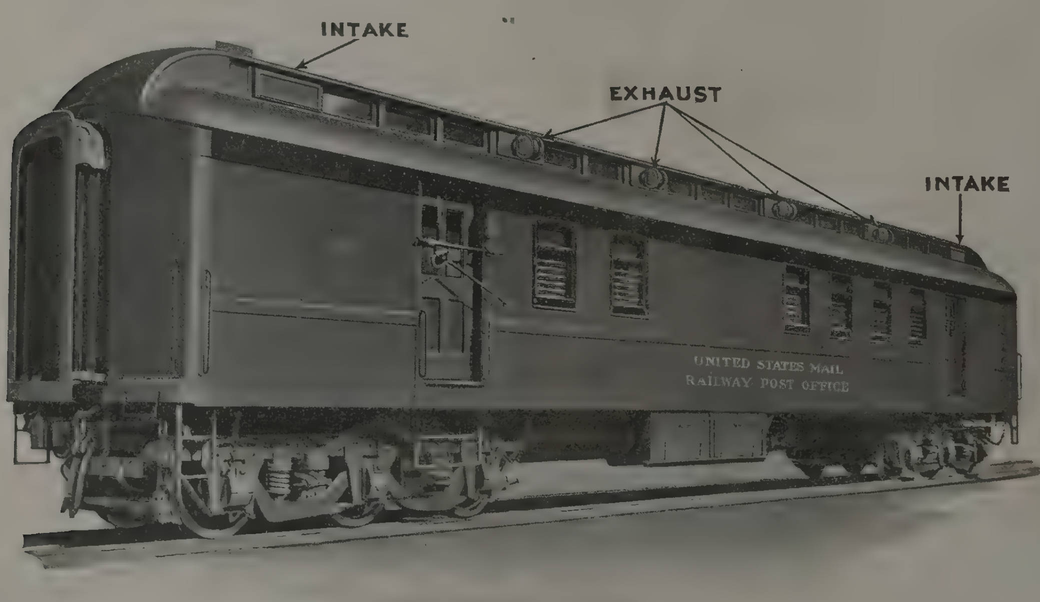


Fig. 2211—Application of Gold Cyclone Ventilators to United States Mail Car. Gold Car Heating & Lighting Company

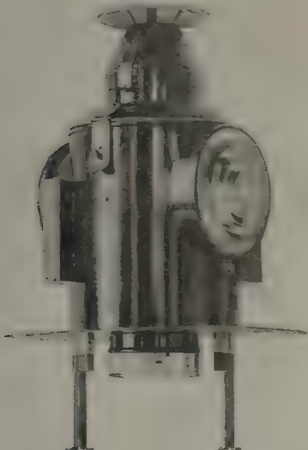


Fig. 2212—Caboose Cupola Lamp.

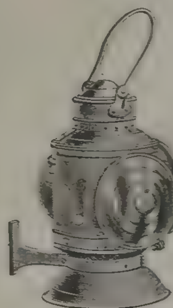


Fig. 2213—Caboose Tail Lamp.

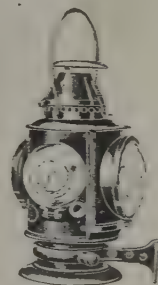


Fig. 2214—Tornado Coach Tail Lamp.

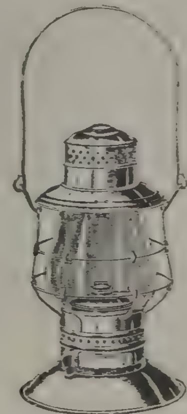


Fig. 2215—Double Wire Guard Lantern.

Adams & Westlake Company.

Fig. 2216—Marker Lamp. Dressel Railway Lamp Works.

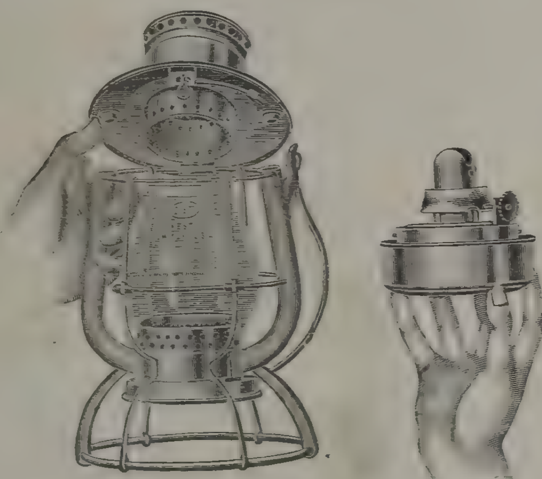


Fig. 2217—Operation of Vesta Railroad Lantern. R. E. Dietz & Company.

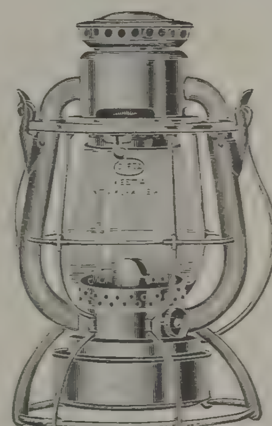


Fig. 2218—Vesta Cold Blast Railroad Lantern. R. E. Dietz Company.

Fig. 2219—Electric Corner Deck Signal Marker Lantern.

Fig. 2220—Interior of Lantern Shown in Fig. 2219.

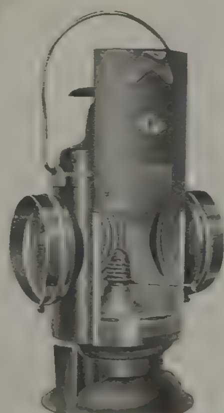


Fig. 2221—Standard Three Lens Tail or Marker Lantern.

Fig. 2222—Standard Four Lens Tail or Marker Lantern.

Peter Gray & Sons, Inc.

Fig. 2223—Spheroidal Car Repair Track Lamp No. 458.

Fig. 2224—Armspear Platform Tail Lamp.

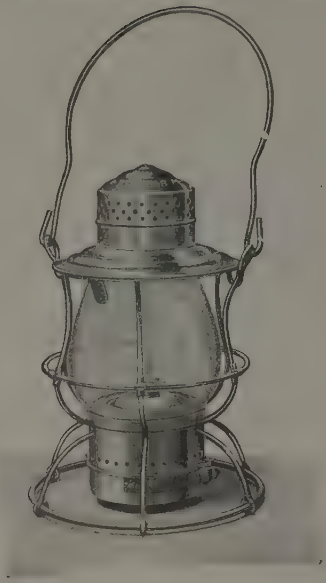


Fig. 2225—Armspear Hand Lantern.

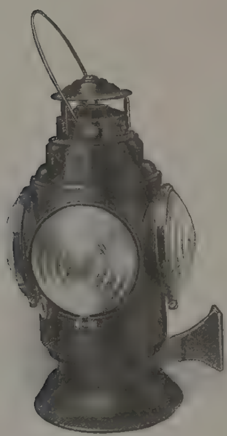


Fig. 2226—Straight Body Steel Marker Lamp.

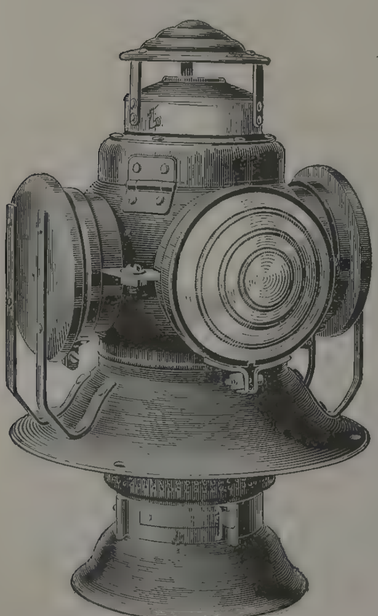


Fig. 2227—Armspear Caboose Deck Lamp.

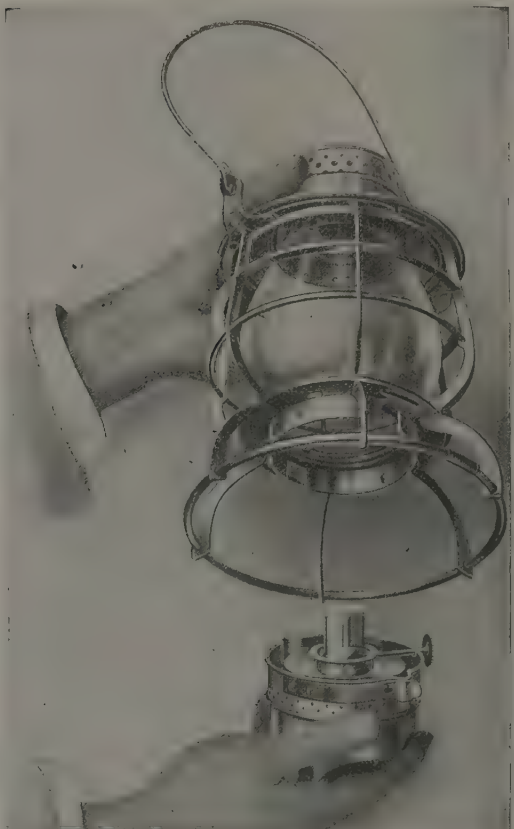


Fig. 2228—Armspear Outside Adjustment Lantern.

Armspear Manufacturing Company.

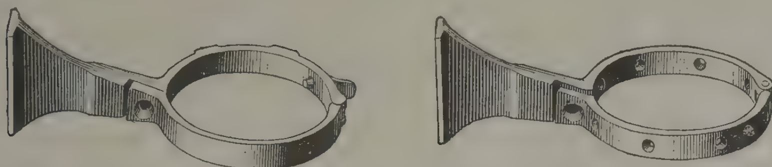
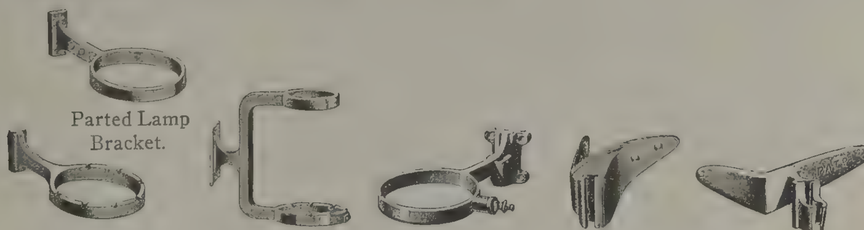


Fig. 2229—Marker or Tail Lamp Brackets. Armspear Manufacturing Company.

Fig. 2230 — Adjustable Marker Arm. Peter Gray & Sons.

Fig. 2231 — Combination Lamp and Flag Socket. Armspear Manufacturing Company.



Parted Lamp Bracket.

Solid Lamp Bracket. Top Support Bracket. Set Screw Bracket. Corner Sockets.

Fig. 2232—Lamp and Flag Holders. Adams & Westlake Company.

Fig. 2233—Lamp Bracket, Adjustable. Adams & Westlake Company.

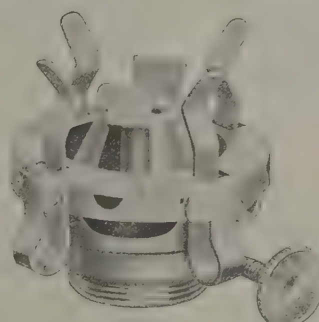


Fig. 2234—Lamp Burner. Peter Gray & Sons.

Fig. 2235—Dressel Low Burner with Flame Spreader. Dressel Railway Lamp Works.

Fig. 2236—Platform Tail Lamp with Upper Draft Ventilator and 8 in. Lens. Dressel Railway Lamp Works.

Fig. 2237—Tail Lamp with Detachable Base. Dressel Railway Lamp Works.

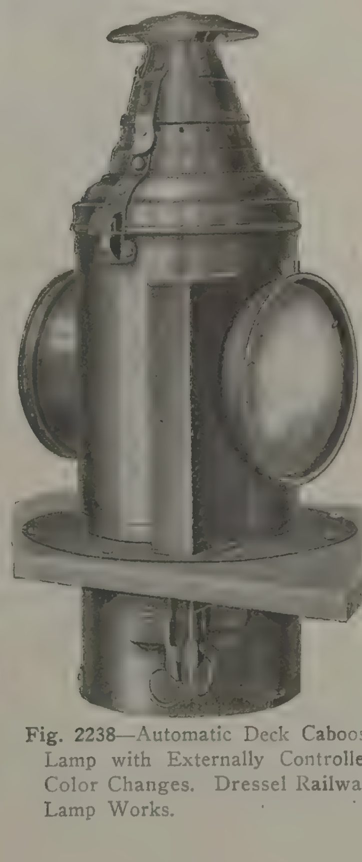


Fig. 2238—Automatic Deck Caboose Lamp with Externally Controlled Color Changes. Dressel Railway Lamp Works.

Fig. 2239—Side Wall Lamp.

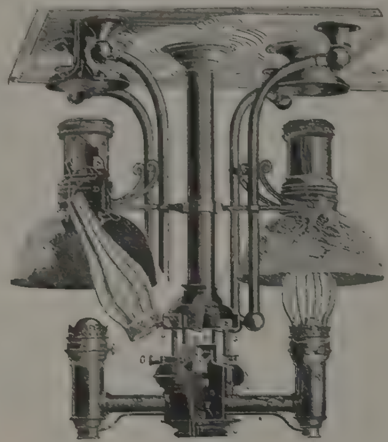


Fig. 2240—Center Lamps.

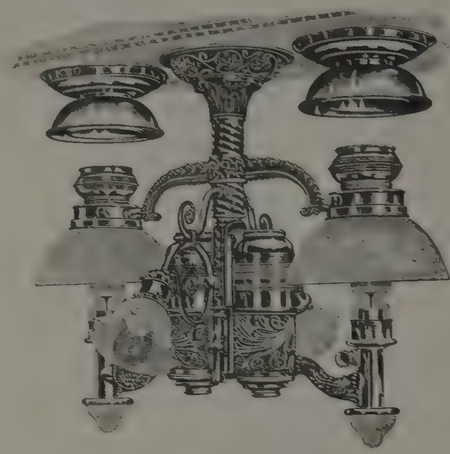


Fig. 2241—Center Lamps.

Dayton Manufacturing Company.

Fig. 2242—Center Lamp. Adams & Westlake Company.

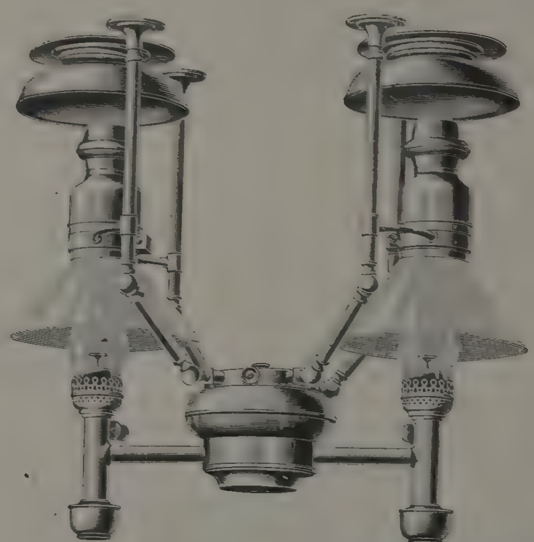


Fig. 2243—Center Lamps with Victoria Burners for Use with Heavy Oil. Sherburne & Company.

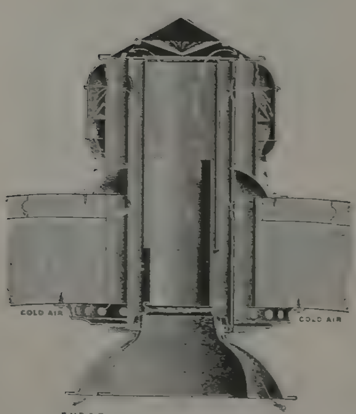


Fig. 2244—Improved Combination Smoke Bell and Ventilator. Adams & Westlake Company.

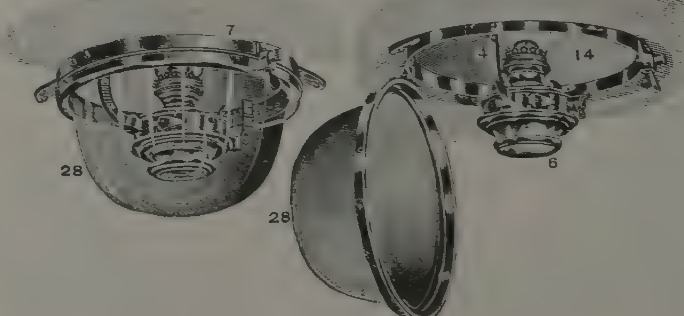


Fig. 2245—Vestibule Dome or Platform Lamp. Adams & Westlake Company.

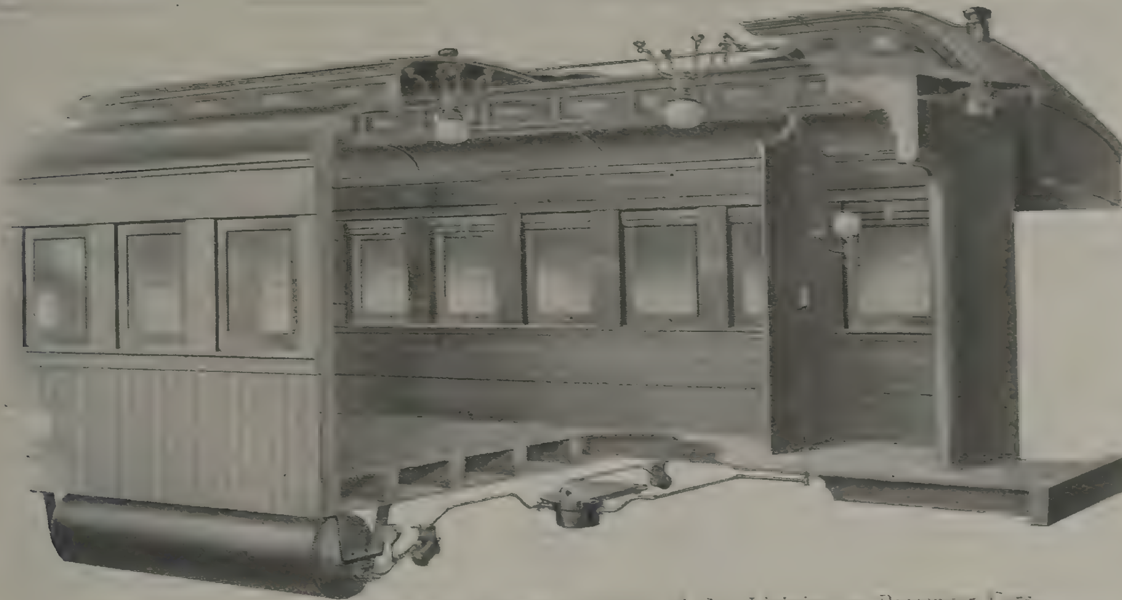


Fig. 2246—Method of Application of Pintsch System of Gas Lighting to Passenger Cars.

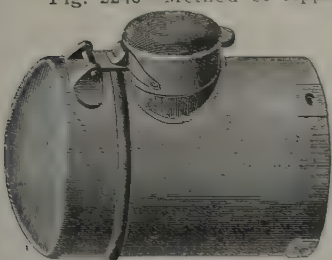


Fig. 2247—Filling Valve Cover.

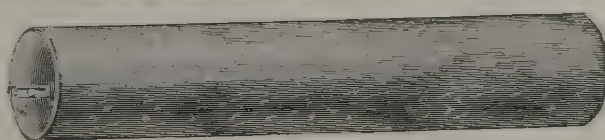


Fig. 2248—Gas Holder.

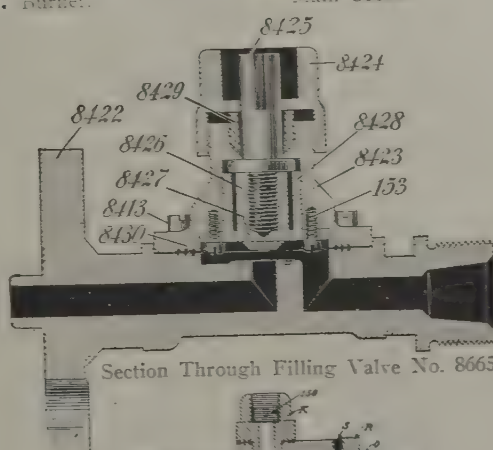
No. 214a, Gage for Car.

Regulator.

No. 244 2 in. Water Pressure.
No. 254 2 lb. Pressure.
No. 1844 6 in. Water Pressure.
No. 1954 1 lb. Pressure.

No. 222a. Burner.

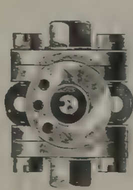
Keys for Lamps and Main Cocks.



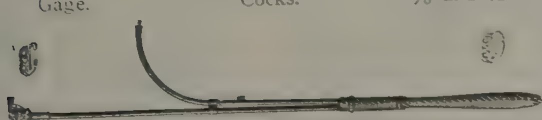
Section Through Filling Valve No. 8665

Gage.

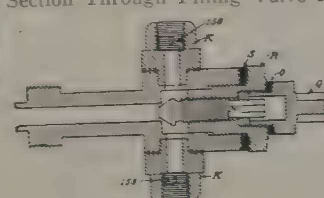
Cover for Main Cocks.



Main Cock; ¼, ⅜ and ½ in.



Torch and Key.

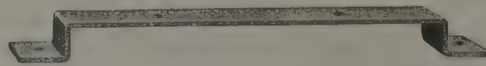


Section Through Holder Valve No. 53b.

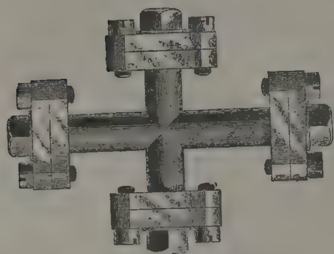
Fig. 2249—Parts for Pintsch Gas Lighting System.

Safety Car Heating & Lighting Company.

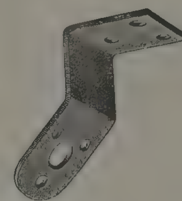

Nipple to Support Lamp; ⅜ in.

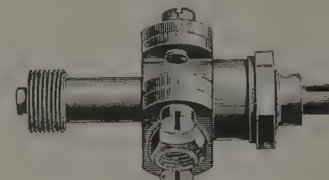

Regulator Strap.


Pipe Strap.

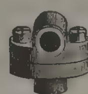

No. 55a, Flanged Cross, ¼ in.

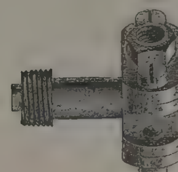

Nos. 16a, b and c, Tee Flanges.

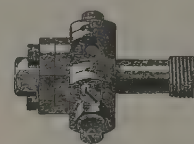

No. 118a, Bracket for Filling Valve.


No. 53b, Holder Valve.


Nos. 12-13, Tee Flange Unions; ¼ by ⅛ in. ¼ by ¼ in.


No. 17a, Angle Flange, ⅛ in.


No. 49, Flange Tee for Regulator, ¼ in.


Flange Cross.

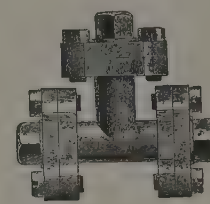

Nos. 54-54, Flanged Tees, ¼ in.

Fig. 2250—Parts for Pintsch Gas Lighting System.

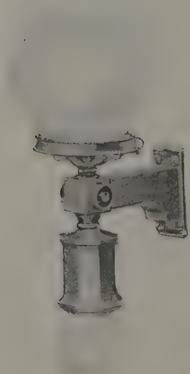


Fig. 2254—Combination Gas and Electric Bracket Lamp No. 1910A.


Fig. 2251 — Pintsch Mantle No. 2640 and Protector.


Fig. 2255 — Pintsch Mantle No. 3044 and Protector.

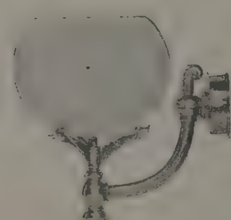


Fig. 2252—Drop Bracket Lamp No. 86.


Fig. 2253—Two and Four-Flame Vestibule Lamp No. 194.

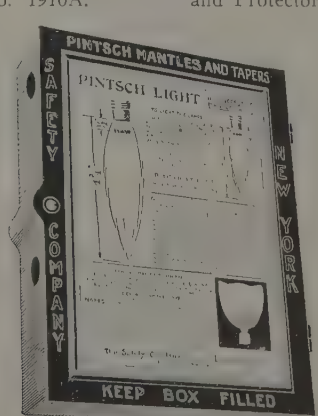


Fig. 2256—Cabinet for Pintsch Gas Mantles.

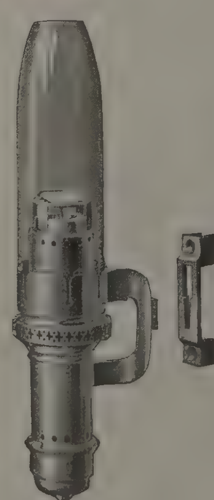


Fig. 2257 — Removable Candle Bracket Lamp No. 282.


Fig. 2258—Mantle Lamp No. 8531, for Letter Cases in Postal Cars.

Safety Car Heating & Lighting Company.

Fig. 2259 — Combination Bracket Mantle Lamp No. 2556a.

Fig. 2260—Bracket Mantle Lamp No. 2556.

Fig. 2261—Bracket Lamp No. 373.

Fig. 2262 — Drop Bracket Lamp No 377.

Fig. 2263—Bracket Mantle Lamp No. 2587.

Fig. 2264—Bracket Mantle Lamp No. 2536.

Fig. 2265 — Bracket Gas Mantle Lamp No. 2515.

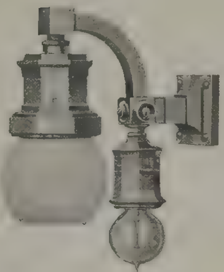


Fig. 2266—Combination Bracket Mantle Lamp No. 2569A.

Fig. 2267 — Combination Mantle Lamp No. 3583B. Gas Mantle and Electric.

Fig. 2268—Combination Bracket Lamp No. 8500A. Gas Mantle and Electric.

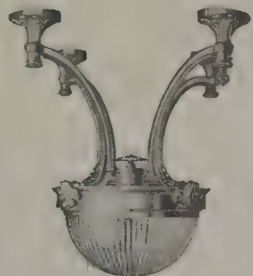


Fig. 2269—Gas Mantle Lamp No. 3598A.

Fig. 2270—Gas Mantle Lamp No. 3599.

Fig. 2271—Mantle Lamp No. 3534.

Fig. 2272—Gas Mantle Lamp No. 3572.

Fig. 2273—Gas Mantle Lamp No. 3542A.

Fig. 2274—Deck Gas Mantle Lamp No. 2511.

Fig. 2275—Gas Mantle Lamp No. 3540.

Fig. 2276—Deck Mantle Lamp No. 8511 for Baggage Cars.

Safety Car Heating & Lighting Company.

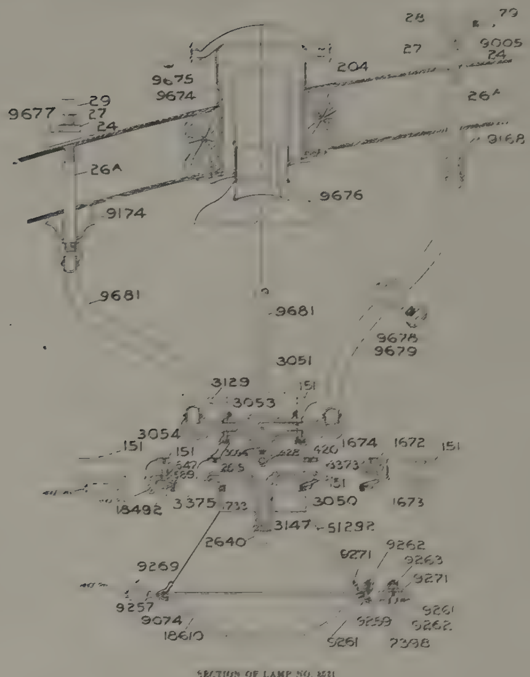


Fig. 2282—Section Through Mantle Lamp No. 3520.

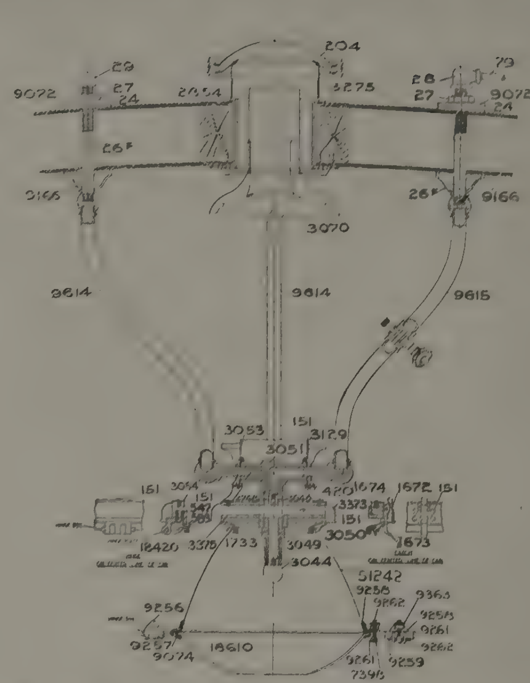


Fig. 2283—Section Through Mantle Lamp No. 8531

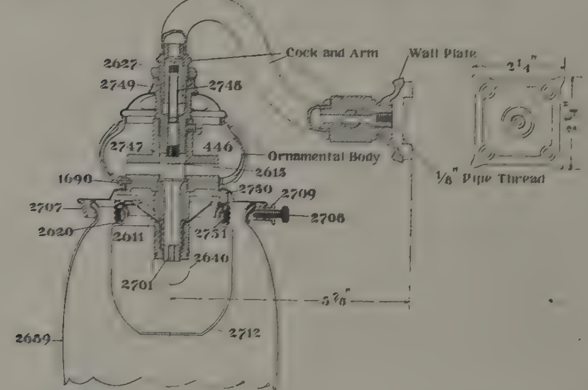


Fig. 2284—Section Through Bracket Gas Mantle Lamp No. 2515.

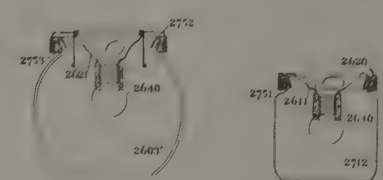
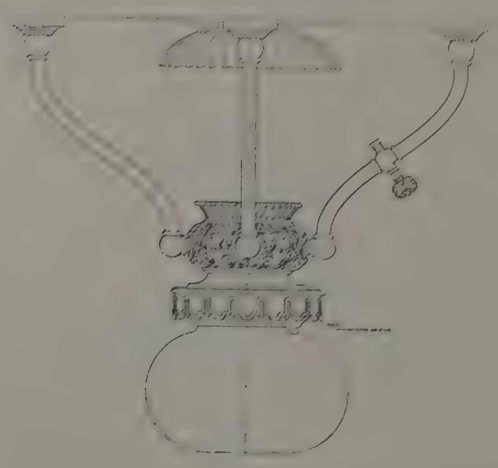


Fig. 2285—Sections Through Gas Mantle Lamp Bulbs.



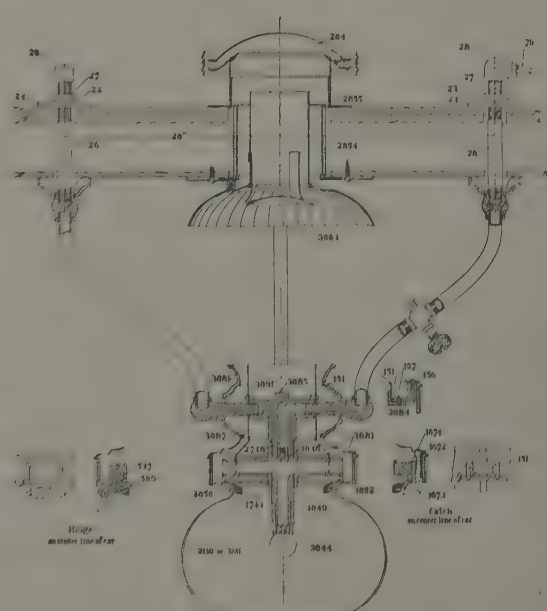


Fig. 2286—Mantle Lamp No. 3508.

Safety Car Heating & Lighting Company.

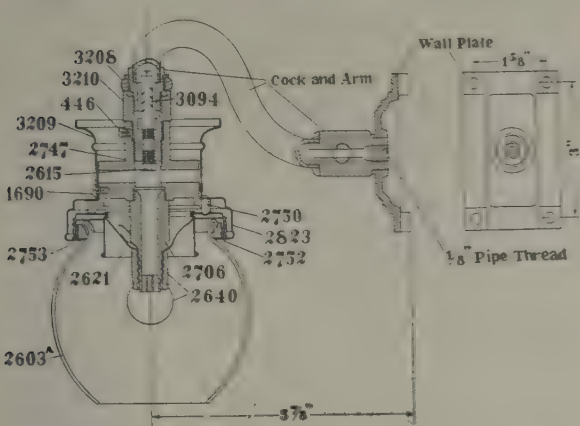


Fig. 2287—Section Through Bracket Mantle Lamp No. 2587.

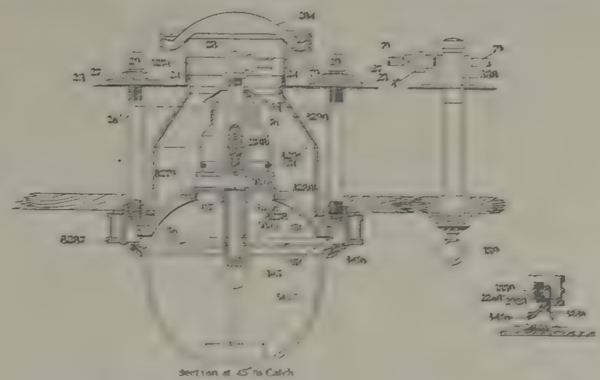


Fig. 2288—Section Through Mantle Lamp No. 8503.

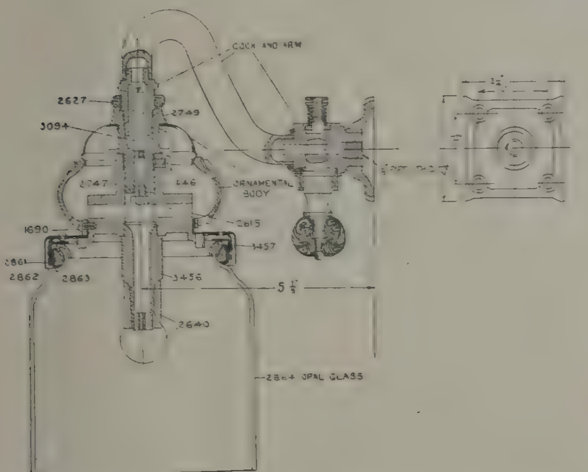


Fig. 2289—Section Through Bracket Mantle Lamp No. 2506.

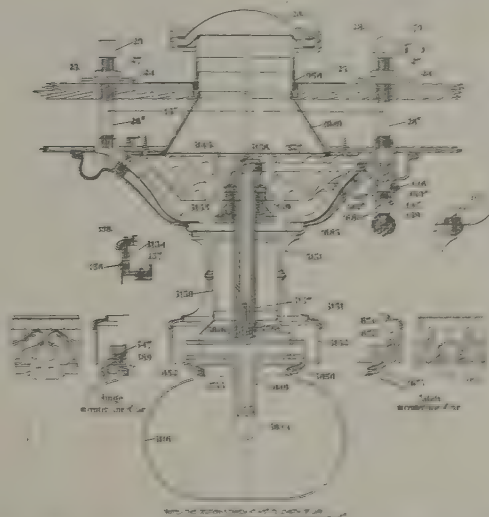


Fig. 2290—Section Through Mantle Lamp No. 3512.

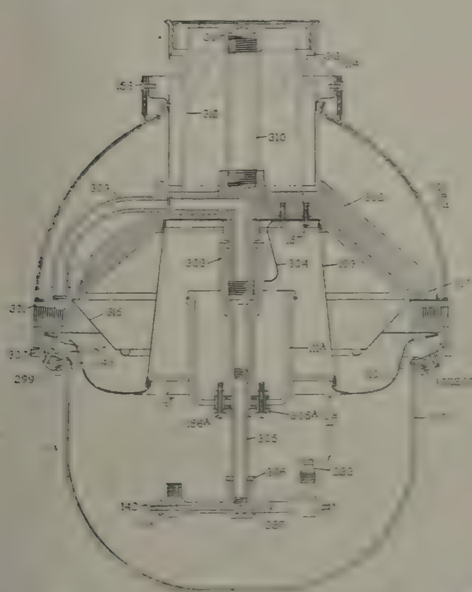


Fig. 2291—Section Through Standard Lamp Body.

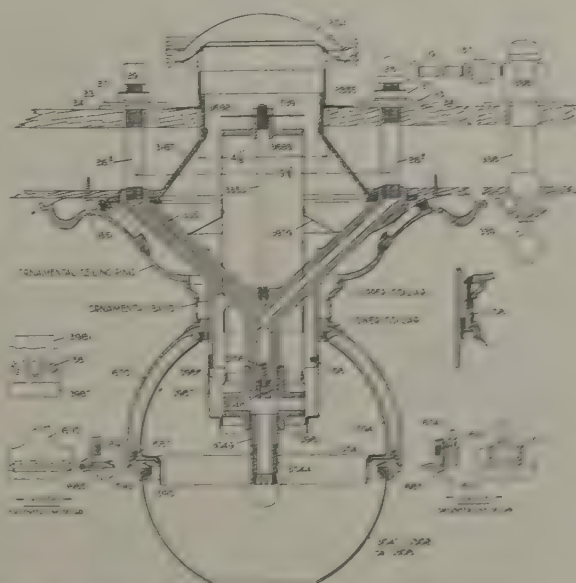


Fig. 2292—Section Through Mantle Lamp No. 3546.

Safety Car Heating & Lighting Company.

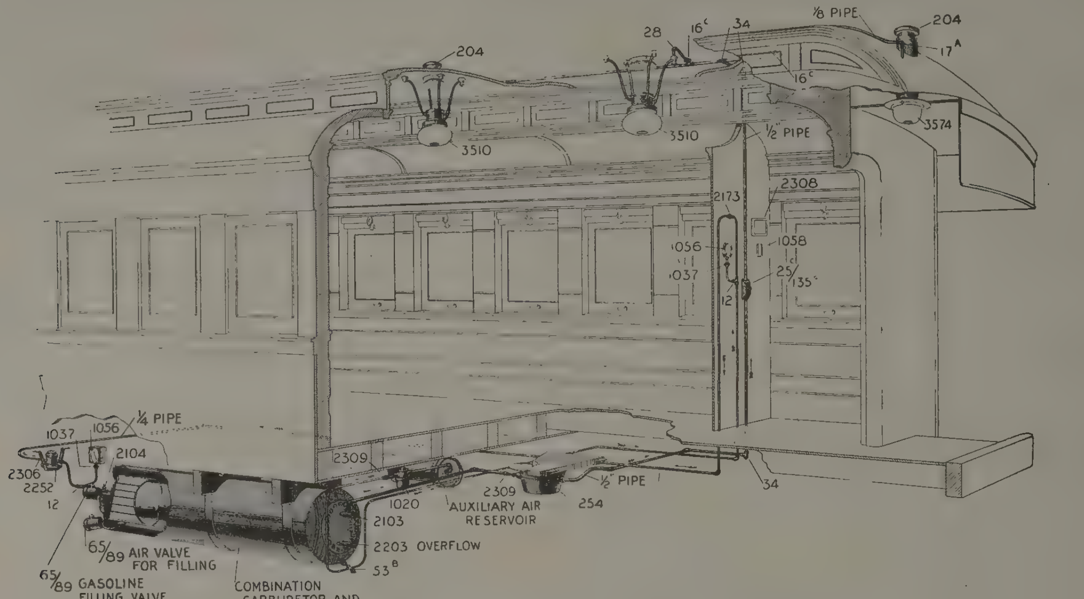


Fig. 2293—Arrangement of Vapor Lighting System on Passenger Car.

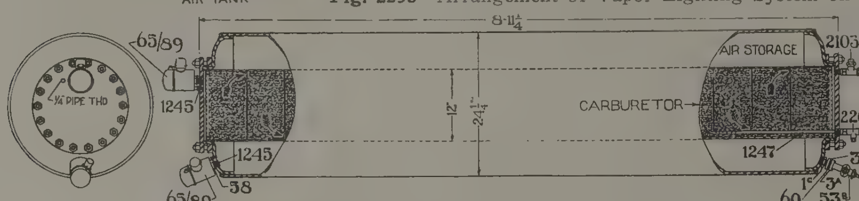


Fig. 2294—Section Through Vapor Lighting Carburetor and Air Tank.

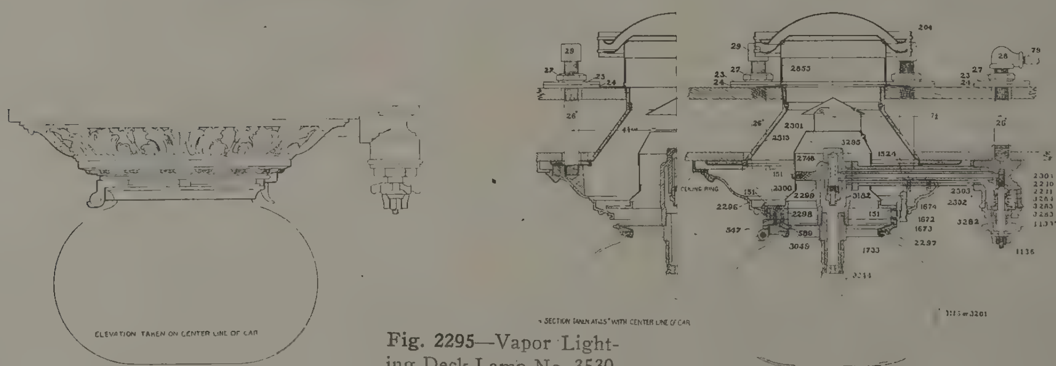


Fig. 2295—Vapor Lighting Deck Lamp No. 3530.

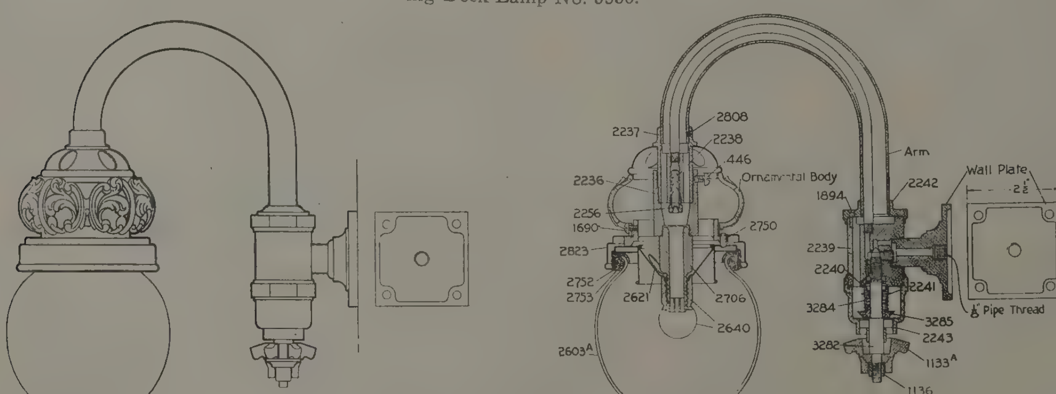


Fig. 2296—Vapor Lighting Bracket Lamp.

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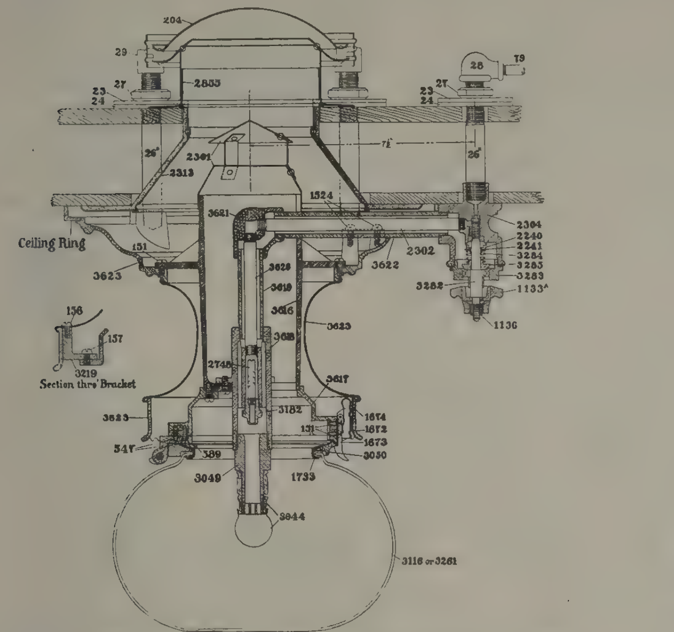

Fig. 2297—Section Through Vapor Lighting Lamp No. 3546.

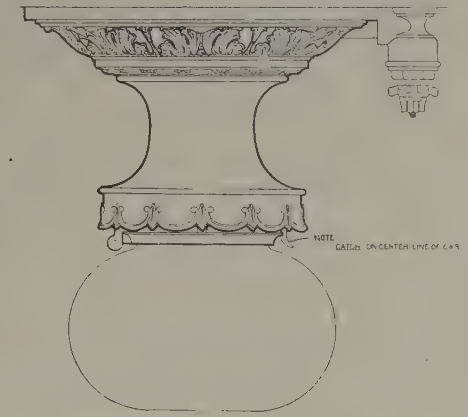

Fig. 2298—Vapor Lighting Lamp No. 3546.

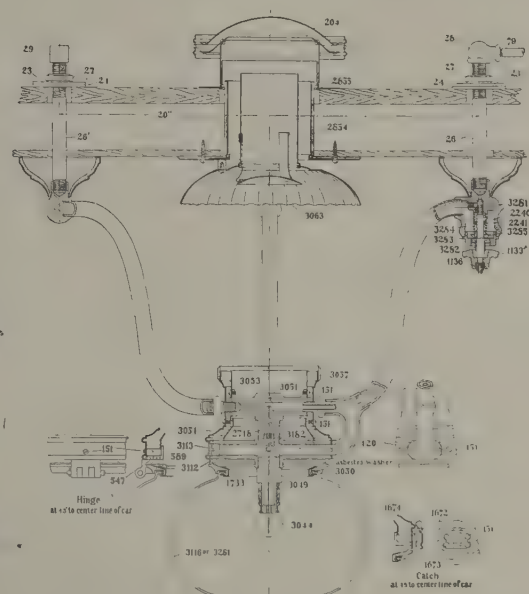

Fig. 2299—Section Through Vapor Lighting Lamp No. 3510.

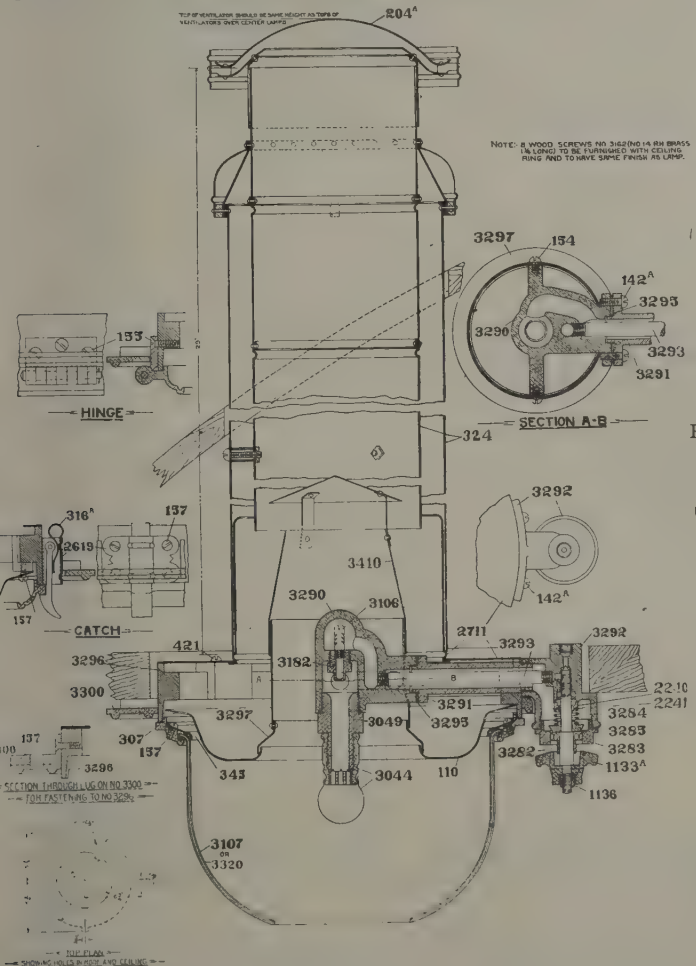

Fig. 2300—Section Through Vapor Lighting Vestibule Lamp No. 3574.

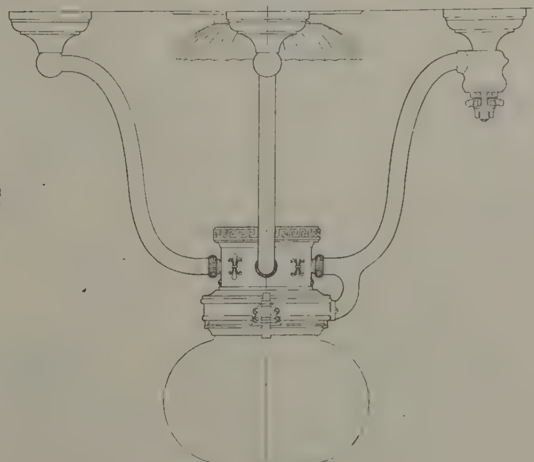

Fig. 2301—Vapor Lighting Lamp No. 3510.

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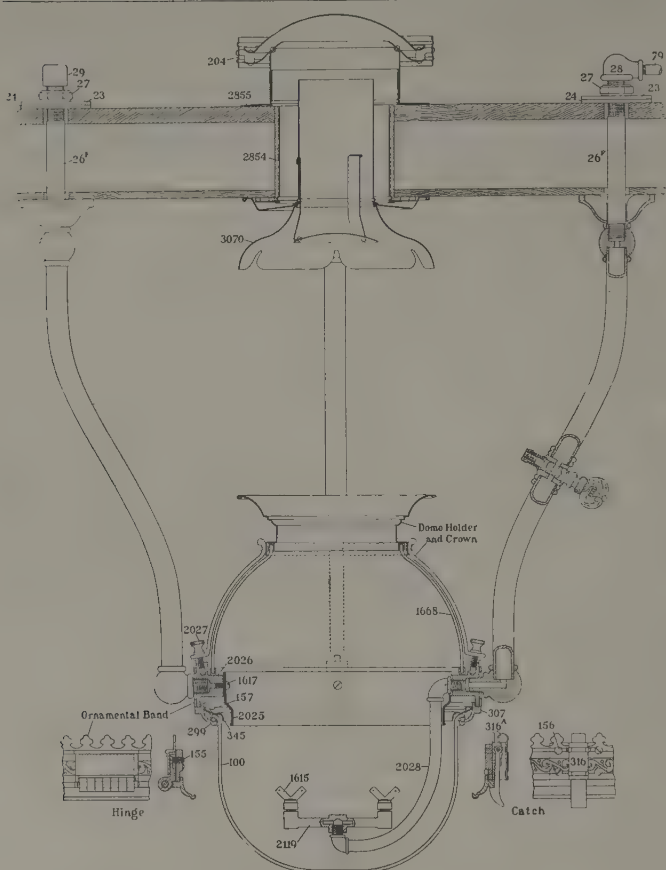

Fig. 2302—Section Through Acetylene Lamp No. 2012.

Fig. 2303—Wall Lamp No. 1641.

Fig. 2304—Acetylene Lamp No. 2012.

Parts of Acetylene Lamps, Figs. 2301-2309.

17a *Angle Flange*
23 *Iron Washer*
24 *Rubber Washer*
26 *3/8 in. Nipple, 6 in. Long*
26b *3/8 in. Nipple, 5 in. Long*
26f *3/8 in. Nipple, 6½ in. Long*
27 *3/8 in. Locknut*
28 *3/8 in. by 1/8 in. Ell*
29 *3/8 in. Cap*
32 *1/8 in. Ell*
79 *1/8 in. Extra Strong Pipe*
100 *Glass Bowl*
140 *Screw for Bezel*
142a *Screw for Gas Cock Body*
144 *Screw for Spring Lock*
151 *Screw for Catch and Reflector*
154 *Screw for Flue*
155 *Screw for Hinge*
156 *Screw for Ceiling Ring*
156a *Screw for Flange*
157 *Screw for Reflector*
157a *Screw for Ceiling Ring*
204 *4 5/8 in. Ventilator*
204a *Ventilator*
307 *Bezel for Bowl, with Hinge*
316 *Spring Catch, Complete*
316a *Spring for Catch*
323a *Diaphragm*
324 *Ventilating Chimney*
326 *Cock, Complete*
345 *Spun Globe Holder Ring*
439 *Thick Washer for Cock*
439a *Thin Washer for Cock*
444 *Plug and Thumb-piece for Cock*
445 *Bonnet for Cock*
446 *Screw for Cock*
447 *Spring for Cock*
547 *Screw for Wall Plate*
586 *Extension Chimney*
589 *Screw for Spun Globe Holder*
590 *Spun Globe Holder*
596 *9 in. Clear Glass Bowl*
597 *9 in. Etched Glass Bowl*
1600a *Frame for Dome*
1602a *Flue*
1604 *9 in. Etched Dome*

(Continued on next page.)

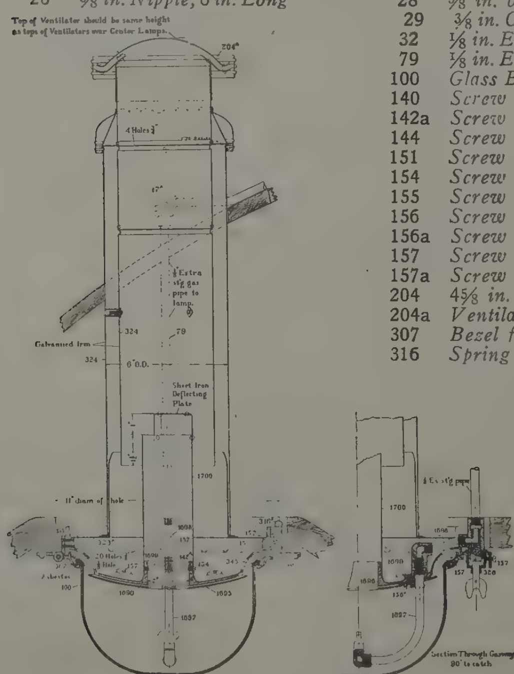

Fig. 2305—Section Through Acetylene Vestibule Lamp No. 1694.

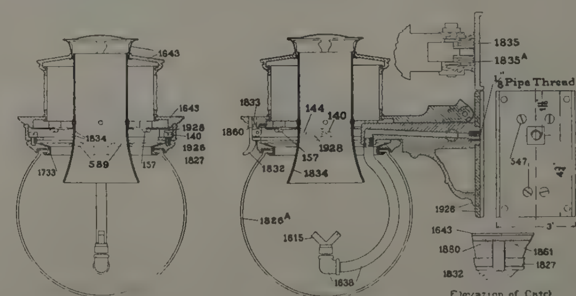

Fig. 2306—Sections Through Acetylene Wall Lamp No. 1641.

Safety Car Heating & Lighting Company.

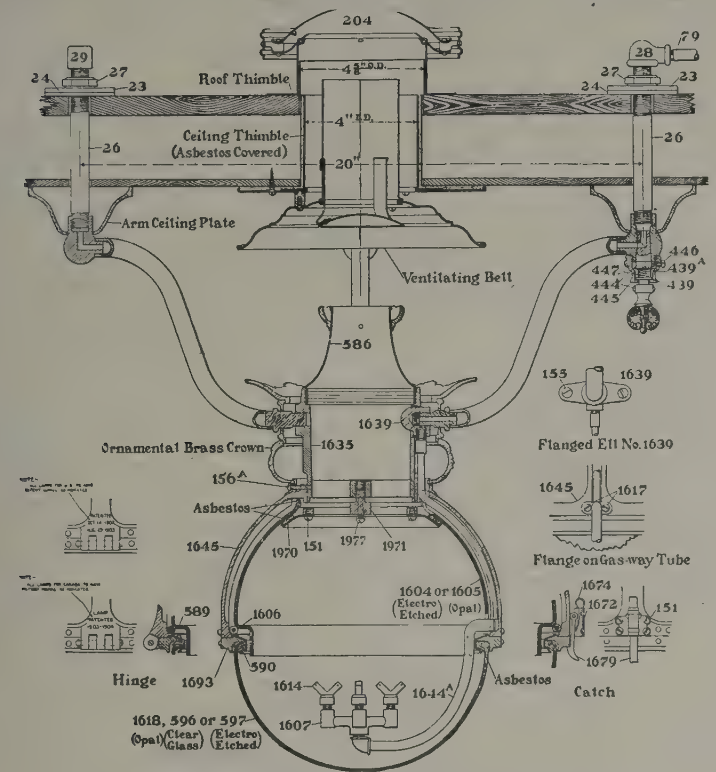

Fig. 2307—Section Through Acetylene Lamp No. 1627.

Fig. 2308—Deck Lamp No. 1681.

Parts of Acetylene Lamps, Figs. 2301-2309—Continued.

1605 *9 in. Opal Dome*
1606 *Dome Ring*
1607 *Four-flame Cluster*
1608a *Gas-way Tub*
1609 *Post for Flues*
1613 *⅜ ft. Von Schwartz Burner*
1614 *½ ft. Von Schwartz Burner*
1615 *¾ ft. Von Schwartz Burner*
1617 *Screw for Gas-way Tube Flange*
1618 *9 in. Opal Bowl*
1635 *Body Casting*
1638 *Gas-way Tube*
1639 *Flanged Ell*
1643 *Crown*
1644a *Gas-way Tube*
1645 *Frame for Dome*
1668 *Opal Dome*
1672 *Cover for Catch*
1674 *Spring for Catch*
1679 *Catch*
1682 *Body Casting*
1683 *Gas Cock Body*
1684 *Thumb-piece and Plug for Cock*
1693 *Bezel*
1695 *Reflector*
1696 *Body Casting*
1697 *Gas-way Tube*
1697a *Two-flame Cluster*
1698 *Brass Nipple*
1699 *Flanged Ell*
1700 *Flue*
1733 *Spun Globe Holder*
1826 *6½ in. Opal Bowl*
1826a *6½ in. Clear Glass Bowl*
1827 *Bezel*
1832 *Catch*
1833 *Spring for Catch*
1834 *Reflector*
1835 *Spring for Hinge, Left*
1835a *Spring for Hinge, Right*
1860 *Flange for Catch*
1861 *Screw for Flange*
1926 *Body with Gas Cock*
1928 *Spring Lock for Bezel*
1949 *Lower Thimble*
1950 *Roof Thimble*
1970 *Reflector*
1971 *Casting for Reflector*
1977 *Set Screw*
1978 *Bushing for Flue Post*
2025 *Reflector*
2026 *Body Ring*
2027 *Thumb Screw*
2028 *Gas-way Tube*
2119 *Two-flame Cluster*
2854 *Ceiling Thimble*
2855 *Roof Thimble*
3070 *Ventilating Bell*

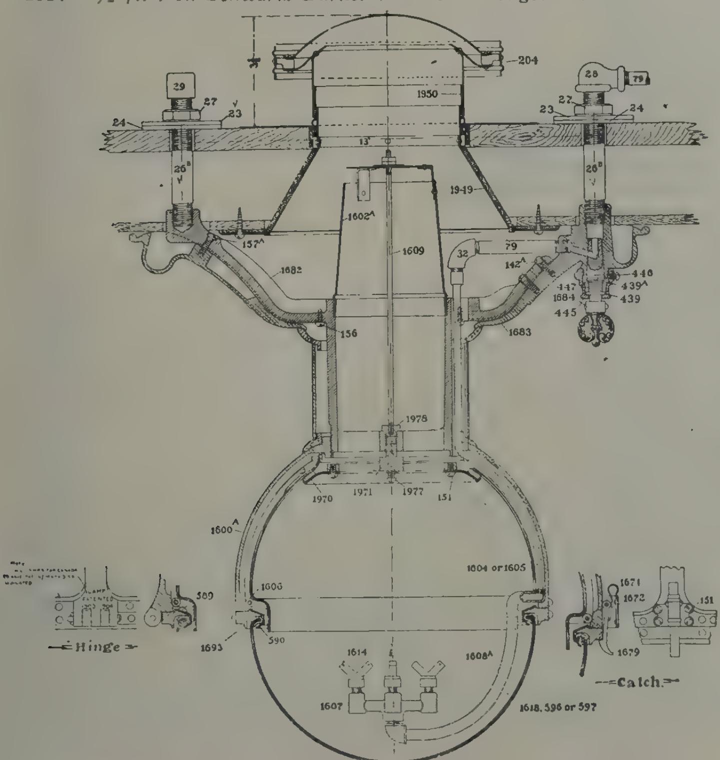

Fig. 2309—Section Through Acetylene Lamp No. 1681.

Fig. 2310—Acetylene Lamp No. 2096.

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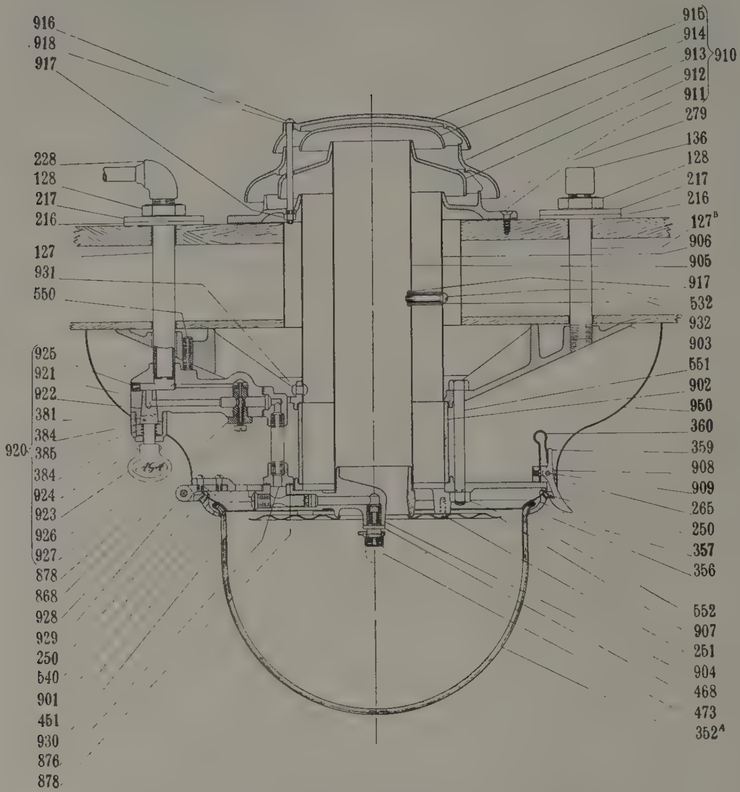


Fig. 2312—Section of 12 in. Drop Deck Lamp. No. 900.

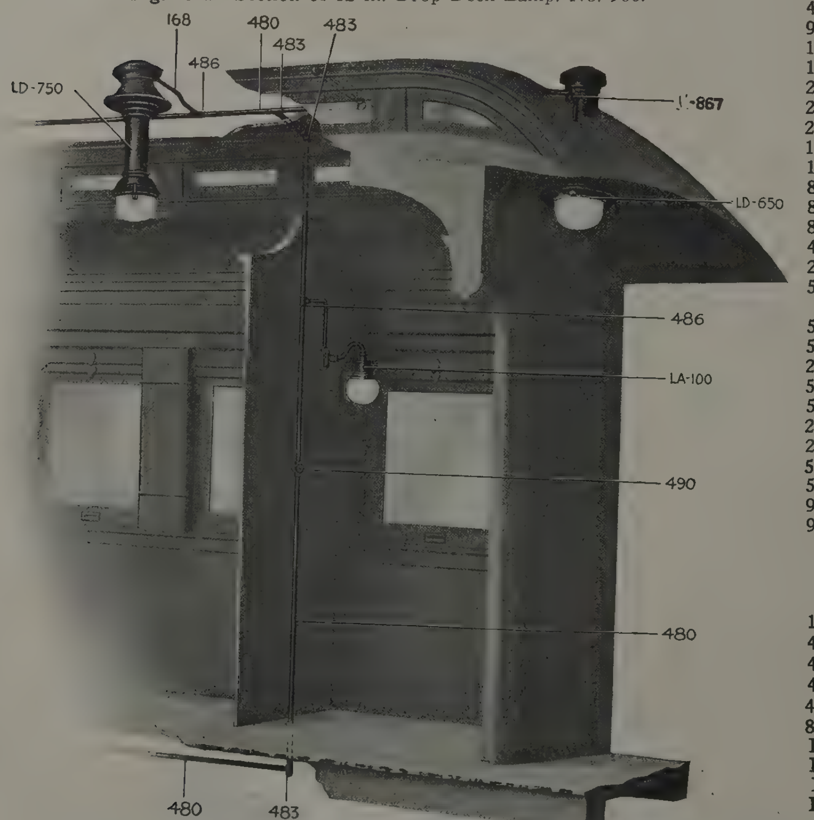


Fig. 2313—Interior and Exterior Installation of A. G. A. Lighting System.

A. G. A. Railway Light & Signal Company.

List of Parts, Fig. 2312.

352A *9½ in. Opal Bowl*
356 *Bezel Ring*
357 *Globe Holder*
901 *Lamp Body Plate*
902 *Lamp Body Ring*
903 *Lamp Body Support*
904 *Gas Way*
905 *Inner Flue*
906 *Outer Flue*
910 Ventilator Complete includes:
911 *Base Plate for Ventilator*
912 *Draft Flue for Ventilator*
913 *Bottom Cover for Ventilator*
914 *Inside Cover for Ventilator*
915 *Outside Cover for Ventilator*
916 *Screw for Ventilator*
917 *Hex. Nut*
918 *Lead Washer for Ventilator Bolt*
907 *8 in. Enameled Reflector*
359 *Catch*
360 *Spring for Catch*
908 *Support for Catch*
909 *Pin for Catch*
920 Cock Complete includes:
921 *Body for Cock*
922 *Plug for Cock*
923 *Thumb piece for Cock*
924 *Pin for Cock*
381 *Cap for Cock*
384 *Washer for Cock*
385 *Spring for Cock*
928 *Hinge Plate*
929 *Hinge Pin*
925 *Plug for Pilot Bore*
926 *Body for Pilot Valve*
927 *Stem for Pilot Valve*
930 *Choke Plug*
468 *Burner Tip*
473 *½ cubic foot Mantle*
950 *Spun Lamp Body*
127 B *⅜ in. x 5 in. Nipple*
127 *⅜ in. x 6 in. Nipple*
216 *Rubber Washer*
217 *Iron Washer*
228 *⅛ in. x ⅜ in. Malleable Iron Ell*
136 *⅜ in. Malleable Iron Pipe Cap*
128 *⅜ in. Malleable Iron Pipe Locknut*
876 *Gas Flange for Lamp Body Plate*
868 *Elbow Flange for Cock Body*
878 *Lead Gasket for Gas Flanges*
451 *⅛ in. Nipple for Gas Flanges*
250 *Screw for Bezel Ring*
530 *Screw for Catch Support and Gas Way.*
540 *Screw for Hinge Plate*
531 *Screw for Gas Flanges*
265 *Screw for Catch Spring*
550 *Screw for Adjusting Cock Body*
532 *Screw for Flue Spacing Piece*
251 *Screw for Reflector*
279 *Wood Screw for Ventilator*
551 *Hex. Head Machine Bolt*
552 *Hex. Nut*
931 *Rivet for Outer Flue*
932 *Spacing Piece for Flue*

List of Parts, Fig. 2313.

168 *⅛" Galv. iron pipe*
480 *¾" Galv. iron pipe*
483 *¾" Galv. iron tee*
486 *¾" x ¾" x ⅛" brass union tee*
490 *¾" main cock*
867 *⅛" flanged ell*
LA-100 *bracket lamp*
LD-650 *vestibule lamp*
LD-750 *center deck lamp, 24" drop*
L-900 *center deck lamp, 12" drop*

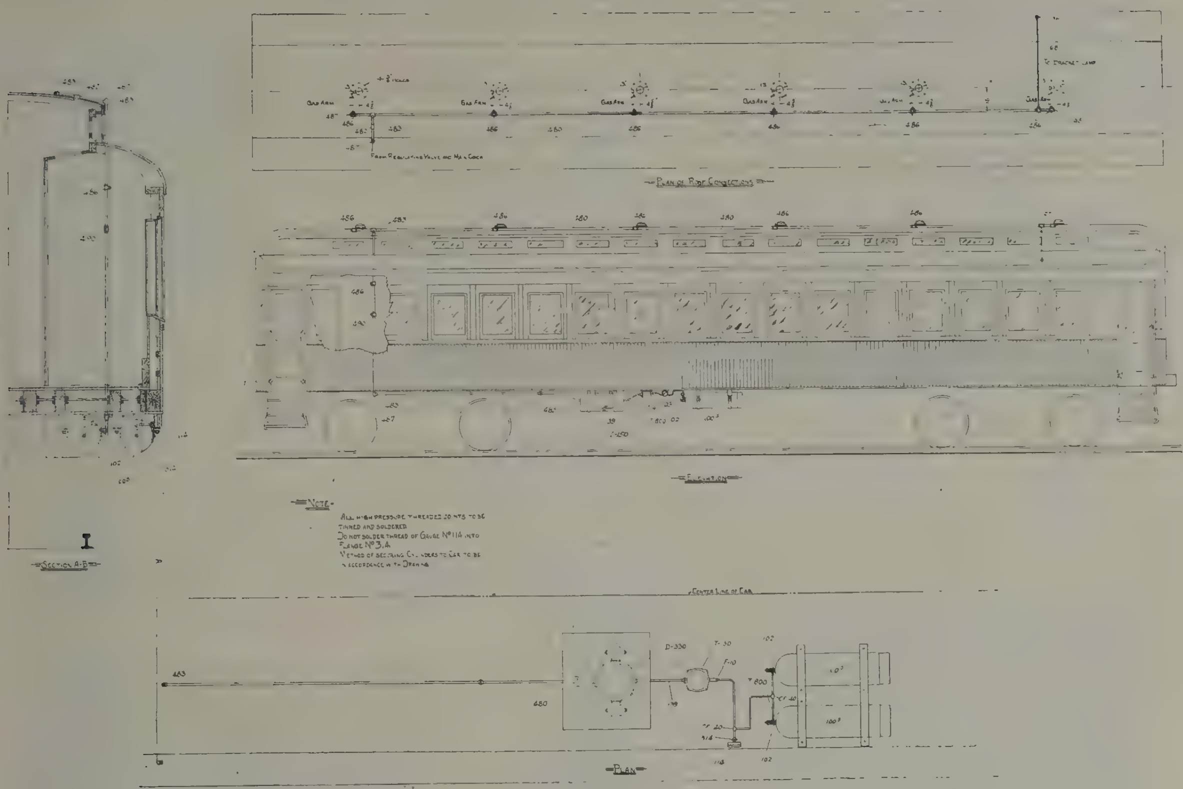


Fig. 2314—Complete Plan of Installation of A. G. A. Lighting System to Railway Coach.

List of Parts, Figs. 2314-2315.

High Pressure Equipment		Low Pressure Equipment	
2 12 in. x 44 in. Cylinders	100-S	100 ft. ¾ in. Galv. Iron Pipe	480
2 Hexagon Brass Nuts for Cylinder Connection	100	1 ¾ in. Galv. Iron Couplings	481
2 Case-hardened Steel Nipples for Cylinder Connection	103	1 ¾ in. Galv. Iron Couplings—R. & L.	482
1 Key for Cylinder	106	3 ¾ in. Galv. Iron Tees	483
2 Block Tees for 8 m/m Tubing	CF-140	1 ¾ in. Ground Joint Union, Galv.	485
1 Mixer Connection	F-10	8 ¾ in. x ¾in. x ⅛ in. Brass Union Tees	486
1 Pressure Gauge	114	4 ¾ in. Plugs	487
20 ft.—8 m/m Copper Covered Tubing	T-800	24 ¾ in. Pipe Straps	488
6-8m/m Pipe Straps	F-120	1 ¾ in. Main Cock	490
1 Mixer	D-330	1 Main Cock Key	491
1 Pressure Regulator with Filter	T-150	25 ft. ⅛ in. Galv. Iron Pipe	168
24 in.—⅜ in. Extra Strong Pipe	139	12 ⅛ in. Galv. Pipe Straps	171-D
1 Gauge Connection	314	1 1⅛ in. Brass Flanged E11	867

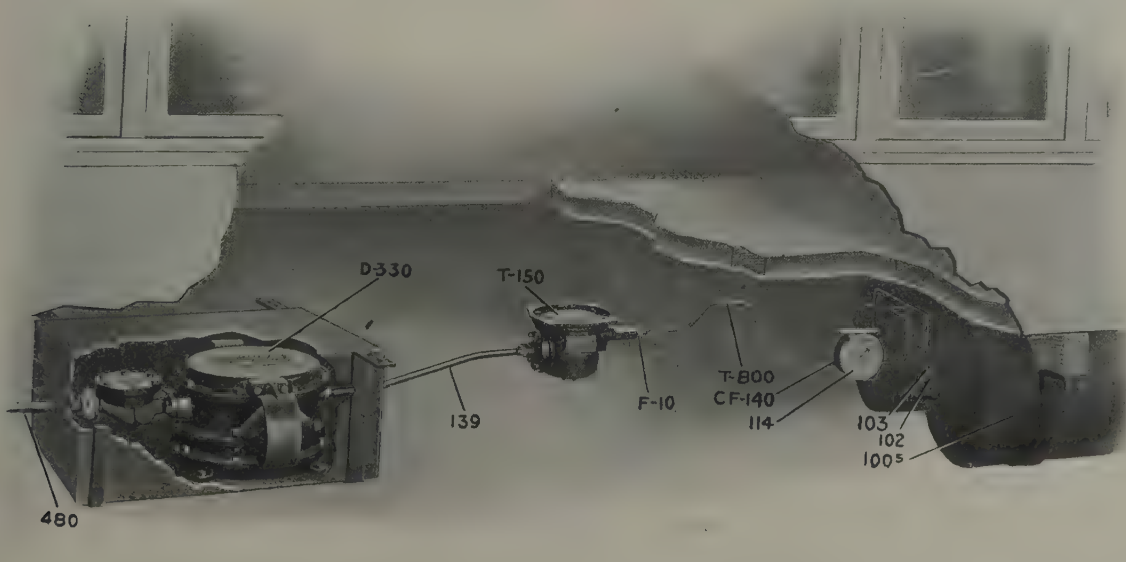


Fig. 2315—A. G. A. Lighting System Applied to Coach.
A. G. A. Railway Light & Signal Company.

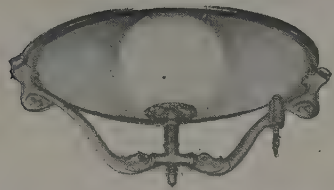


Fig. 2316—Vestibule Lamp No. 709.

Fig. 2317—Two-Light Chandelier No. 720.

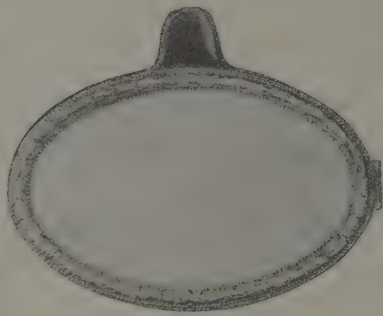


Fig. 2318—One-Light Oval Corridor Lamp.

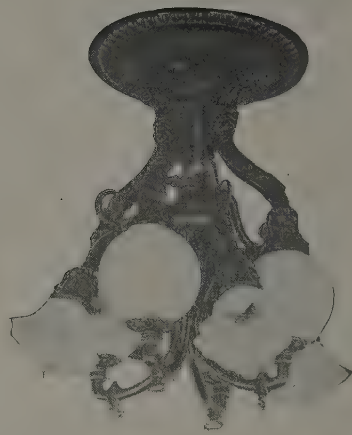


Fig. 2319—Four-Light Combination Gas and Electric Chandelier No. 747.

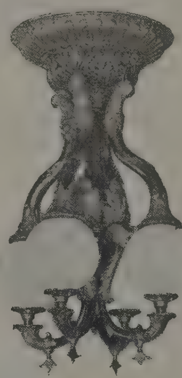
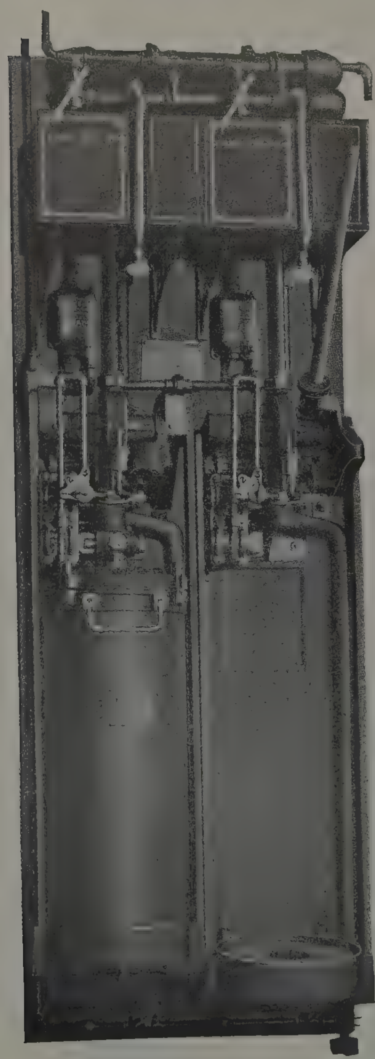


Fig. 2320—Four-Light Chandelier No. 754.



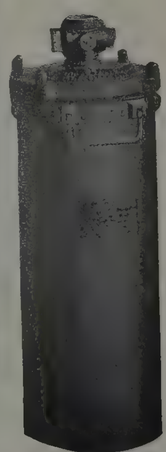


Fig. 2321—Generating Apparatus and Removable Cartridge.

Fig. 2322—View Showing Location of Generator in Closet at End of Car.

Adams & Westlake Company.

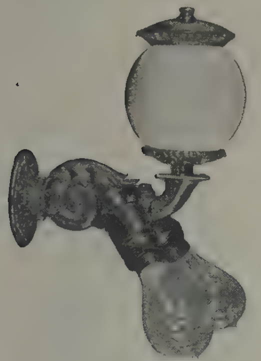


Fig. 2323 — Combination Gas and Electric Side Bracket Lamp No. 723.

Fig. 2324—Oval Panel Lamp No. 732.

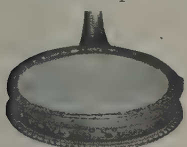


Fig. 2325 — Panel Lamp No. 766, for Passage Way.

Fig. 2326—Side Bracket Lamp No. 738.

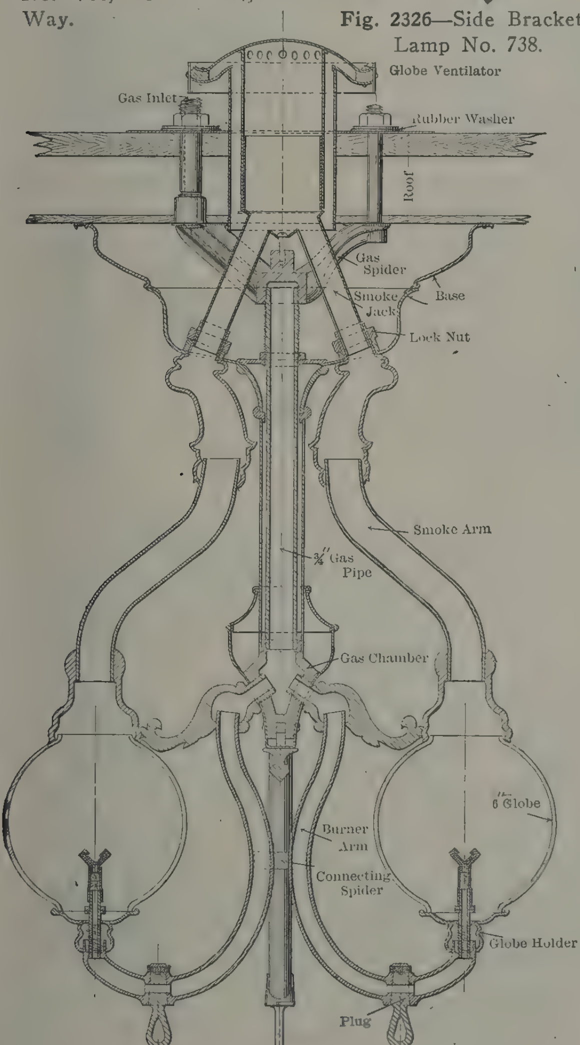


Fig. 2327—Section Through Lamp Body.

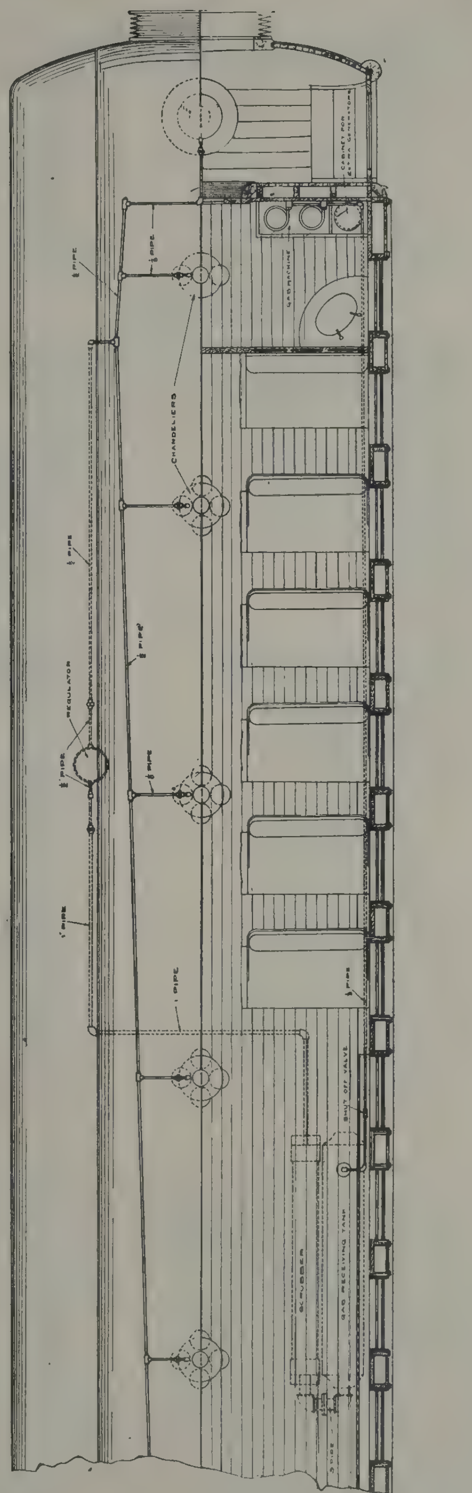


Fig. 2328—Arrangement of Piping on Passenger Car.

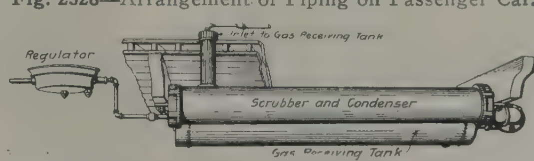


Fig. 2329—Arrangement of Fixtures Under Car.

Adams & Westlake Company.

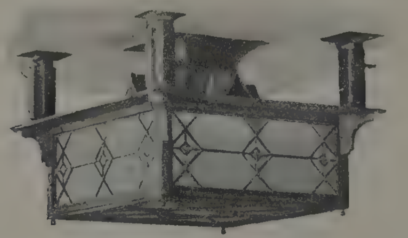


Fig. 2331—Four-Light Chandelier No. 792

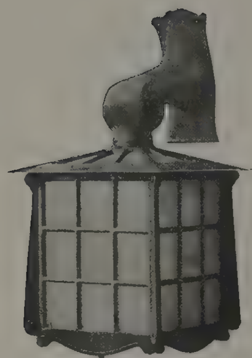


Fig. 2330 — One-Light Side Deck Lamp with Curved Foot for Empire Deck.

Fig. 2332—Two-Light Electric Bracket No. 7190a.

Fig. 2334 — One-Light Oval Panel Lamp.

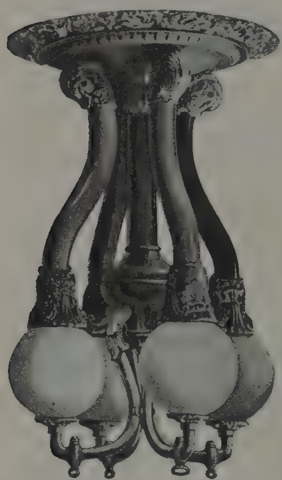


Fig. 2335—Four-Light Chandelier No. 772.

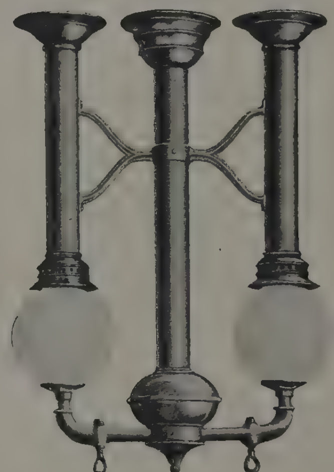


Fig 2336 — Two-Light Chandelier No. 764.

Fig. 2337—Two-Light Chandelier No. 770.

Fig 2338—One - Light Vestibule Chandelier No. 798, for Flat Deck.

Fig. 2339 — One-Light Chandelier No. 784.

Fig. 2340 — Two-Light Electric Bracket No. 7290.

Adams & Westlake Company.

Fig. 2341—Two-Light Chandelier No. 202.

Fig. 2342—Two-Light Chandelier No. 302.

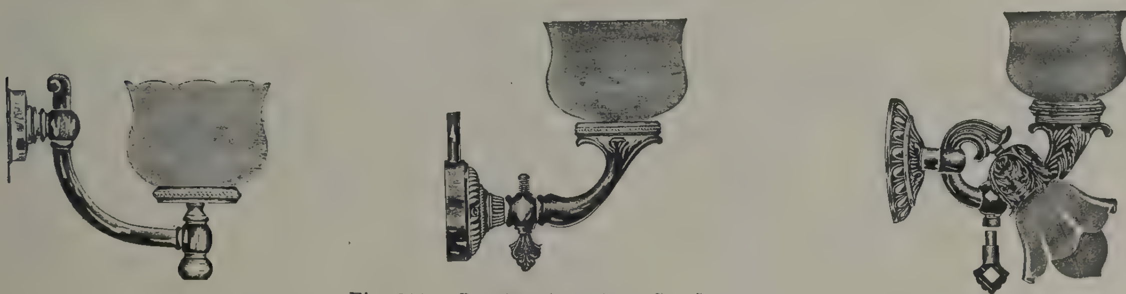


Fig. 2343—Bracket Acetylene Gas Lamps.

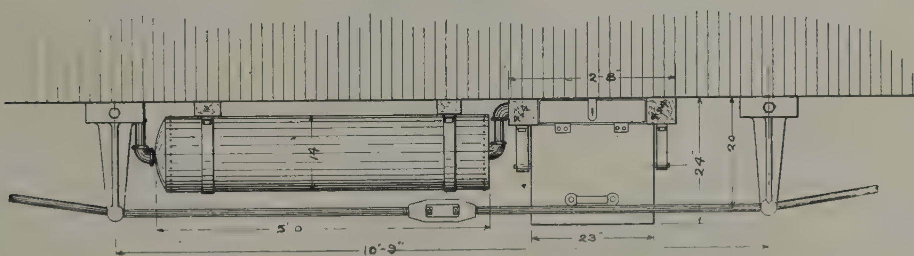


Fig. 2344—Application of Generator and Gas Tank Under Car; Avery System of Acetylene Gas Lighting.

Fig. 2345—Generator Box Lowered for Recharging.

Fig. 2346—Generator Box Closed in Running Position.

Dayton Manufacturing Company.

Fig. 2347—Alukali Reflector No. 51270.

Fig. 2348 — Candle-Lamp Chimney No. 234.

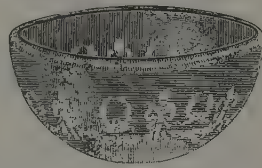


Fig. 2349 — Clear Glass Bowl with Etched Figure.

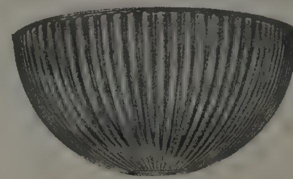


Fig. 2350—Bowl No. 8098.

Fig. 2351—Alukali Reflector.

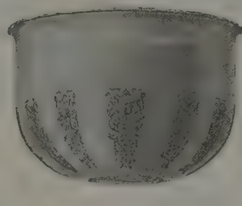


Fig. 2352—Opal Bowl No. 3252.

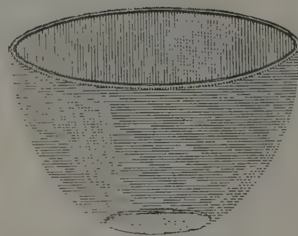


Fig. 2353—Opal Bowl.

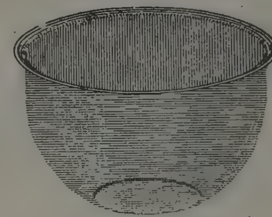


Fig. 2354—Frosted Bowl, 9-in. No. 3320.

Fig. 2355—Bowl No. 8159.

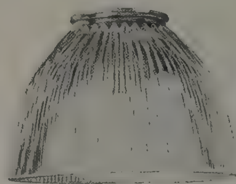


Fig. 2356 — Prismatic Reflector.

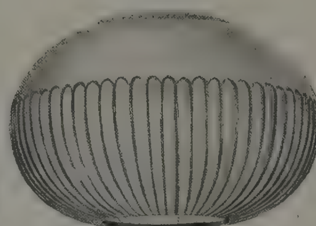


Fig. 2357—Corona Bowl No. 3425.

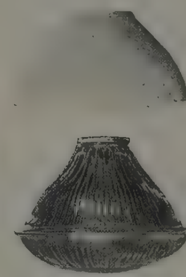


Fig. 2358—Opal Envelope No. 8671 and Prismatic Reflector No. 8672.

Fig. 2359—Etched Bowl No. 9799.

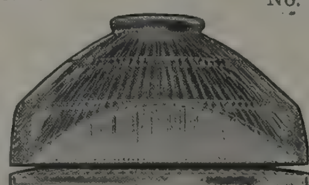


Fig. 2360—Prismatic Reflector Plate Unit No. 18371.

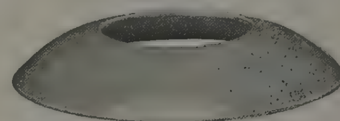


Fig. 2361—Reflector No. 9425.

Fig. 2362—Etched Shade No. 9757.

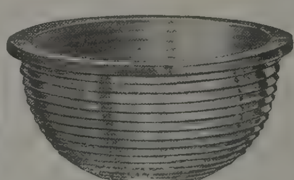


Fig. 2363—Prismatic Bowl No. 18053.

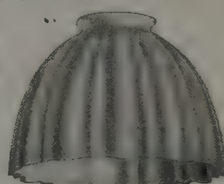


Fig. 2364—Shade No. 9011.

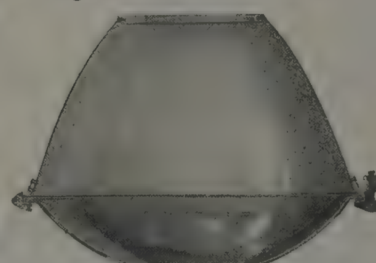


Fig. 2365—Alukali Reflector Bowl Unit, No. 51250, Pintsch Mantle Lamps.

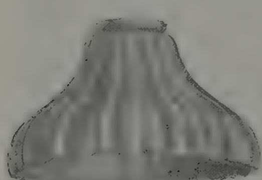


Fig. 2366—Pressed Glass Shade No. 2346.

Fig. 2367—Shade No. 3261.

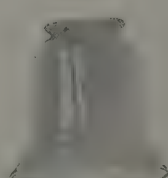


Fig. 2368—Shade No. 3738.

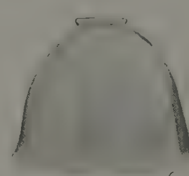


Fig. 2369—Heavy Density Opal Reflector No. 18678.

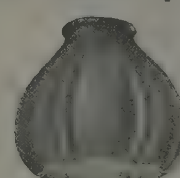


Fig. 2370 — Shade No. 3990.

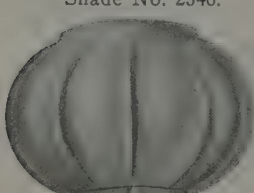


Fig. 2371—Bowl No. 8017.

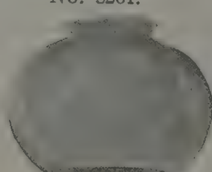


Fig. 2372 — Shade No. 3847.

Fig. 2373—Opal Dome No. 104.

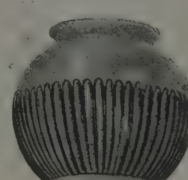
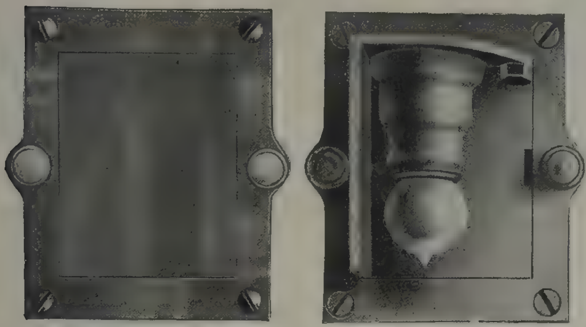


Fig. 2374—Bowl No. 8025.

Safety Car Heating & Lighting Company.



Closed. Open.

Fig. 2375—Berth Lamp No. 10540.

Closed. Open.

Fig. 2376—Berth Lamp.

Fig. 2377—Pendant No. 7620.

Fig. 2378 — Pendant No. 7760.

Fig. 2381—One-Light Chandelier.

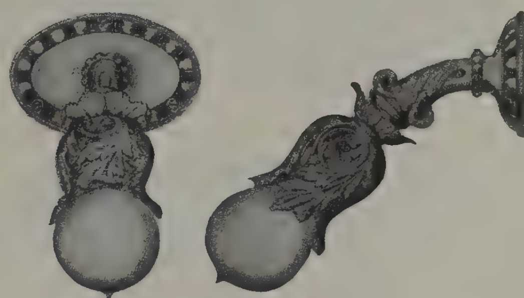


Fig. 2379—Bracket Lamp No. 9230.

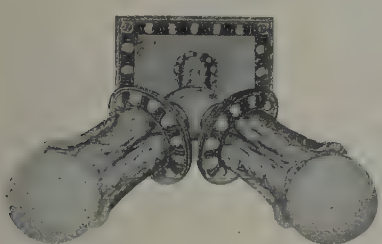


Fig. 2380—Bracket Lamp No. 7260.

Fig. 2382—Bracket Lamp.

Adams & Westlake Company.

Fig. 2383—Moonstone Doric Reflectors. Jefferson Glass Company.

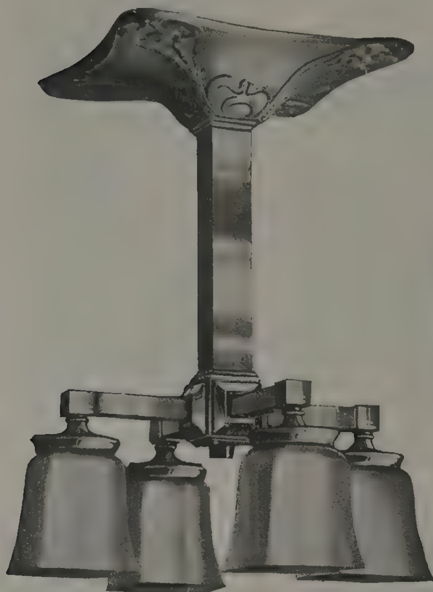


Fig. 2384—Four-Light Chandelier.

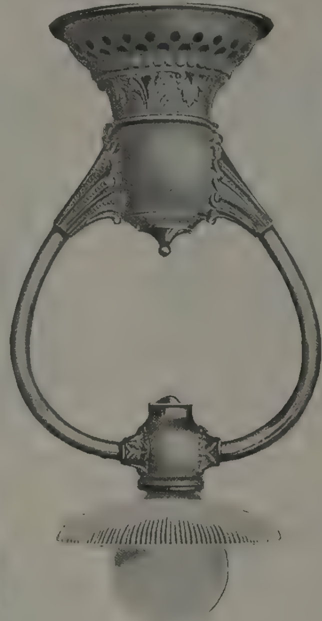


Fig. 2385—One-Light Center Fixture.

Fig. 2386—One-Light Center Fixture.

Fig. 2387—One-Light Pendant.

Fig. 2388—One-Light Pendant.

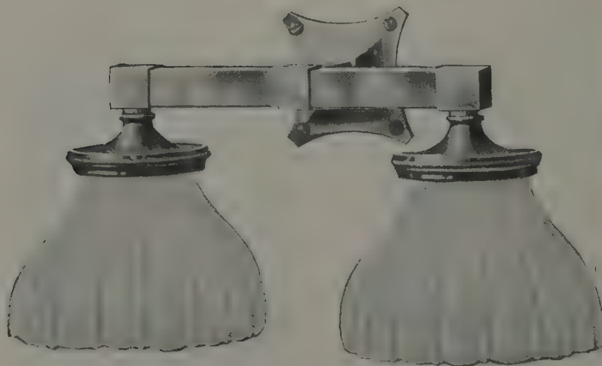
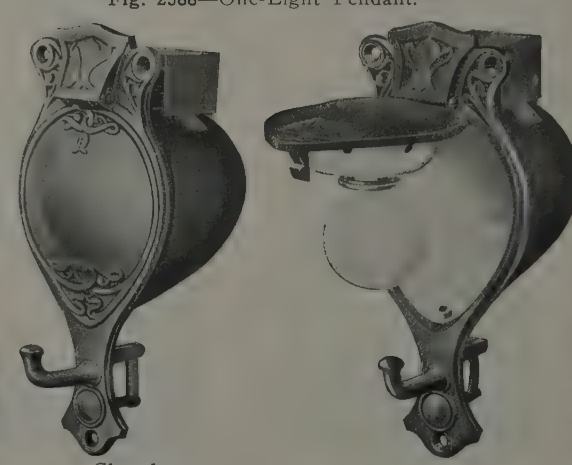


Fig. 2389—Two-Light Bracket Lamp.



Closed. Open.

Fig. 2390—Berth Lamp No. 9600.

Adams & Westlake Company.


Fig. 2391—Platform Lamp.


Fig. 2392—Bracket Lamp No. 19075.


Fig. 2393—Bracket Lamp No. 1785.


Fig. 2394 — Corner Berth Lamp.


Fig. 2395—Berth Lamp No. 3862.


Fig. 2396—Berth Lamp No. 2485.


Fig. 2397—Bracket Lamp No. 8960.

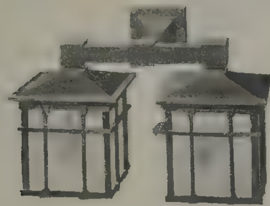


Fig. 2398—Bracket Lamp No. 8080.


Fig. 2399—Bracket Lamp.

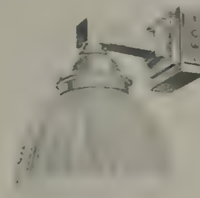


Fig. 2400—Bracket Lamp No. 8183 With Base Switch.


Fig. 2401 — Two-Light Bracket.


Fig. 2402 — One-Light Bracket.


Fig. 2403—Bracket Lamp No. 8249.

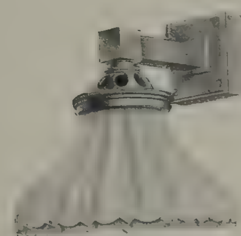


Fig. 2404—Bracket Lamp No. 2305.


Fig. 2405—Bracket Lamp No. 8373.


Fig. 2406 — Fixture No. 9055.


Fig. 2407—Bracket Lamp No. 19026.


Fig. 2408—Bracket Lamp.


Fig. 2409—Bracket Lamp.


Fig. 2410—Bracket Lamp No. 8138.


Fig. 2411—Bracket Lamp No. 8184.


Fig. 2412—Bracket Lamp No. 3845.


Fig. 2413—Bracket Lamp No. 8752.


Fig. 2414—Lamp No. 3880.


Fig. 2415—Electric Lamp for Condulet.


Fig. 2416—Pendant No. 8185.


Fig. 2417—Lamp No. 8304.


Fig. 2418—Pendant No. 3846.


Fig. 2419—Deck Lamp No. 9390 With Bowl No. 9781.


Fig. 2420—Deck Lamp No. 19032 With Reflector No. 18678.


Fig. 2421—Pendant No. 2482.

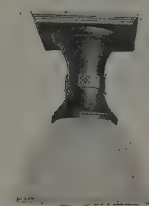


Fig. 2422—Lamp No. 3960.


Fig. 2423—Lamp No. 9411 for Letter Case Section of Postal Car.


Fig. 2424—Pendant.


Fig. 2425—Lamp No. 8661.


Fig. 2426—Lamp No. 3875.


Fig. 2427—Pendant No. 8139.


Fig. 2428—Pendant No. 1749.

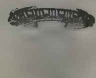


Fig. 2429—Pendant No. 1921.


Fig. 2430—Platform Lamp.


Fig. 2431—Pendant No. 2136.

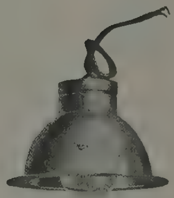


Fig. 2432—Vestibule Lamp No. 8406.

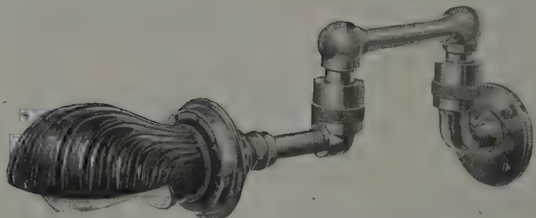


Fig. 2433—Swinging Bracket Lamp No. 8181.


Fig. 2434—Removable Swinging Bracket Lamp No. 8380.

Safety Car Heating & Lighting Company.

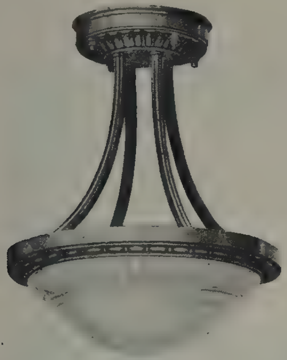


Fig. 2435—Semi-Indirect Lighting Fixture No. 19127. Safety Car Heating and Lighting Company.

Fig. 2436—Semi-Indirect Lighting Fixture No. 9470. Safety Car Heating & Lighting Company.

Fig. 2437—Lamp No. 8645. Safety Car Heating & Lighting Company.

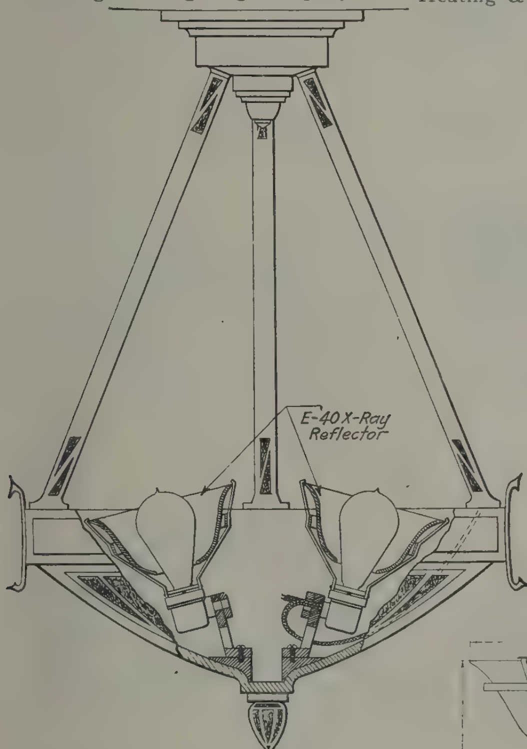


Fig. 2438—X-Ray Eye Comfort Reflector, Holder and Receptacle. National X-Ray Reflector Company.

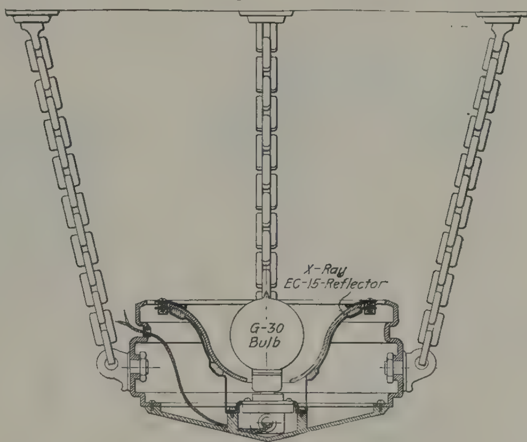


Fig. 2439—X-Ray Reflector Applied to Safety Car Heating & Lighting Company Fixtures. National X-Ray Reflector Company.

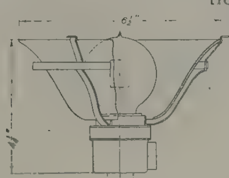


Fig. 2440—X-Ray Eye-Comfort Reflector. National X-Ray Reflector Company.

Fig. 2441—Vestibule Lamp No. 9060.

Fig. 2442—Lamp No. 19007.

Fig. 2443—Lamp No. 9385.

Fig. 2444—Deck Lamp No. 9050.

Fig. 2445—Lamp No. 19057.

Safety Car Heating & Lighting Company.

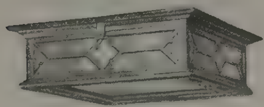


Fig. 2446—Lamp No. 9367.

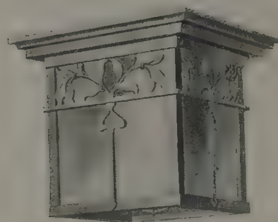


Fig. 2447—Lamp No. 3694.


Fig. 2448—Deck Lamp No. 8113.

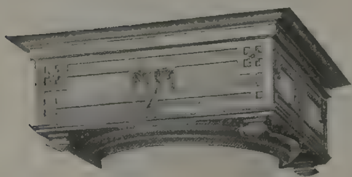


Fig. 2449—Lamp No. 3938.

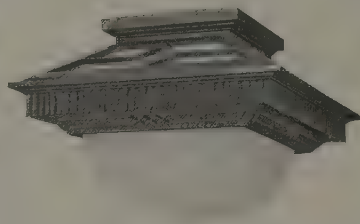


Fig. 2450—Lamp No. 2326.

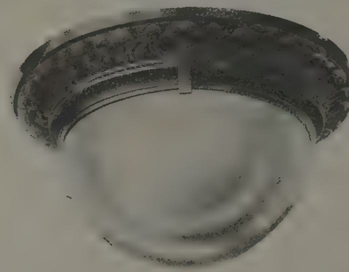


Fig. 2451—Deck Lamp No. 2160.

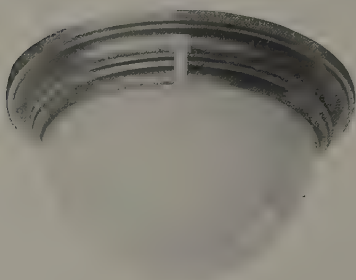


Fig. 2452—Lamp No. 2283.


Fig. 2453—Lamp No. 8350.


Fig. 2454—Lamp No. 8105.


Fig. 2455—Table Lamp No. 9860.


Fig. 2456—Electric Pendant No. 9700.


Fig. 2457—Lamp No. 3889.

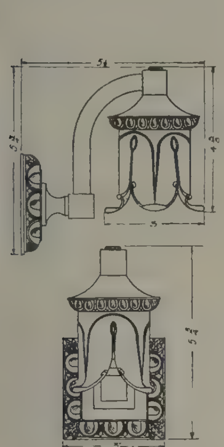

No. 2453. No. 2166.
Fig. 2458—Electric Table Lamps.


Fig. 2459—Chandelier No. 3688.

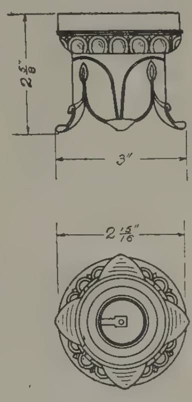

Fig. 2460—Adjustable Table Lamp.


Fig. 2461—Candelabra No. 2125.

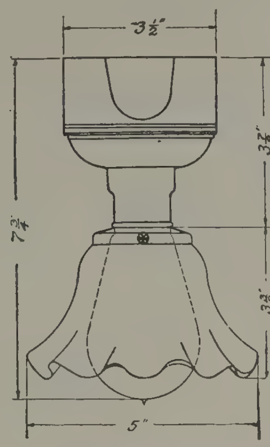
Safety Car Heating & Lighting Company.



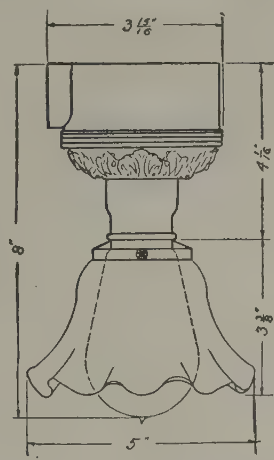
No. 548—Embossed Single Bracket.



No. 549—Embossed Pendant.



No. 544—Plain Ceiling Pendant with Box for Conduit Wiring Complete with Opal Shade.



No. 545 — Embossed Ceiling Pendant with Box for Conduit Wiring Complete with Opal Shade.

Fig. 2462—Bracket and Pendant Electric Lamps. F. H. Lovell & Company.

Fig. 2463—No. 152 Ceiling Fixture. Dayton Mfg. Company.

Fig. 2464—No. 167 Chandelier. Dayton Mfg. Company.

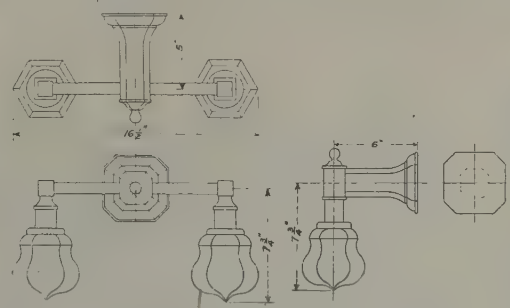


Fig. 2465—Double and Single Bracket Lamps. F. H. Lovell & Company.

Fig. 2466—Dining Car Table Lamp. Dayton Mfg. Co.

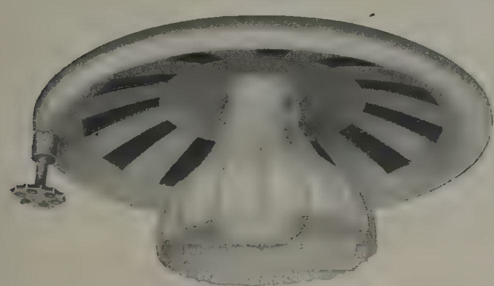


Fig. 2467—No. 133 Ceiling Fixture. Dayton Manufacturing Company.

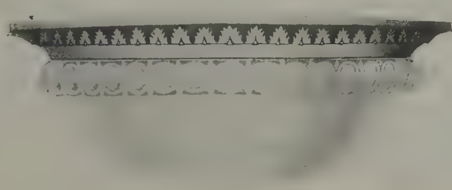


Fig. 2468—No. 149 Ceiling Fixture. Dayton Manufacturing Company.

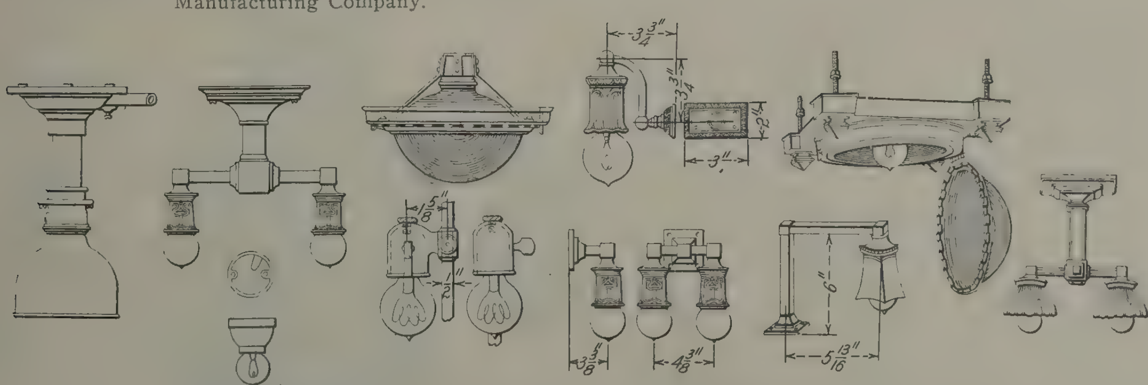


Fig. 2469—Miscellaneous Electric Lamps. Dayton Manufacturing Company.

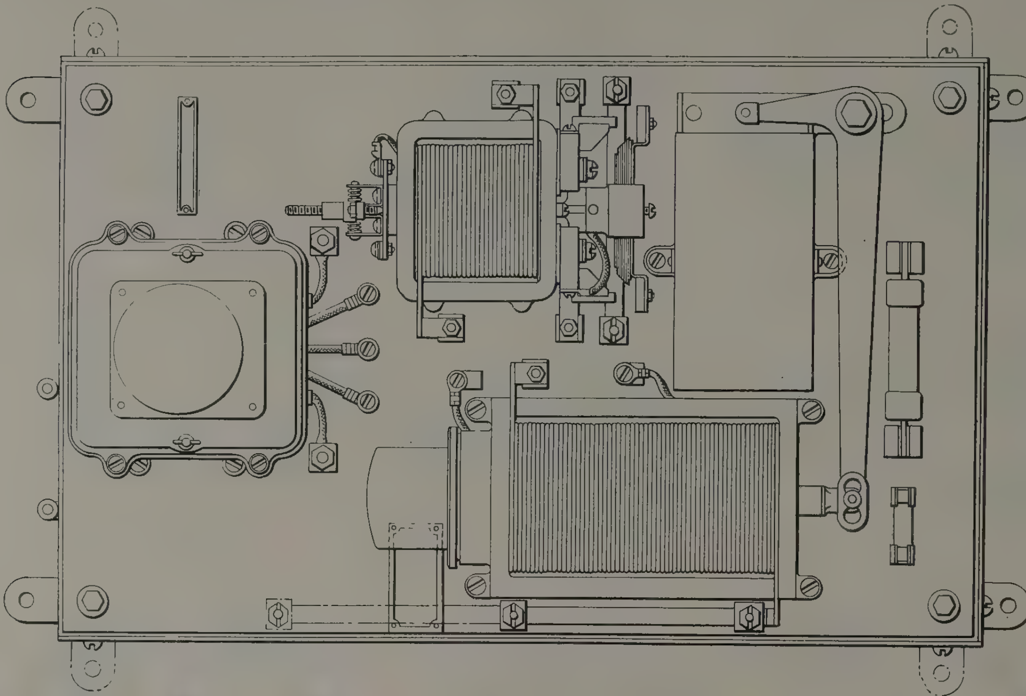


Fig. 2473—Type C. Panel with Ampere Hour Meter.

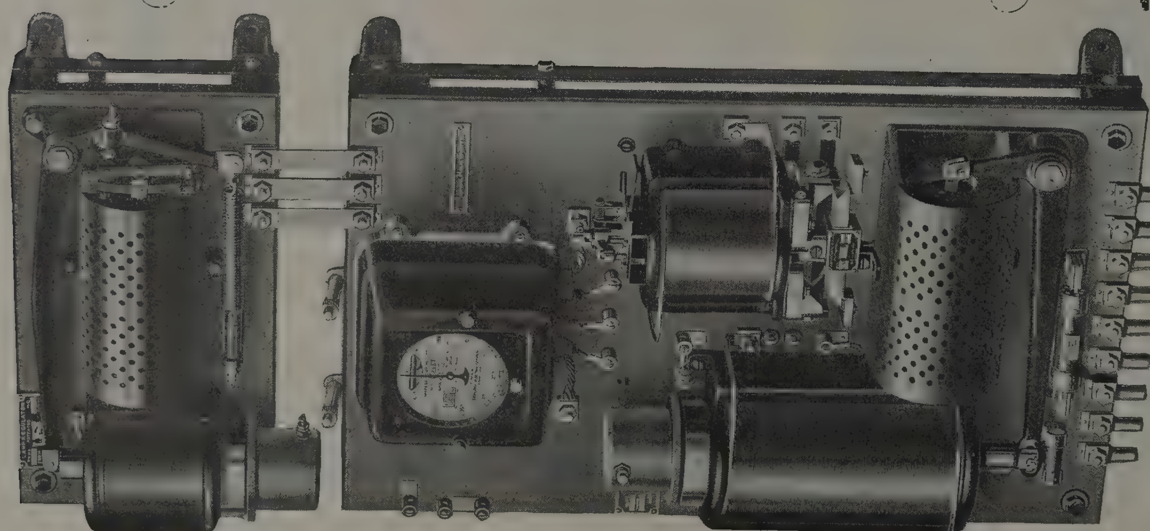


Fig. 2472—Lamp Regulator.

U. S. Light and Heat Corporation.

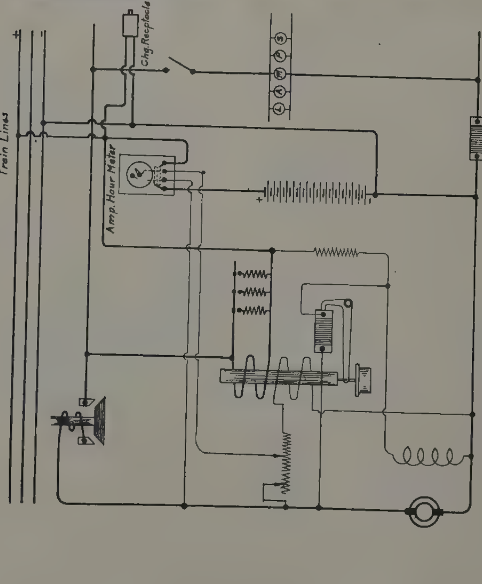


Fig. 2470—Schematic Diagram of "C" Panel.

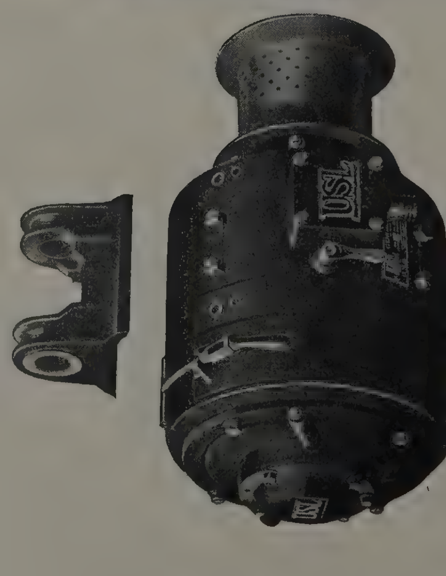


Fig. 2471—O.B.H. Generator with Body Hung Adaptor Suspended Above.

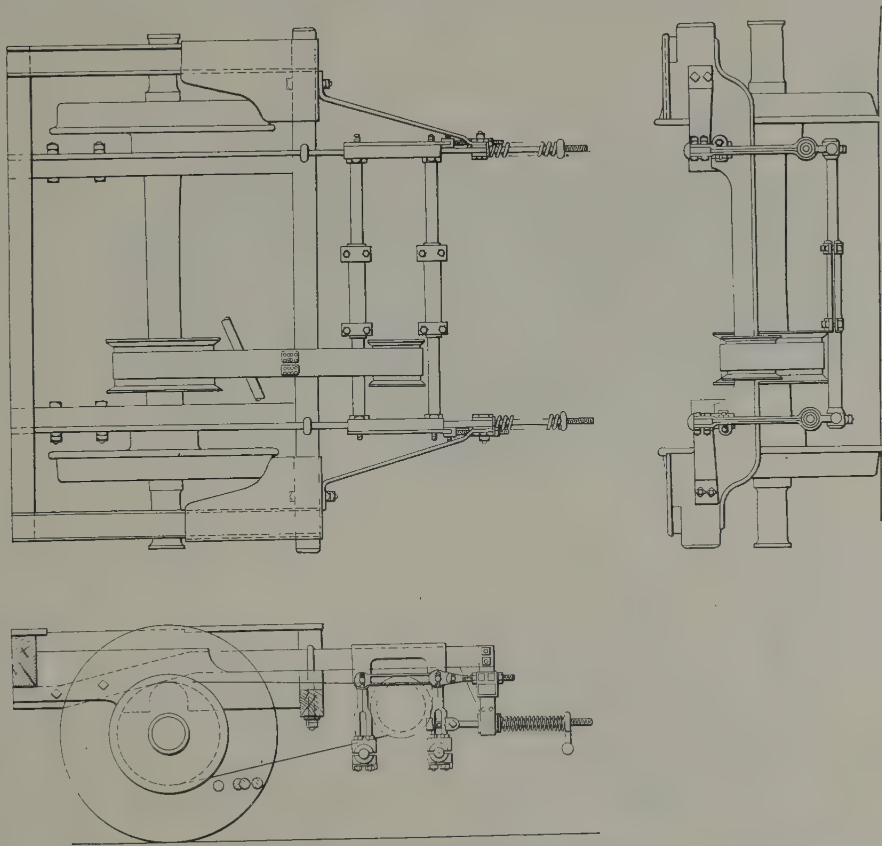


Fig. 2474—Truck Suspenson, Parallel Link.

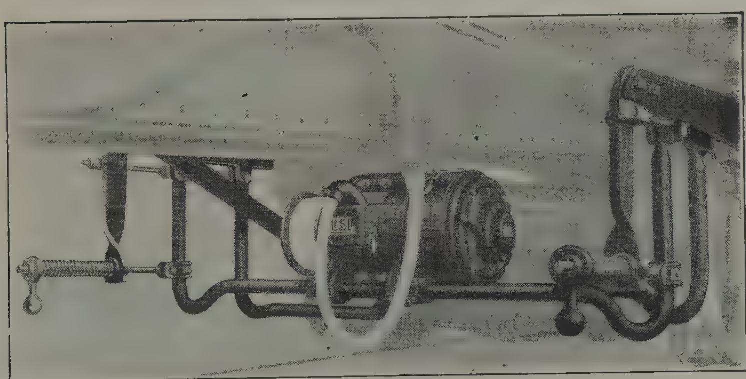


Fig. 2475—Application of U. S. L. System, Parallel Link Type.

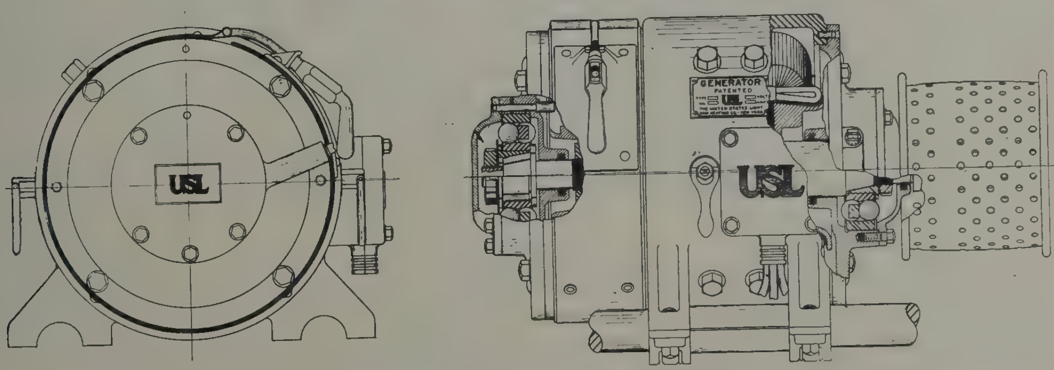


Fig. 2476—Assembly Type M-3-B Generator

U. S. Light and Heat Corporation.

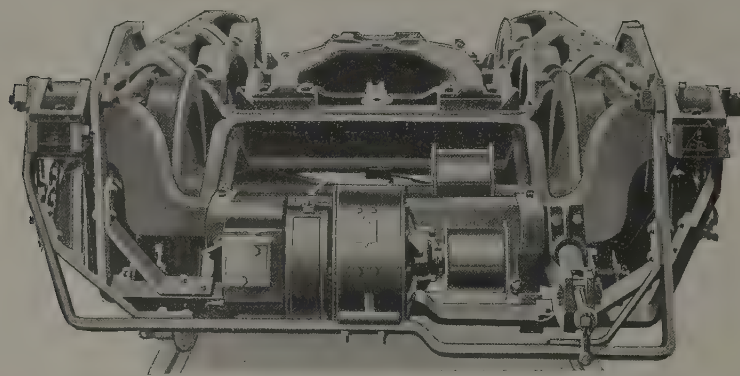


Fig. 2477—Two-Point Swinging Suspension on Commonwealth Truck.

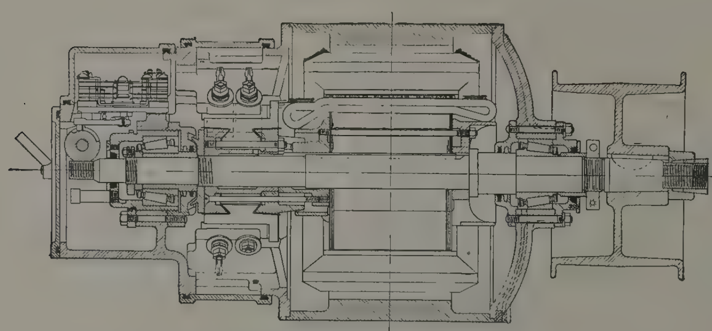


Fig. 2478 –Section Through Dynamo with Timken Roller Bearings.

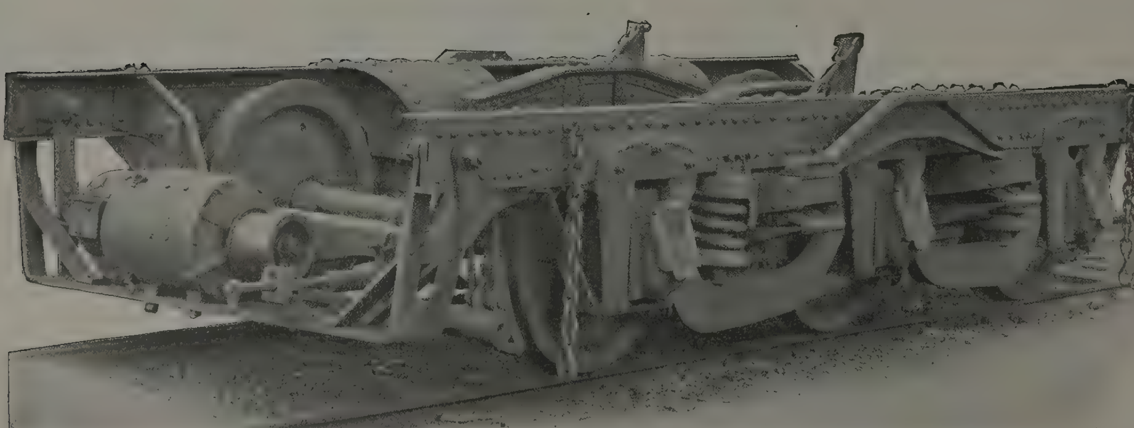


Fig. 2479—Two-Point Swinging Suspension on Built-Up Truck with Side Sills Extended.

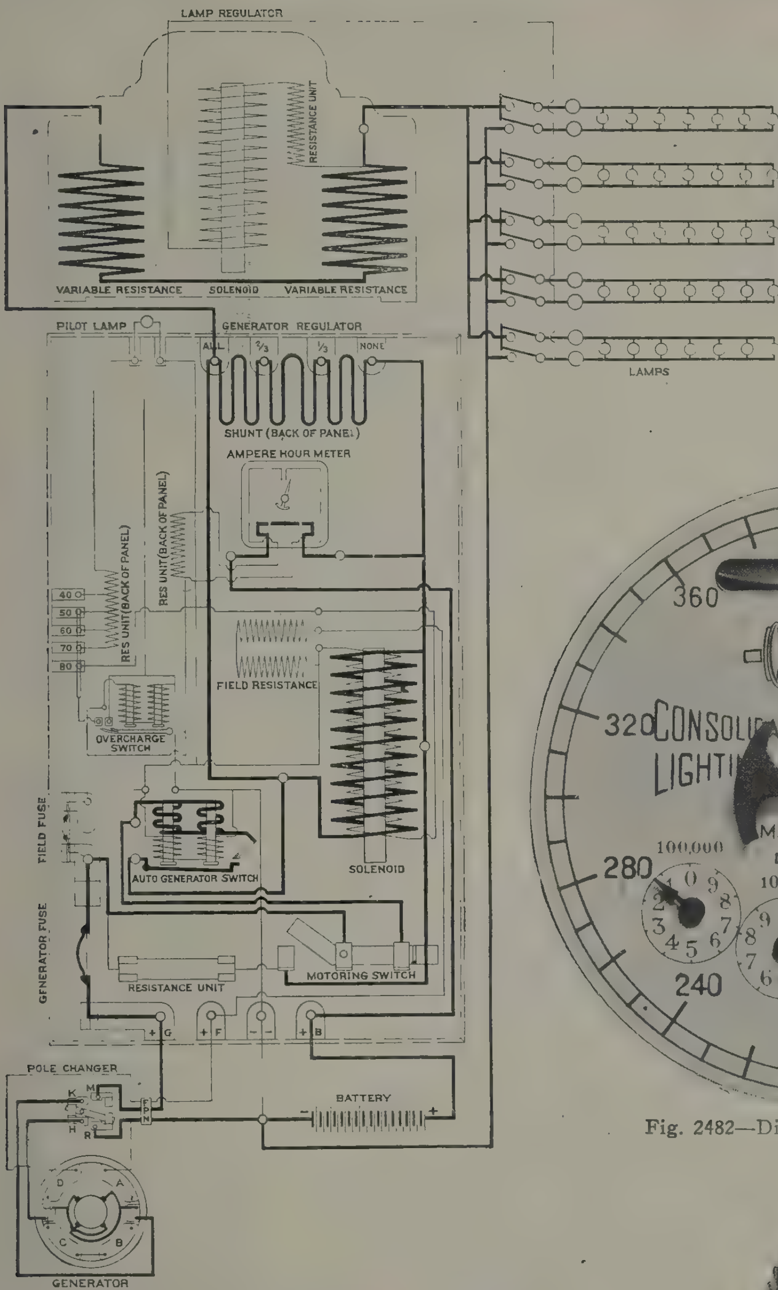


Fig. 2480—Wiring Diagram of Consolidated Axle Light System.

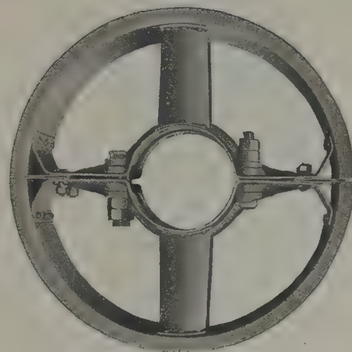


Fig. 2481—Axle Pulley.

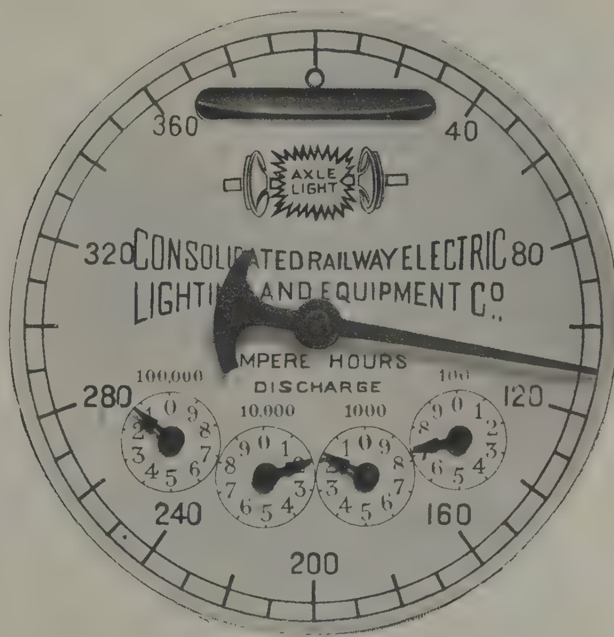


Fig. 2482—Dial of Ampere-Hour Meter.

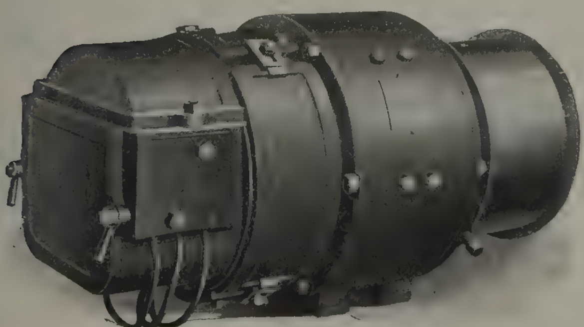


Fig. 2483—Type D-5 Generator.

Fig. 2484—Type L Lamp Regulator.

Consolidated Railway Electric Lighting & Equipment Company.

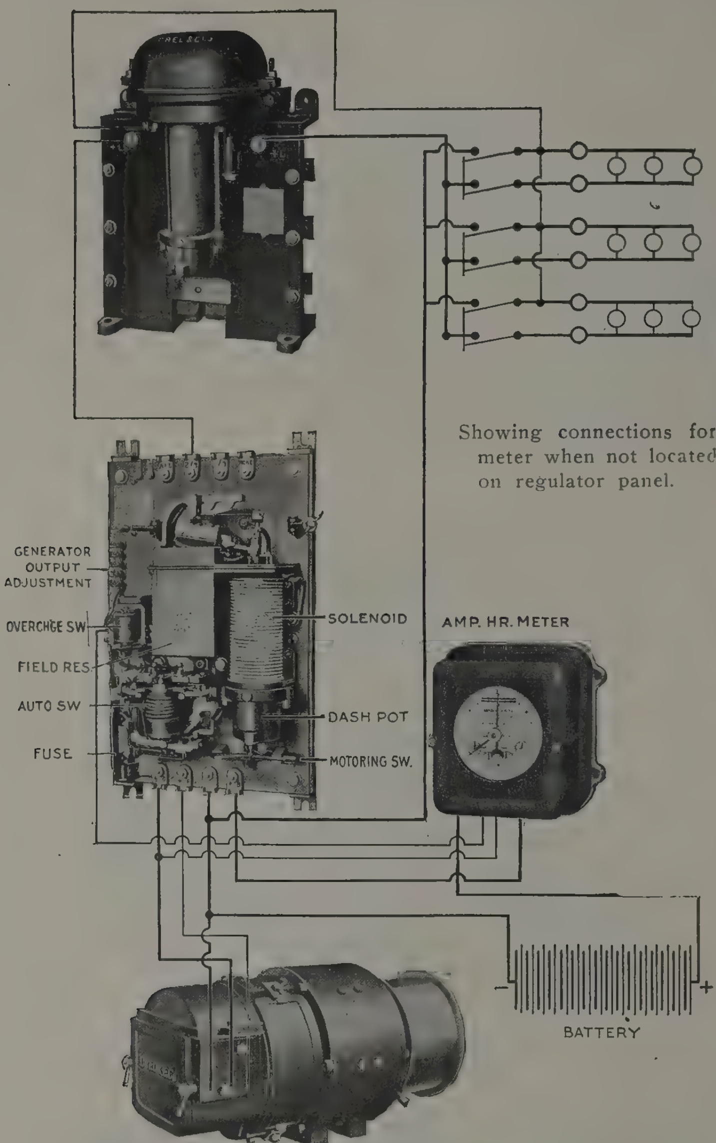


Fig. 2485—Diagram of Connections on a Car Between Dynamo, Batteries and Regulators.

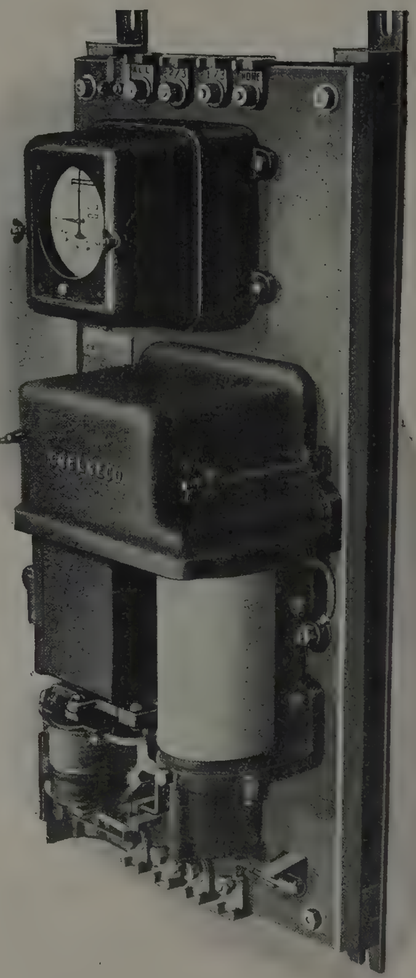


Fig. 2486—Type L-3 Regulator Ampere-Hour Meter Control.

Fig. 2488—Axle Pulley Bushing.

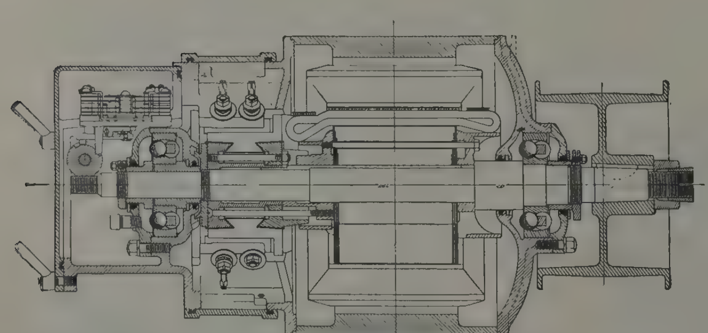


Fig. 2487—Section Through Type D-5 Ball Bearing Dynamo.

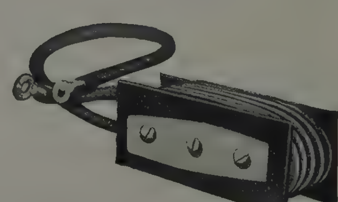


Fig. 2489—Interpole.

Consolidated Railway Electric Lighting & Equipment Company.

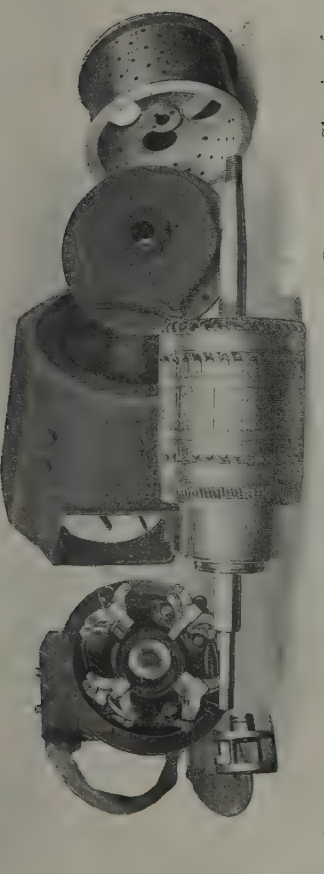


Fig. 2490—Main Units Plain Bearing, Waste Packed Generator. Showing from Left to Right: Commutator End Housing Trip Carrier, Magnet Frame, Armature and Shaft, Pulley End Housing and Generator Pulley.

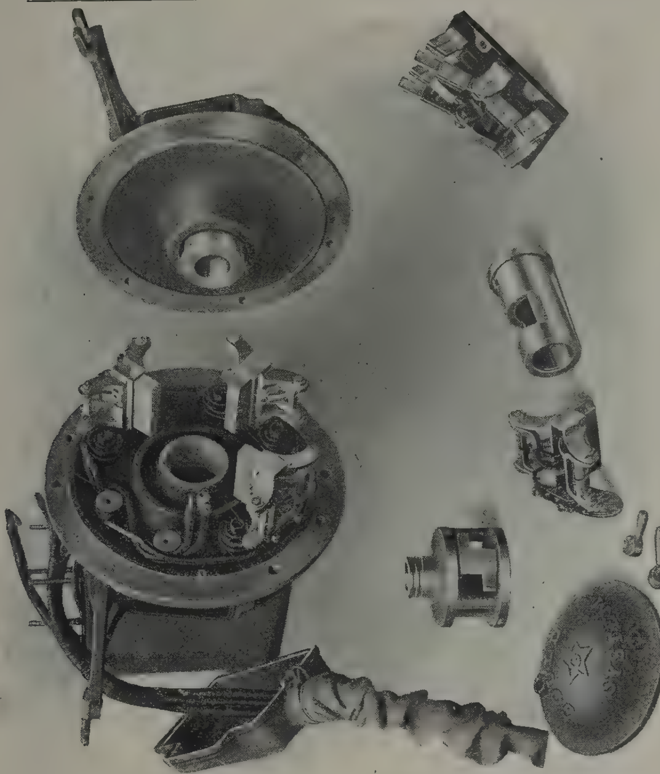


Fig. 2491—Commutator End Housing Plain Bearing, Waste Packed Type, Pulley End Housing, Trip Carrier with Trip, Commutator End Cap, Lever Nuts, Brush Holder with Brushes, Bearing and Pole Changer Switch.

Fig. 2492—Plain Bearing, Waste Packed Generator, Showing Pole Changer Ready for Removal

Fig. 2493—Plain Bearing, Waste Packed Generator, Type "B".

Gould Coupler Company.

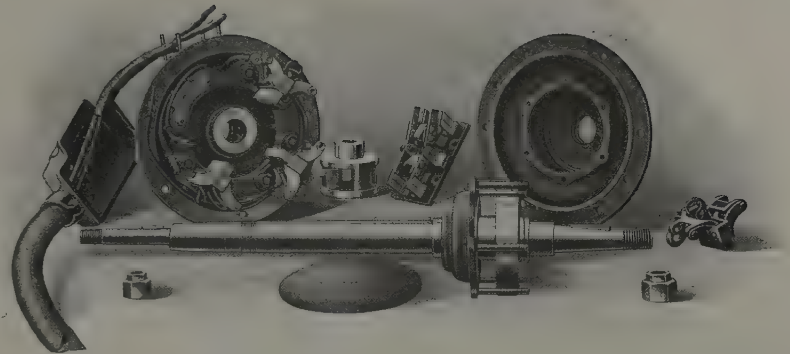


Fig. 2494—Main Units Ball Bearing Generator Showing Commutator End Housing at Left with Pole Changer Cap Removed, Trip Carrier Complete with Trip, Pole Changer Switch, Pulley End Housing, Shaft with Ball Bearing Brush Holder, Brushes and Commutator End Cap.

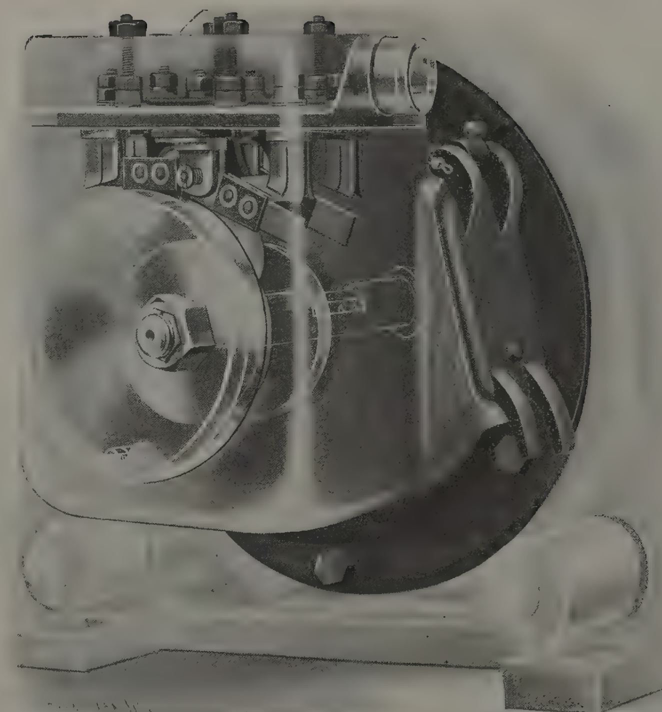


Fig. 2495—Phantom View of Pole Changer with Armature Rotating in Clockwise Direction, Trip About to Throw Pole Changer Switch so as to Reverse Connections.

(*See Fig.* 2499.)

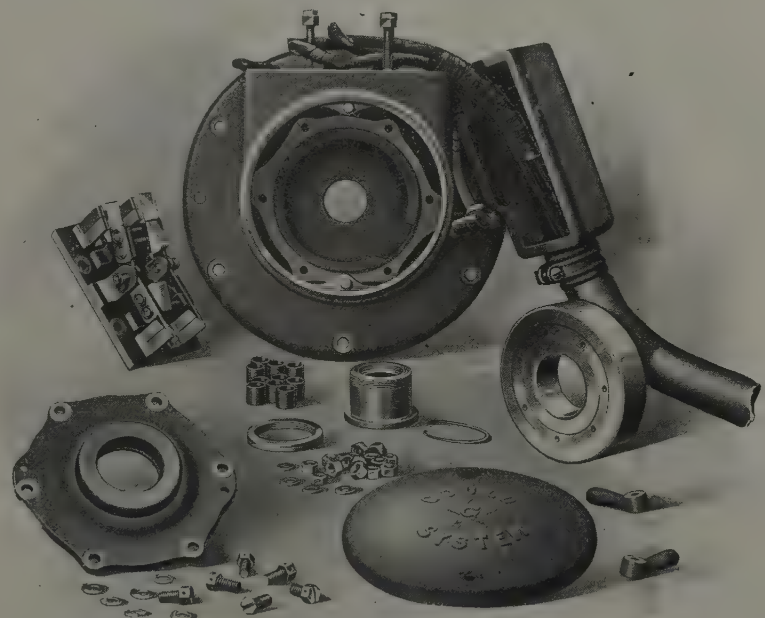


Fig. 2496—Commutator End Housing Ball Bearing Generator, Pole Changer Switch, Ball Bearing, Bearing Plate and End Cap.

Fig. 2497—Ball Bearing Generator Type "BB."

Gould Coupler Company.

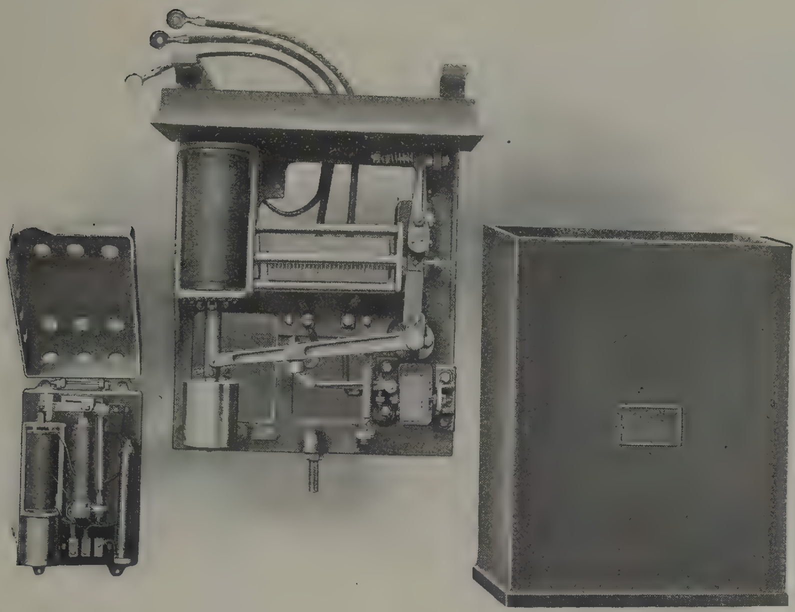
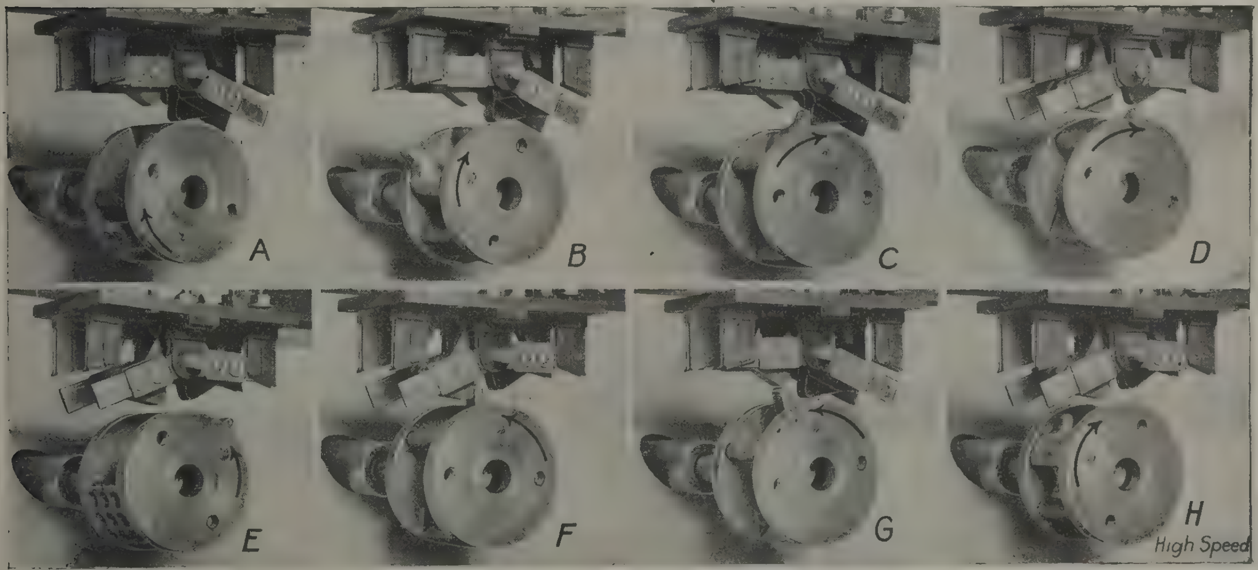


Fig. 2498—Lamp Regulator, Type "B," and Multiplier, for Outside Mounting.

"Movie" of Pole Changer in Action, see Fig. 2499. Figs. A, B, C and D show the various steps of the pole changer action in throwing the pole changer switch. Armature is revolving in the direction as shown. In **A** the trip hangs evenly balanced at the bottom; in **B** it has been carried upward, but the right hand end of the trip striking the shaft tilts it slightly as shown. In **C** the trip is engaging with the projecting lug at the rear of the switch on the right side. In **D** the trip has thrown over the reverse switch and passes the projecting lug of the switch. Views **E**, **F** and **G** show the pole changer operation when the direction of motion is reversed as shown. In **E** the tip of the trip is shown tilted, the left hand end then bearing on the shaft; in **F**, the trip has just engaged the front projecting lug at the left side of the switch, and in **G**, the trip has just thrown the switch and trip is passing the projecting lug. In **H**, the trip is shown evenly balanced by the centrifugal force when operating at high speed. The trip remains in this position without any tilt whatever, when operating at a speed of above four miles per hour.



(See Fig. 2495.)

Fig. 2499—Movie of Pole Changer in Action.

Gould Coupler Company.

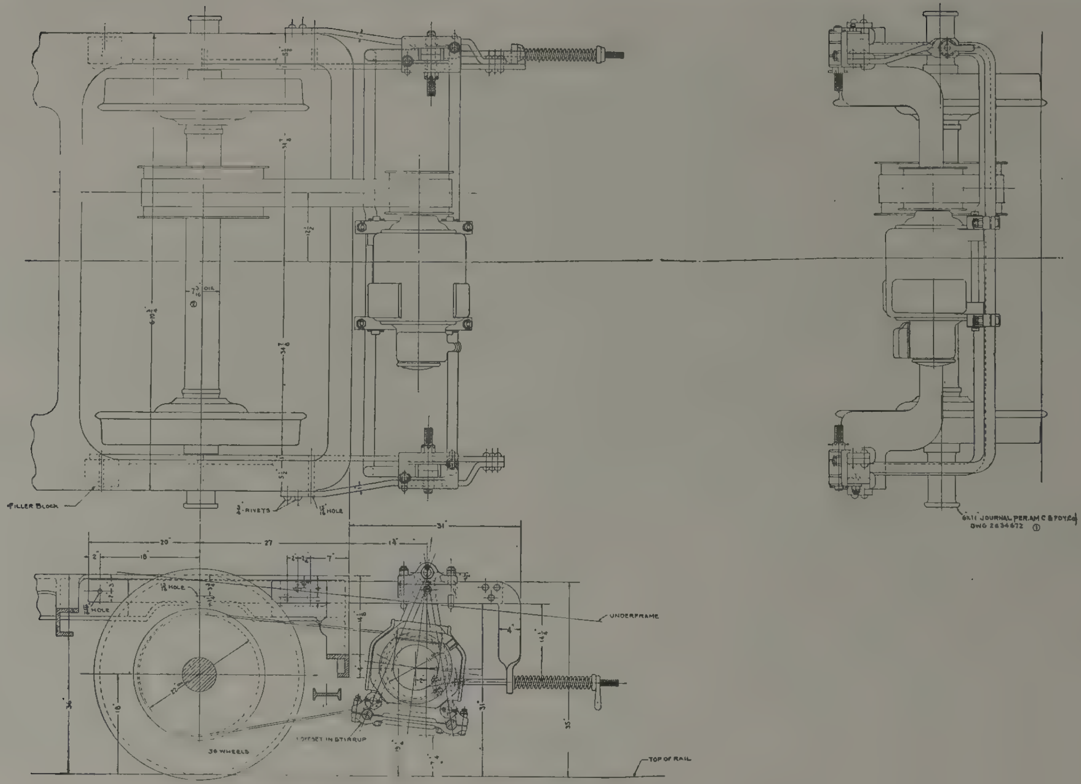


Fig. 2500—Link Type Truck Suspension, Two-Point Design.

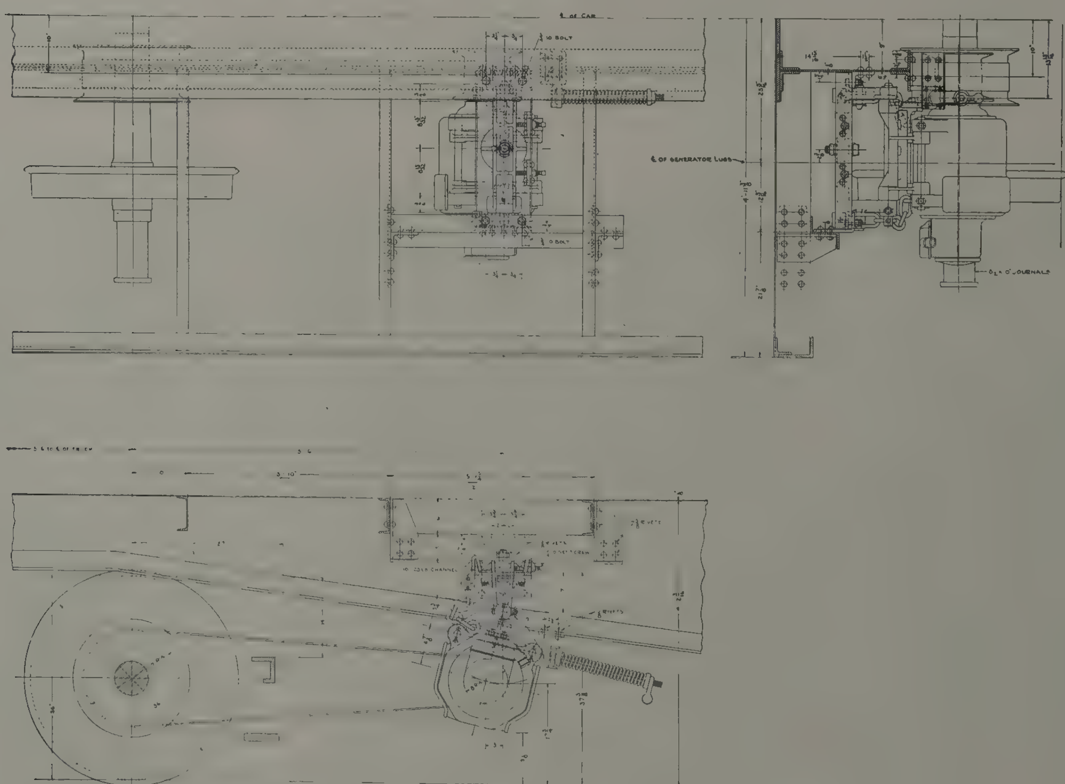


Fig. 2501—Adapter Type Body Suspension Used with Standard Truck Type Magnet Frame.

Gould Coupler Company.

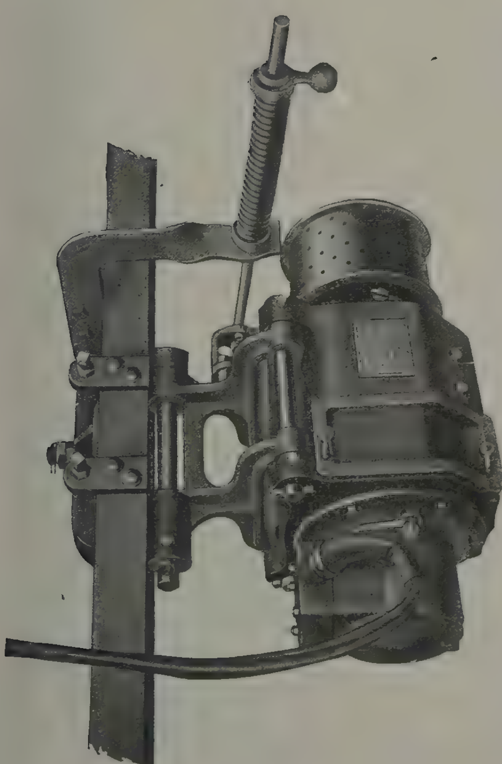


Fig. 2502—Adapter Type Body Suspension Used with Standard Truck Type Magnet Frame.

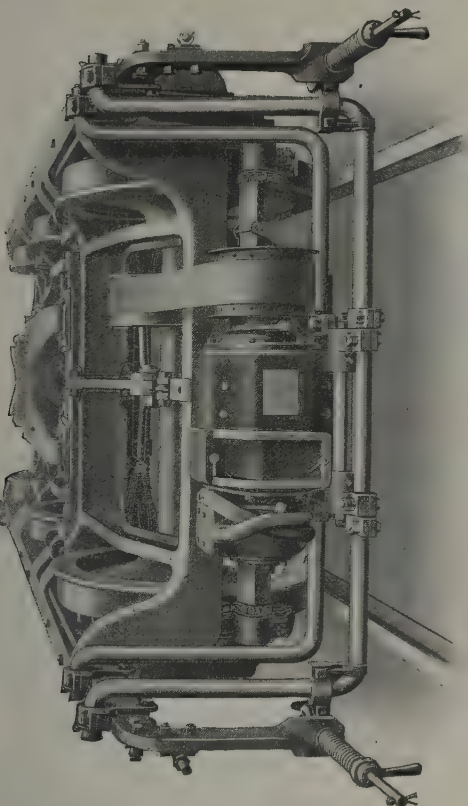


Fig. 2503—Link Type Truck Suspension.

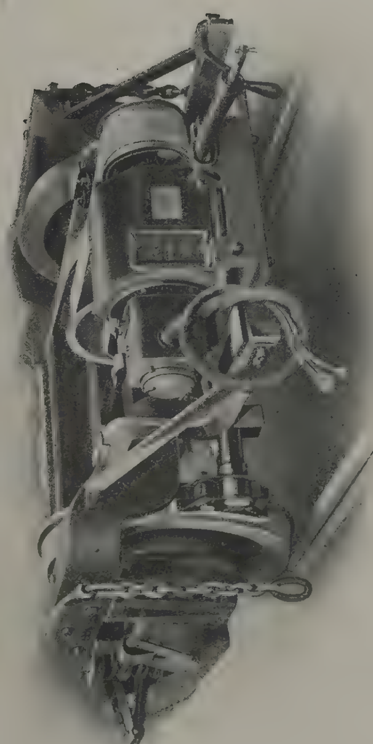


Fig. 2504—Drop Type Truck Suspension.


Fig. 2505—Generator Pulley, Axle Pulley and Belt.

Gould Coupler Company.

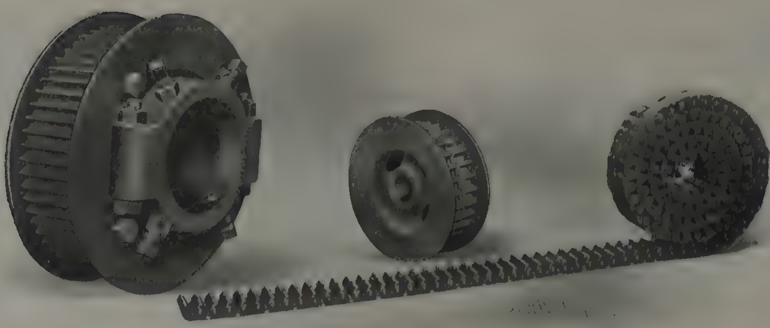


Fig. 2506—Axle Sprocket, Generator Sprocket and Chain.

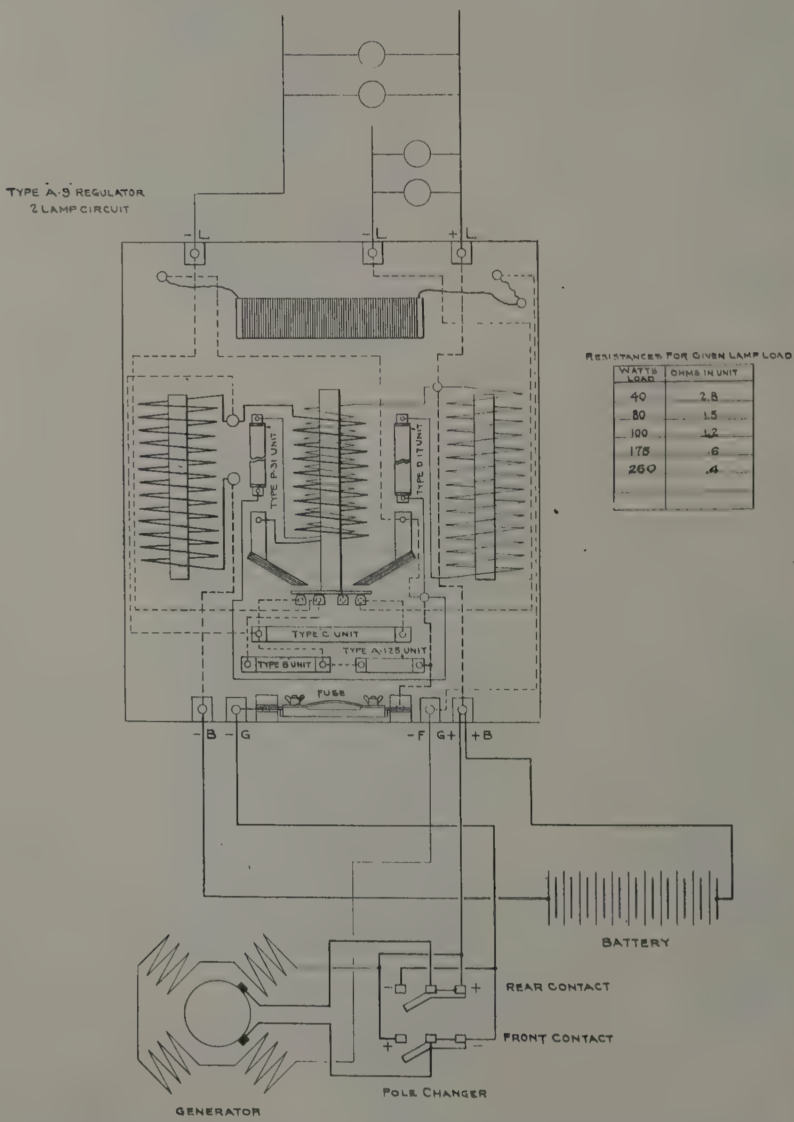


Fig. 2507—Wiring Diagram, Type "A9," Combination Generator Regulator and Lamp Regulator, Arranged for Three Lamp Circuits. Battery Charge Plus Lamp Load.

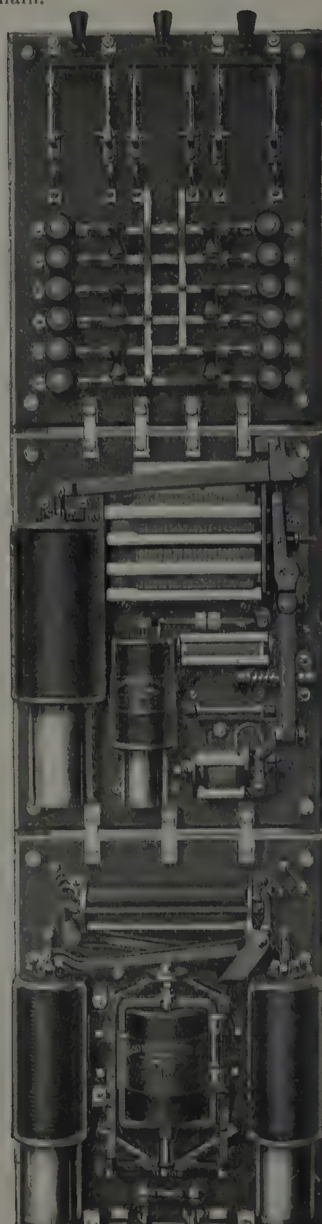
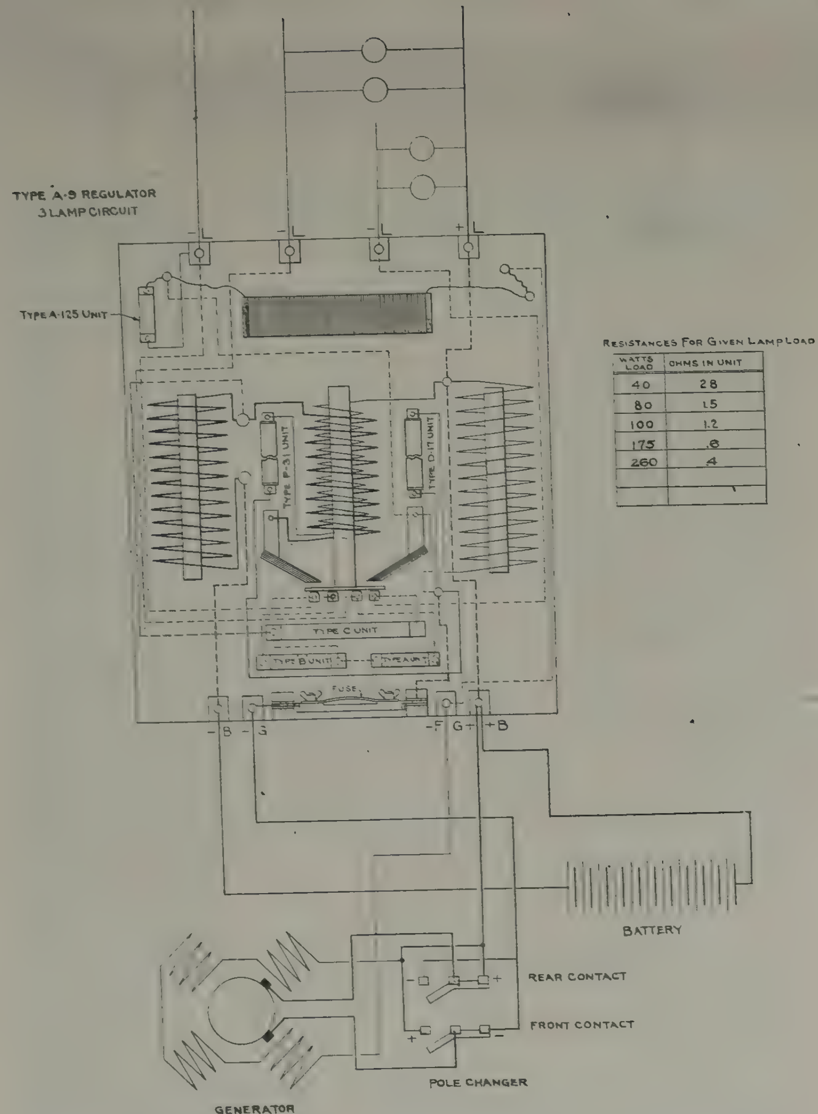


Fig. 2508—General Arrangement of Panels When Mounted in Lockers.

Gould Coupler Company.



WATTS LOAD	OHMS IN UNIT
40	2.8
80	1.5
100	1.2
175	.8
260	.4

Fig. 2509—Wiring Diagram, Type "A9" Combination Generator Regulator and Lamp Regulator, Arranged for Two Lamp Circuits. Battery Charge Plus Lamp Load.

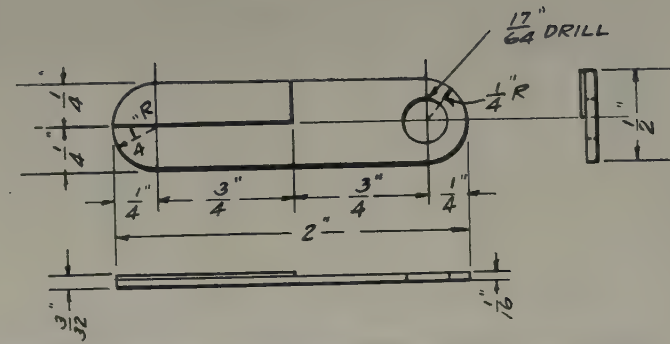


Fig. 2510—Gage for Setting, Types "M" and "M2," Lamp Regulator.

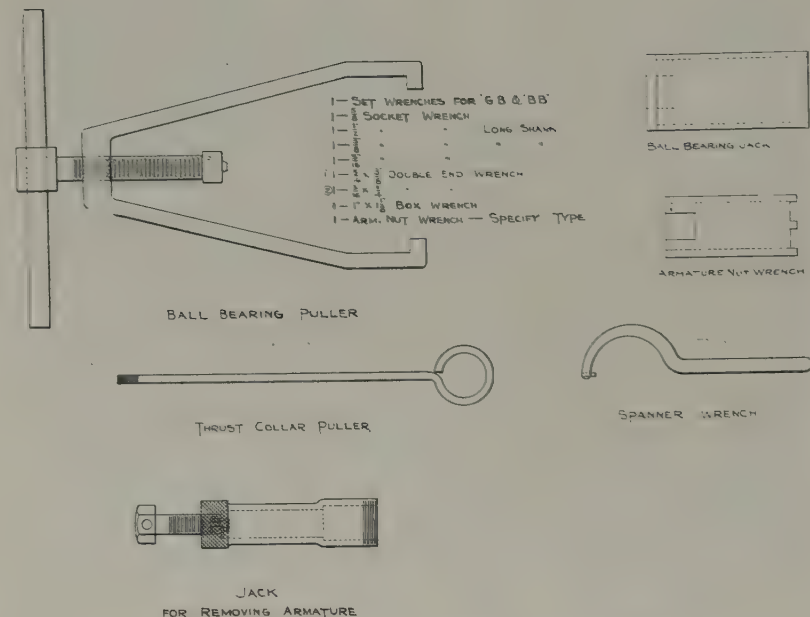


Fig. 2511—Tools for Ball Bearing Type Generator.

Gould Coupler Company.

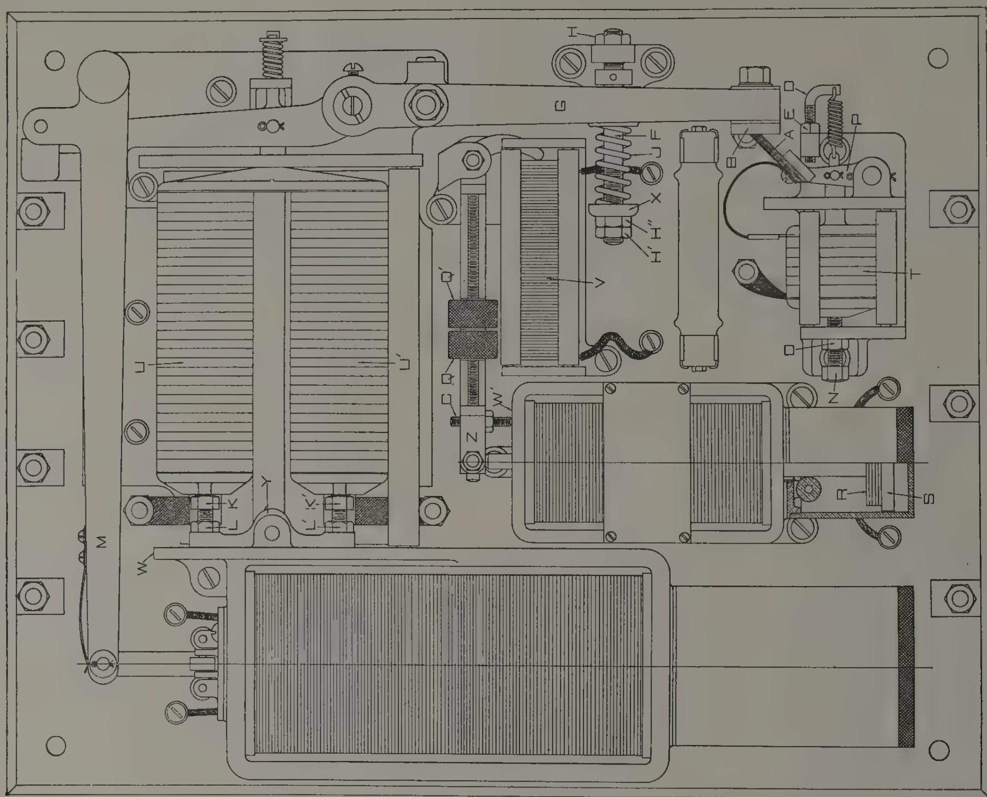


Fig. 2513—Outline for Setting, Types "M" and "M2," Lamp Regulator. Gould Coupler Company.

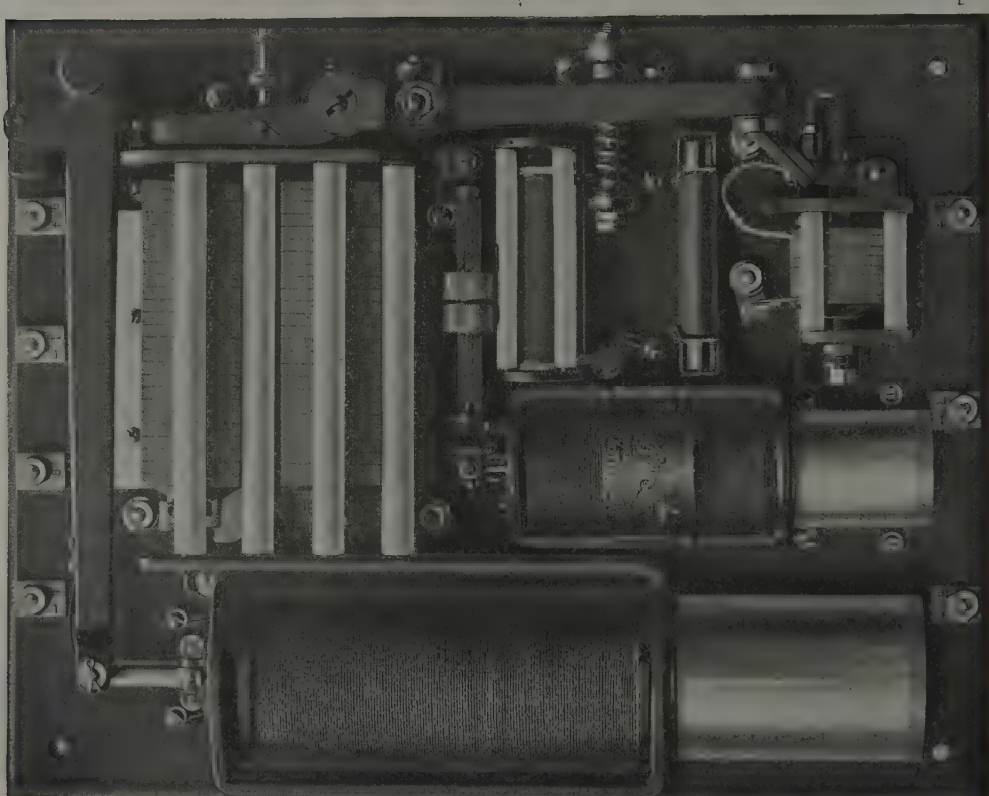


Fig. 2512—Lamp Regulator Panel, Types "M" and "M2."

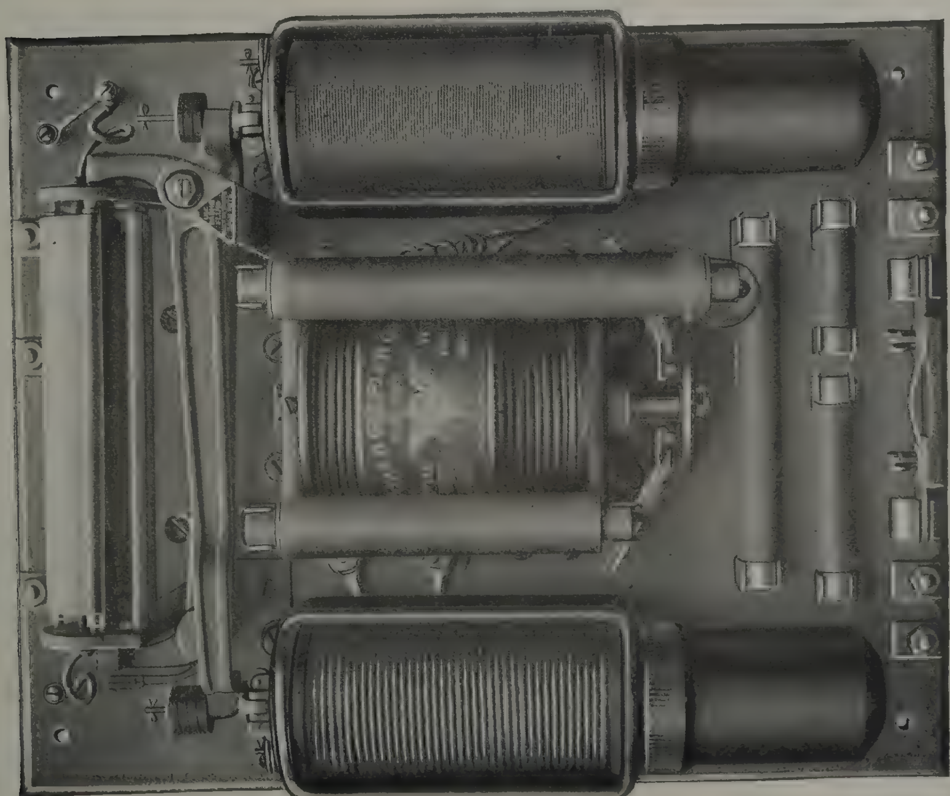


Fig. 2514—Combination Generator Regulator and Lamp Regulator Panel Type "A9."

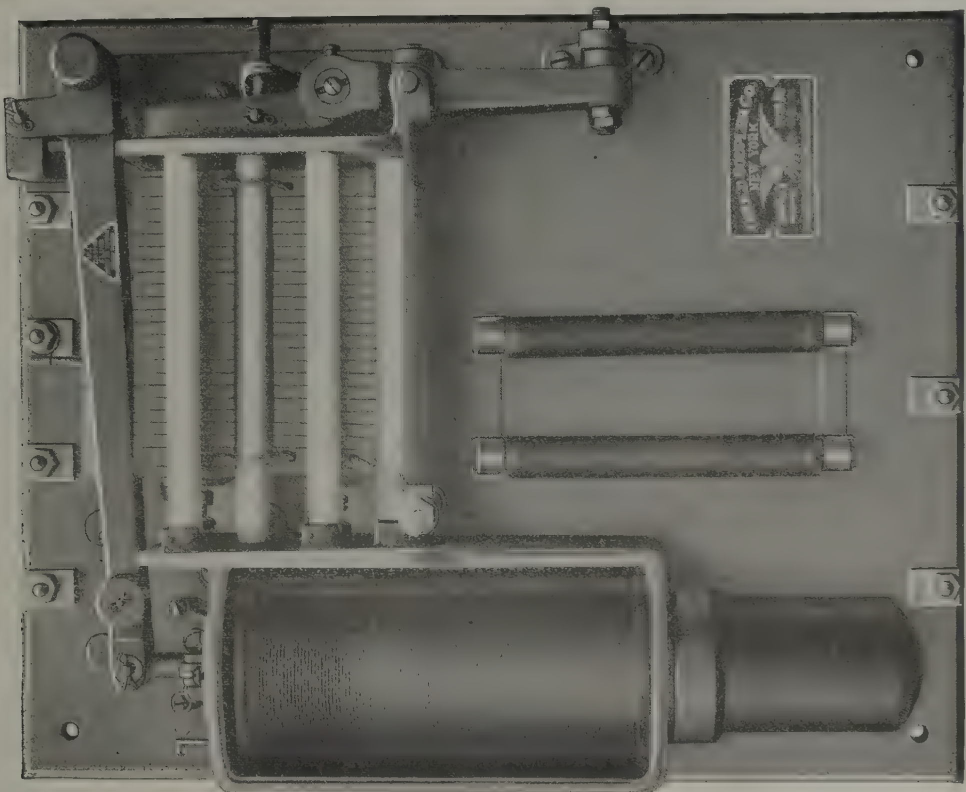


Fig. 2515—Lamp Regulator Panel, Type "M3."

Gould Coupler Company.

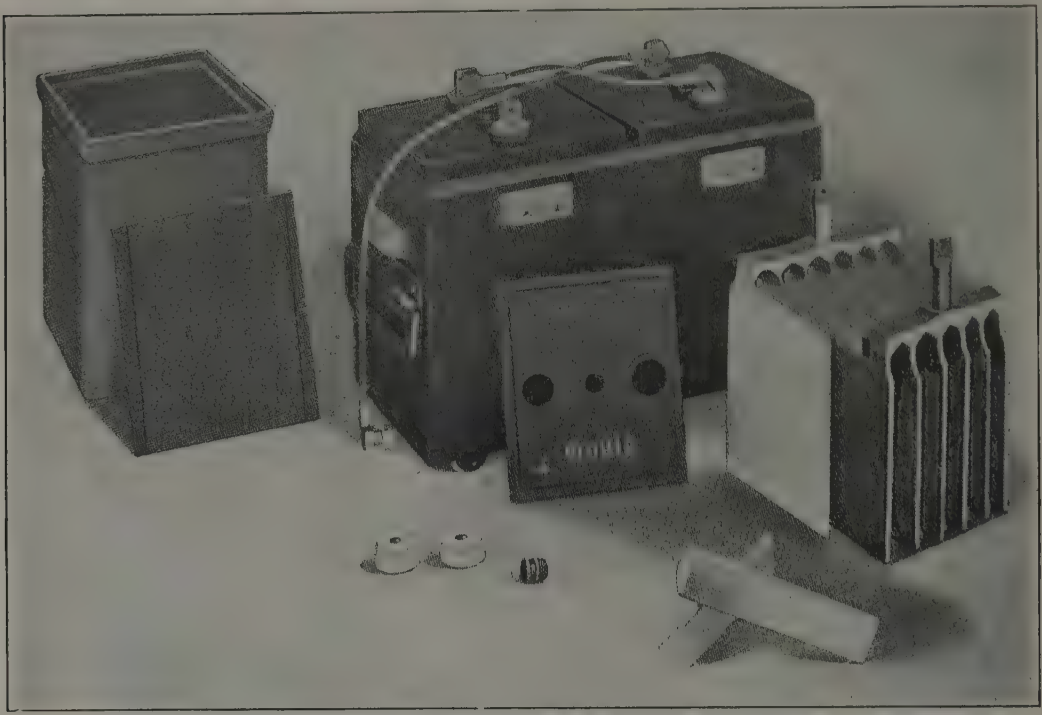


Fig. 2516—Double Compartment Cell and Parts. Gould Storage Battery Company.

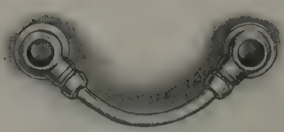


Fig. 2517—Connector.

Fig. 2518—Jumper.

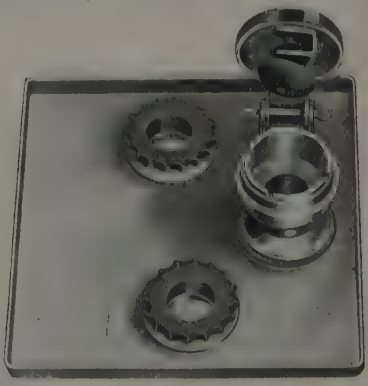


Fig. 2520—Cell Cover, Showing Filling Aperture and Check Valve.

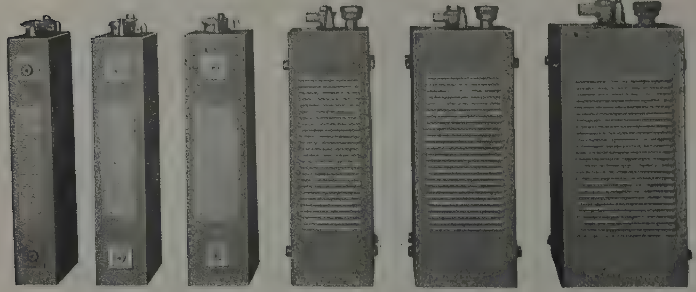


Fig. 2519—A-4 H, A-5 H, A-6 H, A-8 H, A-10 H, A-12 H; Rated Capacity, Ampere-Hours 150, 187.5, 225, 300, 375, 450.

Fig. 2522—Cell with Cover Removed to Show Assembling and Insulating.

Fig. 2521—Twenty-five Cells Type A-8 H; Weight, 863 lb., Complete.

Edison Storage Battery Company.

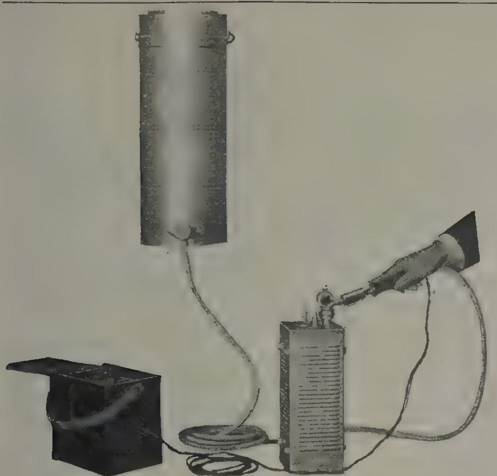


Fig. 2523—Edison Electric Filling Outfit for Adding Distilled Water.

Fig. 2524—Edison A-8 H Train Lighting Cells in Tray.

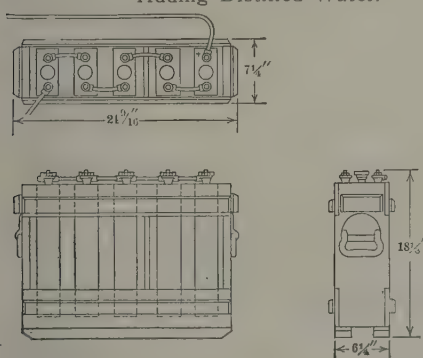


Fig. 2525—Five-Cell A-4 H Edison Storage Battery.

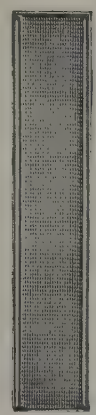


Fig. 2526—Perforated Nickel-Plated Steel Negative Pocket, Loaded with Iron Oxide.

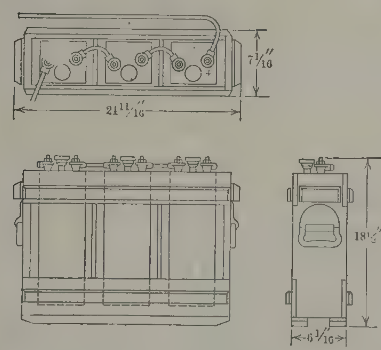


Fig. 2527—Three-Cell A-8 H Edison Storage Battery.

Fig. 2528—Negative Plates; Pockets Mounted on Nickel-Plated Steel Grid.

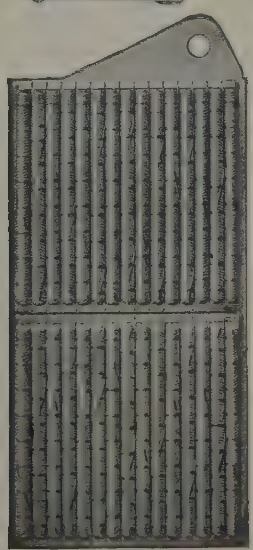


Fig. 2529—Positive Plate; 30 Tubes on Nickel-Plated Steel Grid.

Fig. 2530—Perforated Nickel Plated Steel Positive Tube.

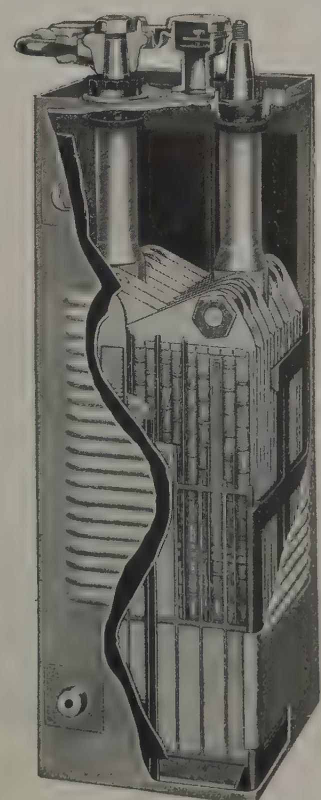


Fig. 2531—Alkaline Storage Battery.

Edison Storage Battery Company.

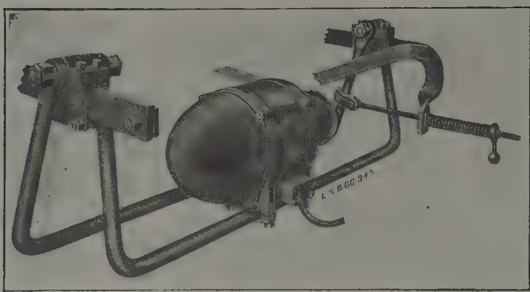


Fig. 2532—E. S. B. Truck Type Generator and Suspension.

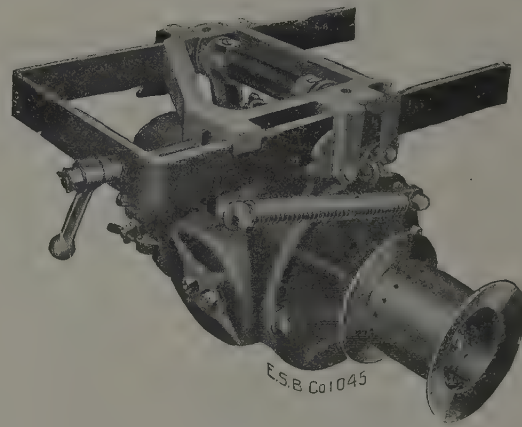


Fig. 2533—E. S. B. Body Hung Generator and Suspension.

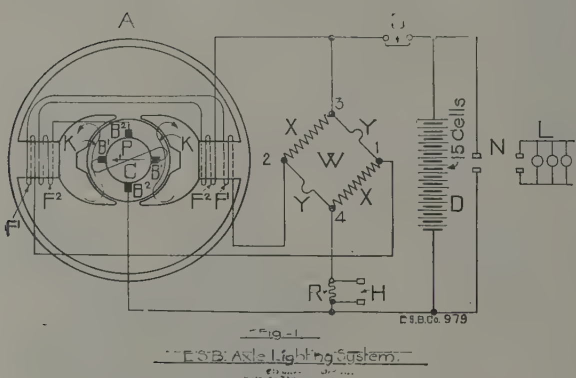


Fig. 2534—Diagram of Connections.

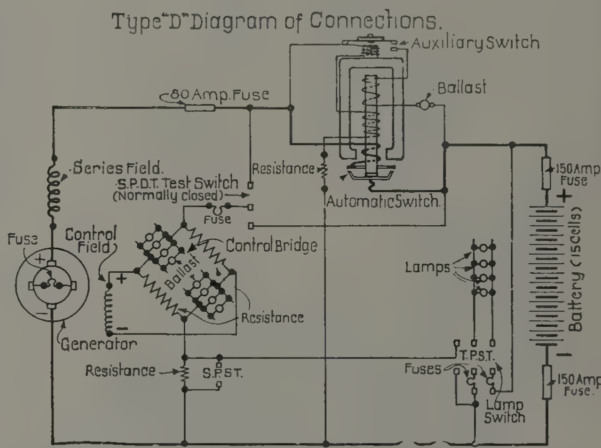


Fig. 2535—E. S. B. Constant Voltage Axle Lighting System.

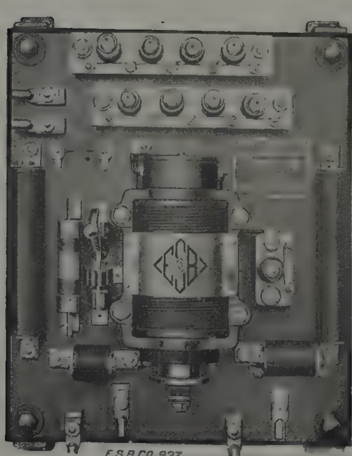


Fig. 2536—E. S. B. Control Panel.

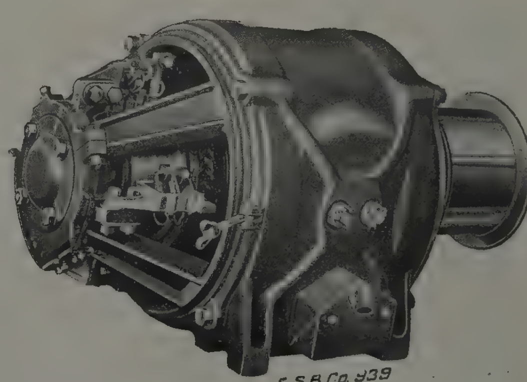


Fig. 2537—E. S. B. Truck Type Generator, Cover Removed.

The Electric Storage Battery Company.

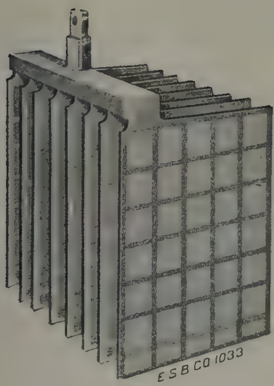


Fig. 2538—Box Negative Group, Type EP-15.

Fig. 2539 — Manchester Positive Group, Type EP-15.

Fig. 2540—Terminal Post Bushing.

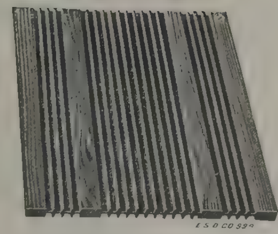


Fig. 2541—Wood Separator.

Fig. 2542—Alloy Vent Cap.

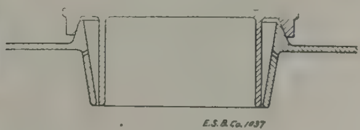


Fig. 2543—Section of Cover Through Vent Cap.

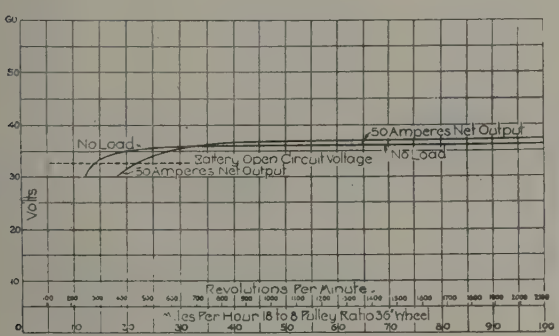


Fig. 2544—Voltage Regulation Curve, ESB Axle Lighting System. 16 Cell Battery.

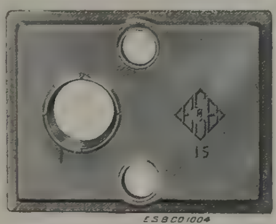


Fig. 2545—Alloy Cover.

Fig. 2546—Lead Lining.

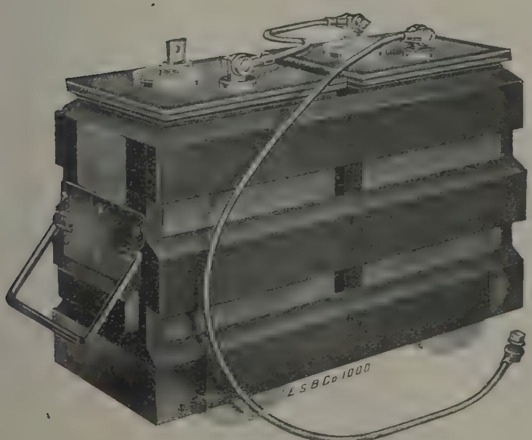


Fig. 2547—E. S. B. Train Lighting Battery Two-Cell Unit.

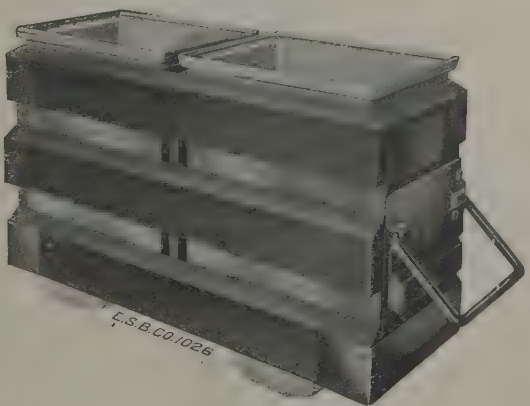


Fig. 2548—Two Compartment Crate Assembled with Lead Linings.

The Electric Storage Battery Company.

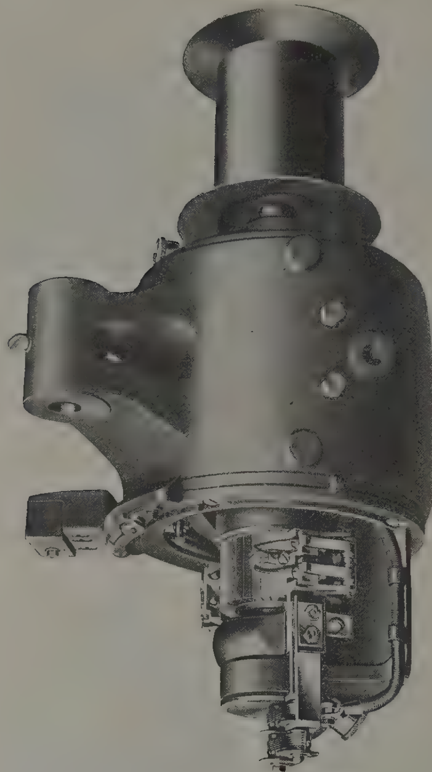
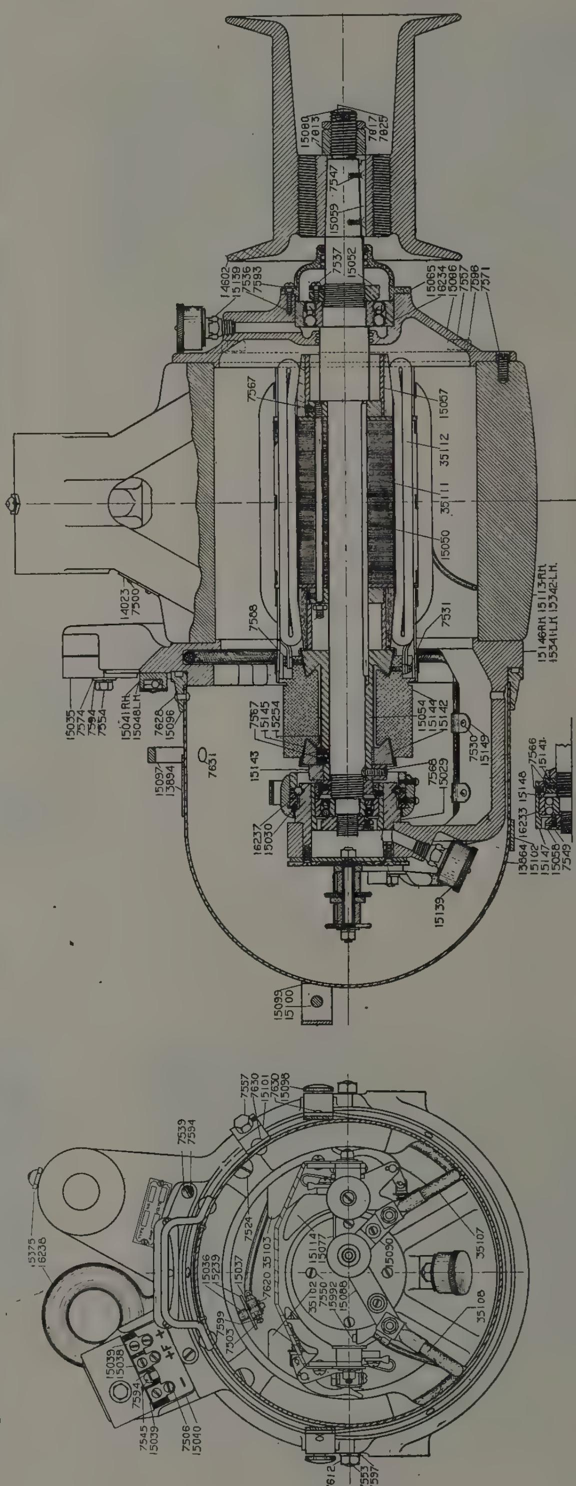


Fig. 2550—T-35 Generator with Dust Cover Removed.

Fig. 2549—T-35 Armature Commutator, Backhead Bearing and Pulley.



Longitudinal Section.

End View.

Fig. 2551—T-35 Generator, 40-Volt, 40-Ampere Complete for Stone-Franklin Lighting Equipment. Franklin Railway Supply Company, Inc.

Fig. 2553—T-50 Armature Commutator, Backhead Bearing and Pulley.

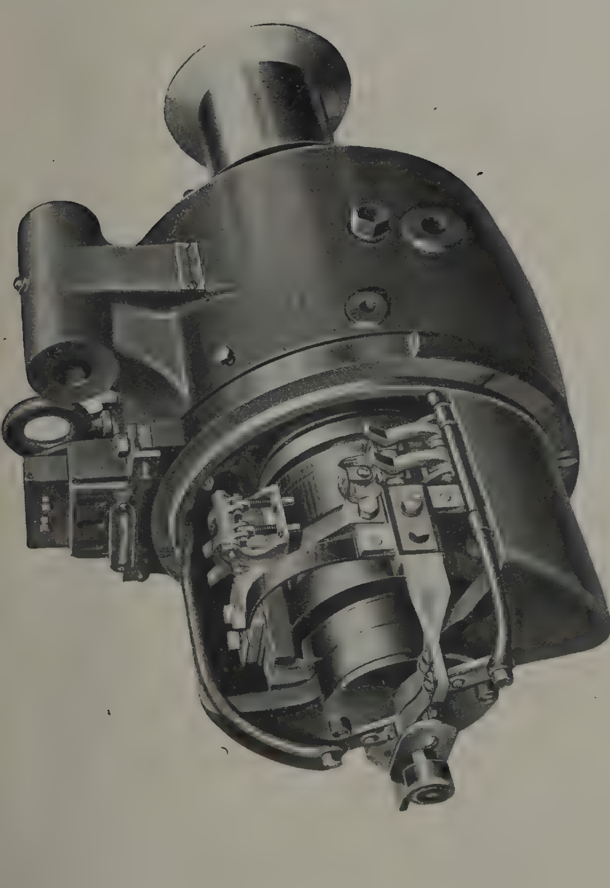
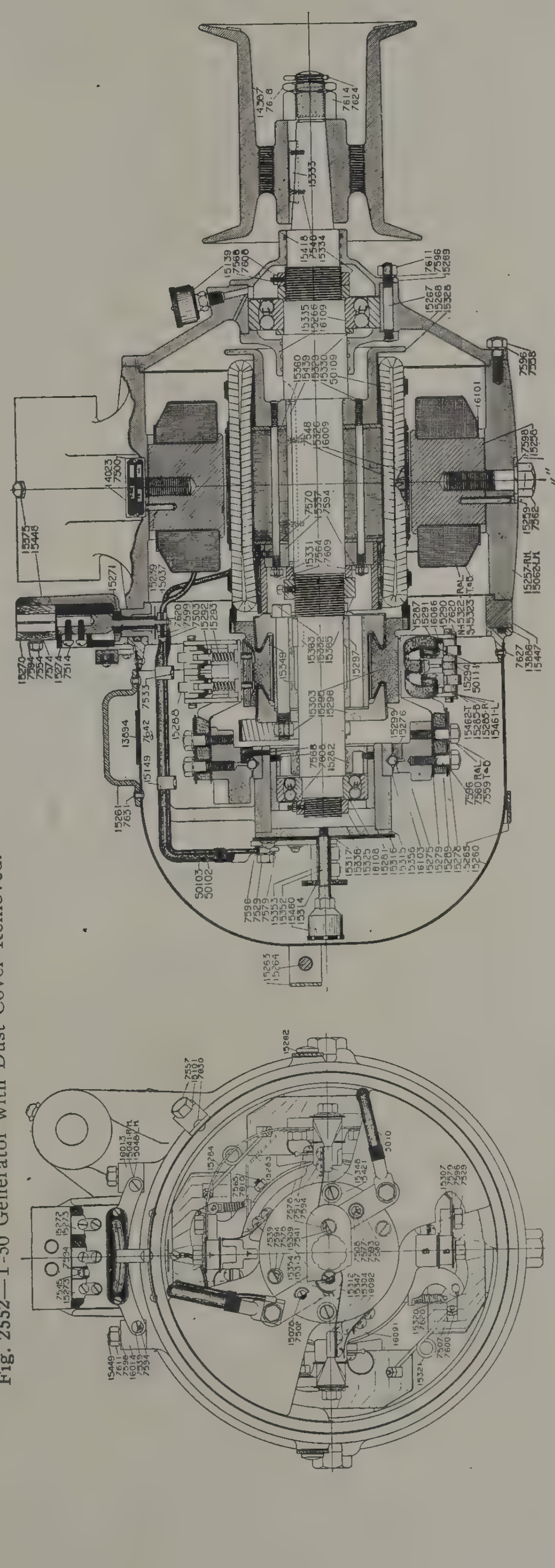


Fig. 2552—T-50 Generator with Dust Cover Removed.



Longitudinal Section.

End View.

Fig. 2554—T-50 Generator, 40-Volt 75-Ampere, Complete for Stone-Franklin Lighting Equipment.

Franklin Railway Supply Company, Incorporated.

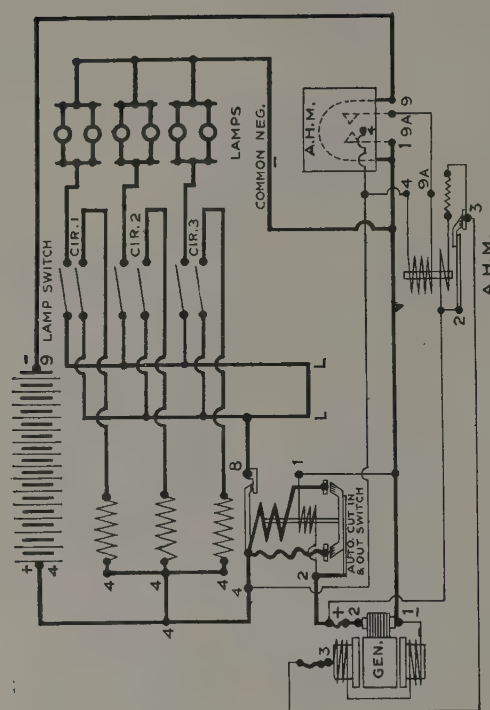


Fig. 2556—Stone-Franklin Baggage Car Equipment. Schematic Wiring Diagram.

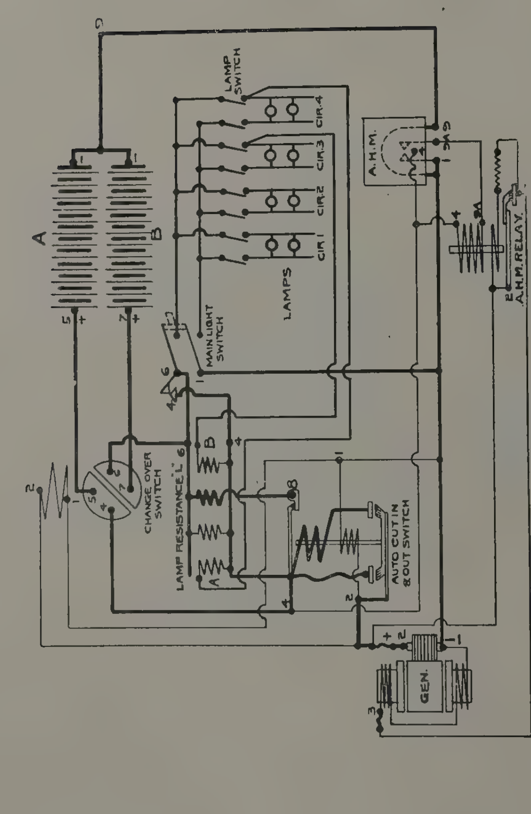


Fig. 2555—Stone-Franklin Standard Equipment Schematic Wiring Diagram.

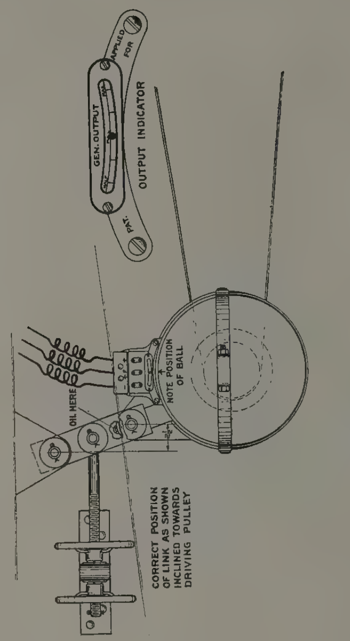


Fig. 2558—Belt Adjustment for Correct Generator Output.

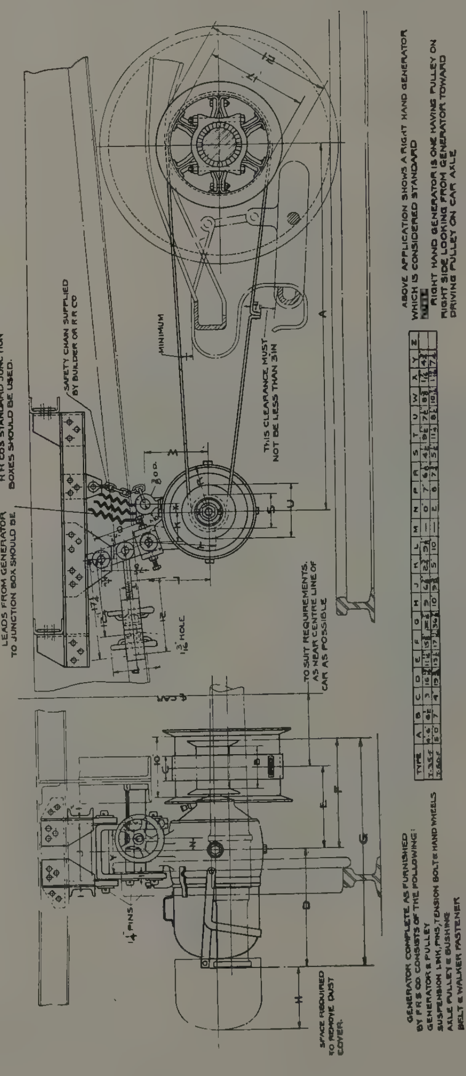


Fig. 2557—Stone-Franklin Standard Application Drawing No. 15,300.

Franklin Railway Supply Company, Incorporated.

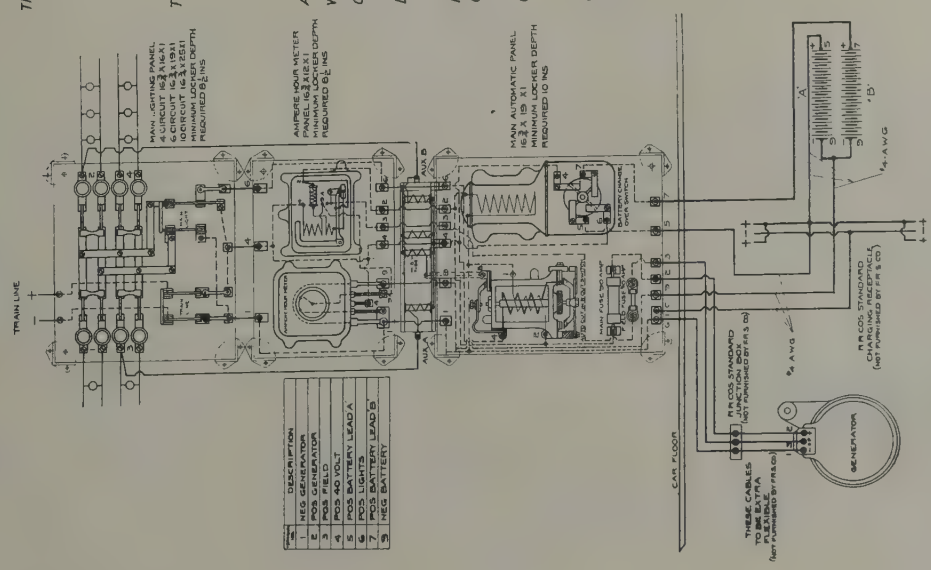


Fig. 2559—Stone-Franklin Standard Equipment for Passenger Cars.

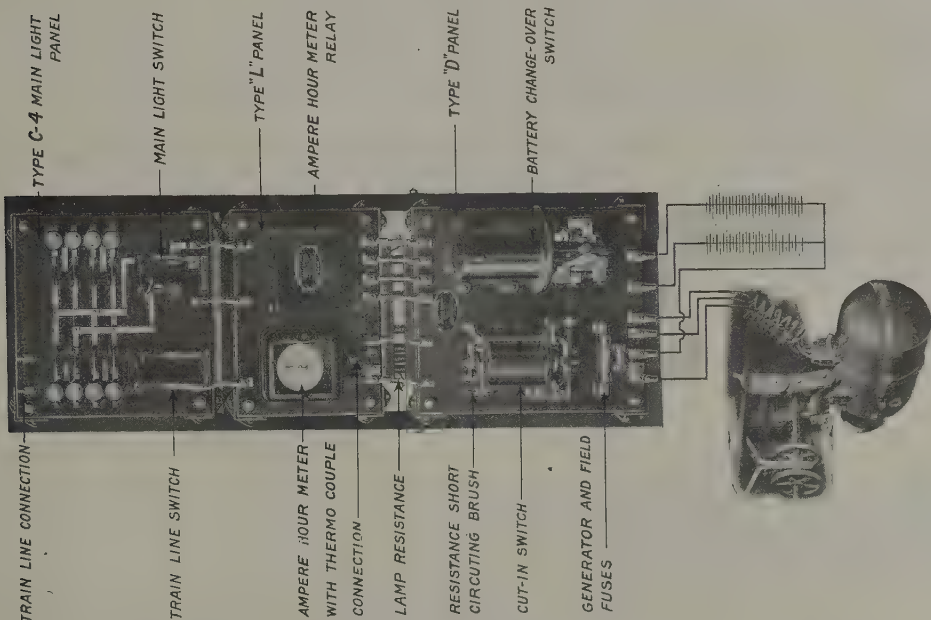


Fig. 2560—Stone-Franklin Standard Equipment Wiring Diagram.

Franklin Railway Supply Company, Incorporated.

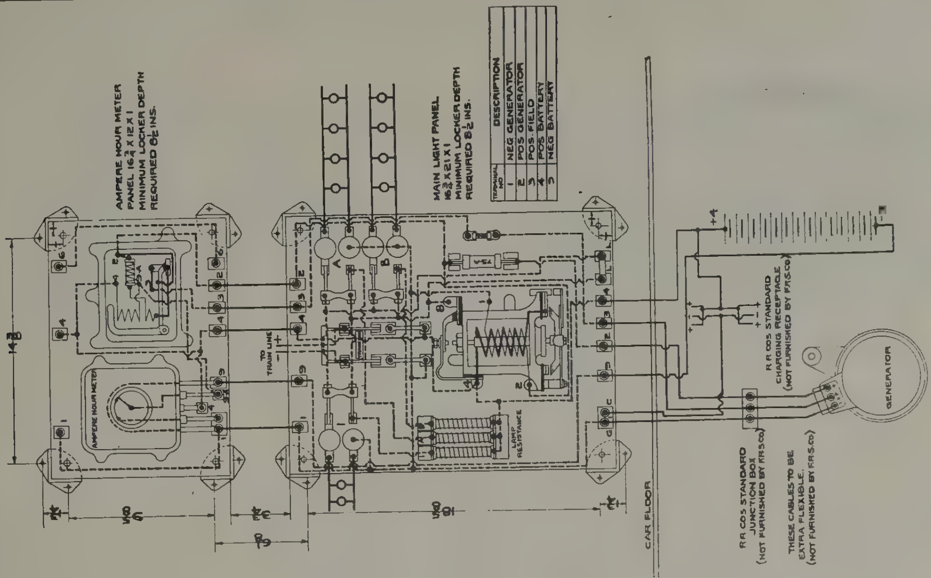


Fig. 2561—Stone-Franklin Baggage Car Wiring Diagram.

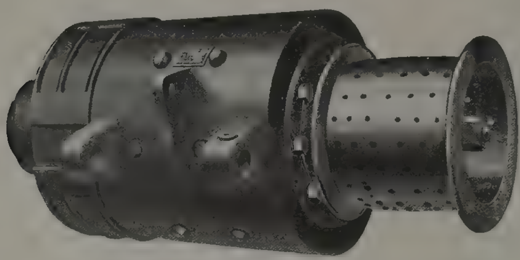


Fig. 2562—Truck Dynamo.

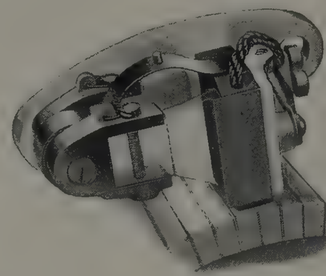


Fig. 2563—Commutator Brush Box and Pressure Spring.

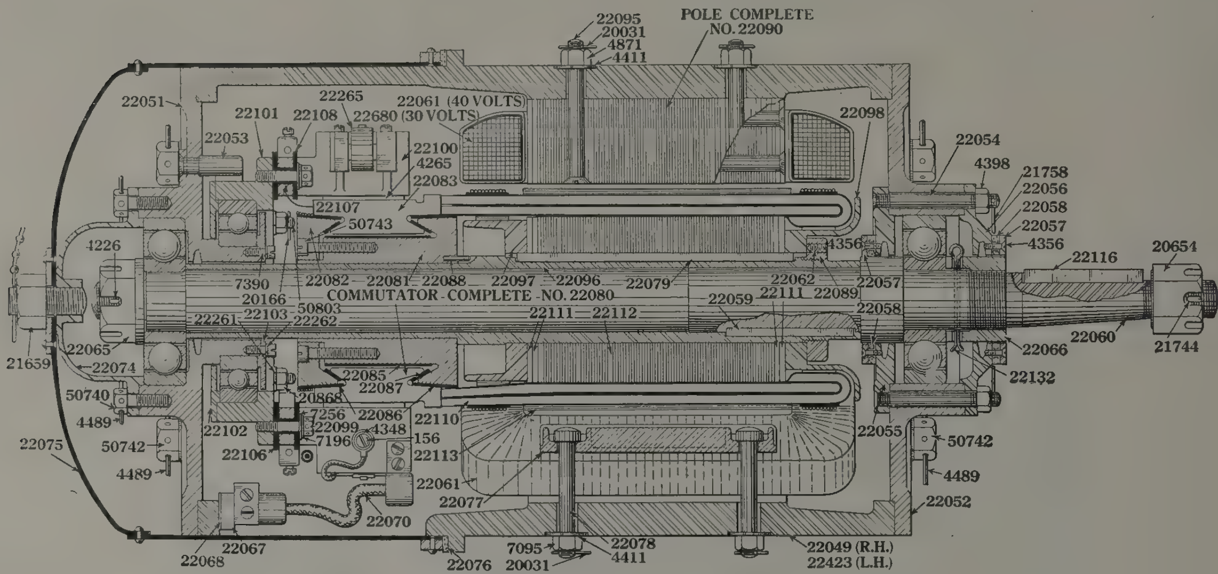


Fig. 2564—Section of 40-Volt 25-Ampere Underframe Dynamo.

Fig. 2565—Tension Spring for Underframe Suspension.

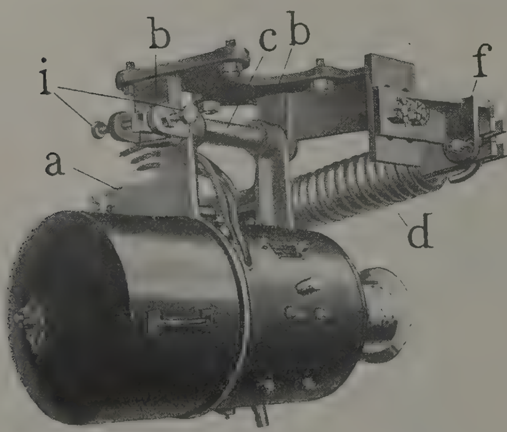


Fig. 2566—"Underframe" Dynamo and Suspension.

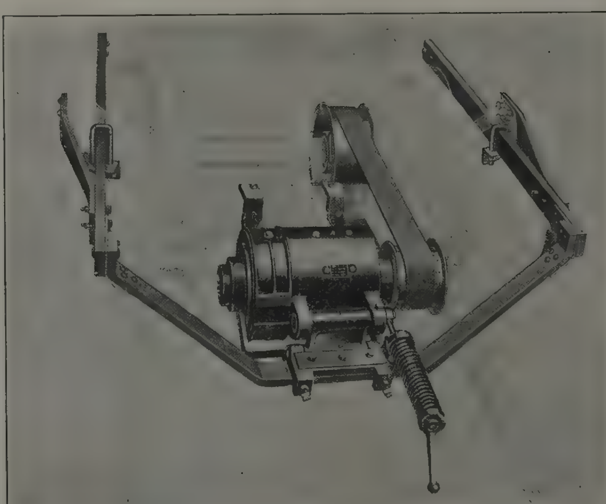


Fig. 2567—Dynamo Truck Suspension.

Safety Car Heating & Lighting Company.

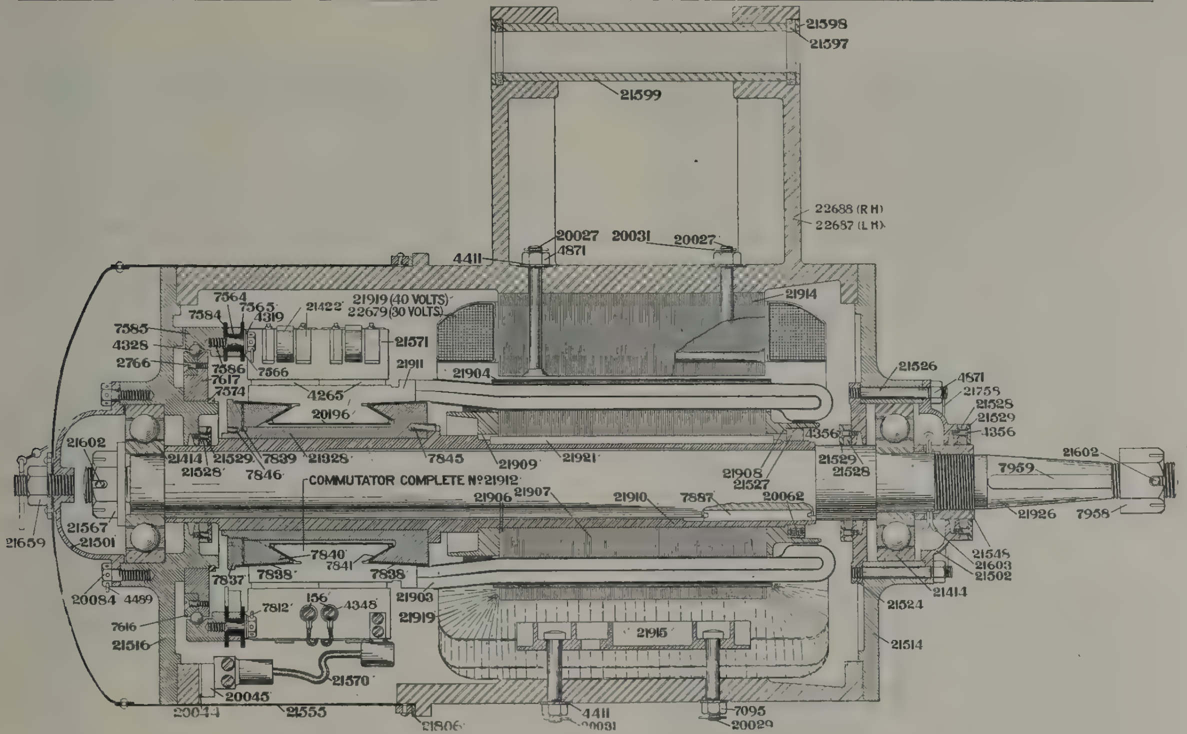


Fig. 2568—Section of 40-Volt, 100-Ampere Underframe Dynamo

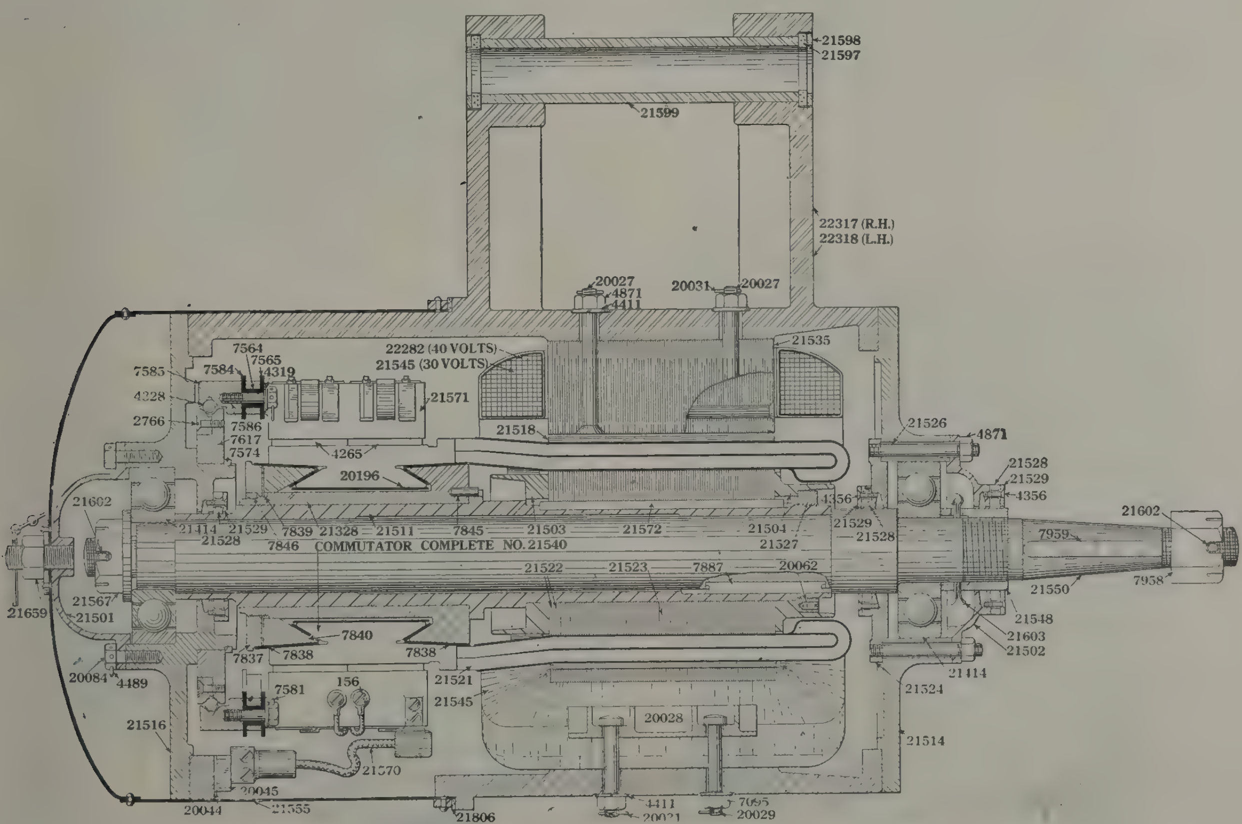


Fig. 2569—Section of 40-Volt, 75-Ampere Underframe Dynamo.

Safety Car Heating & Lighting Company.

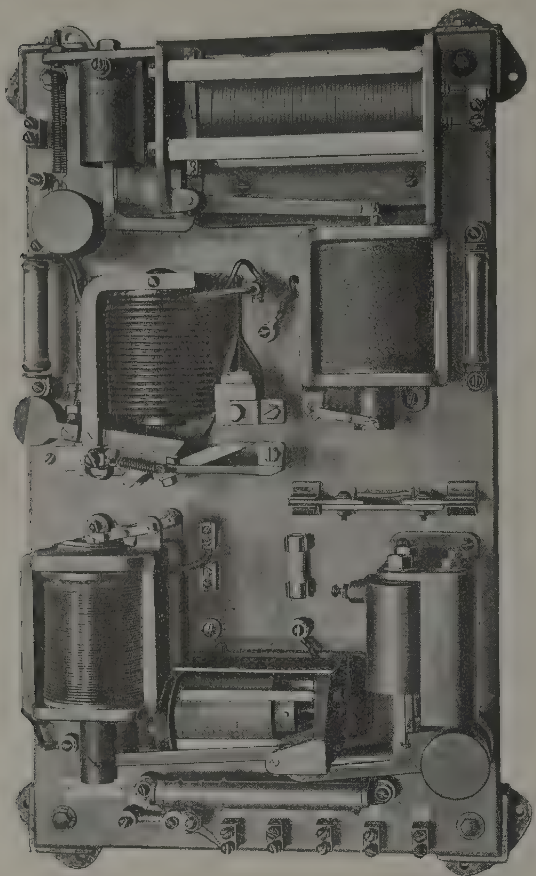


Fig. 2570—F-1 Combined Dynamo and Lamp Regulator.

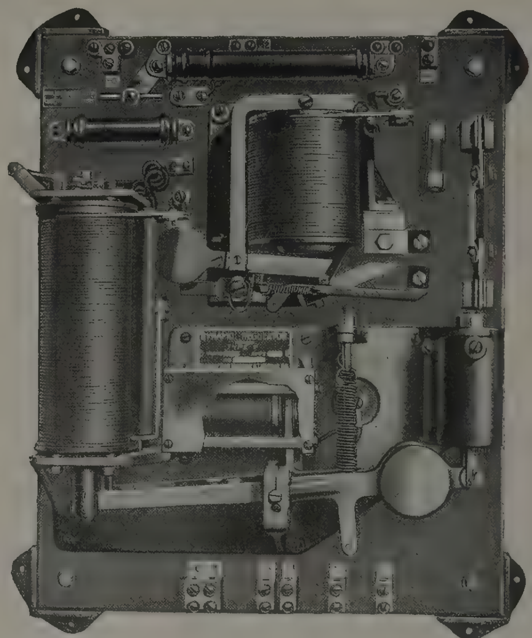


Fig. 2571—Type F Dynamo Regulator.

Fig. 2572—Brush Box and Brush Pressure Spring.

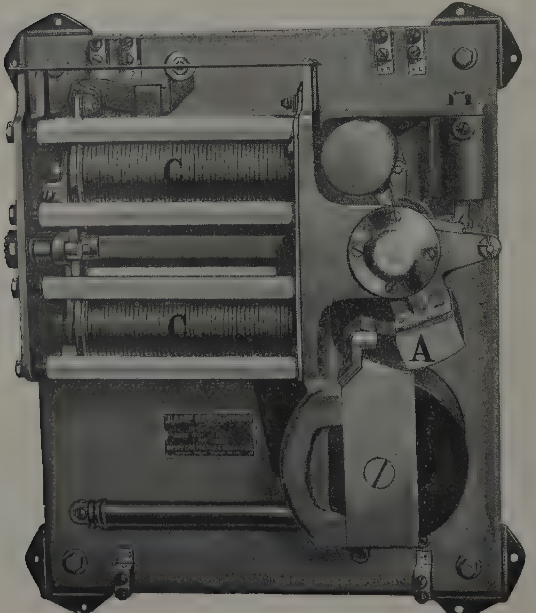


Fig. 2573—F Lamp Regulator.

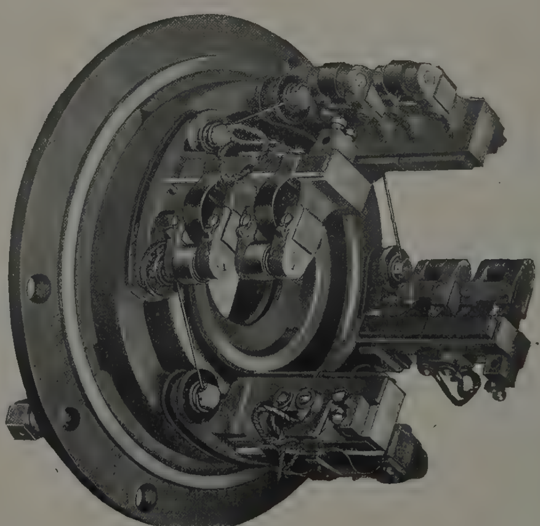


Fig. 2574—Pole Changer Brush Rigging.

Safety Car Heating & Lighting Company.

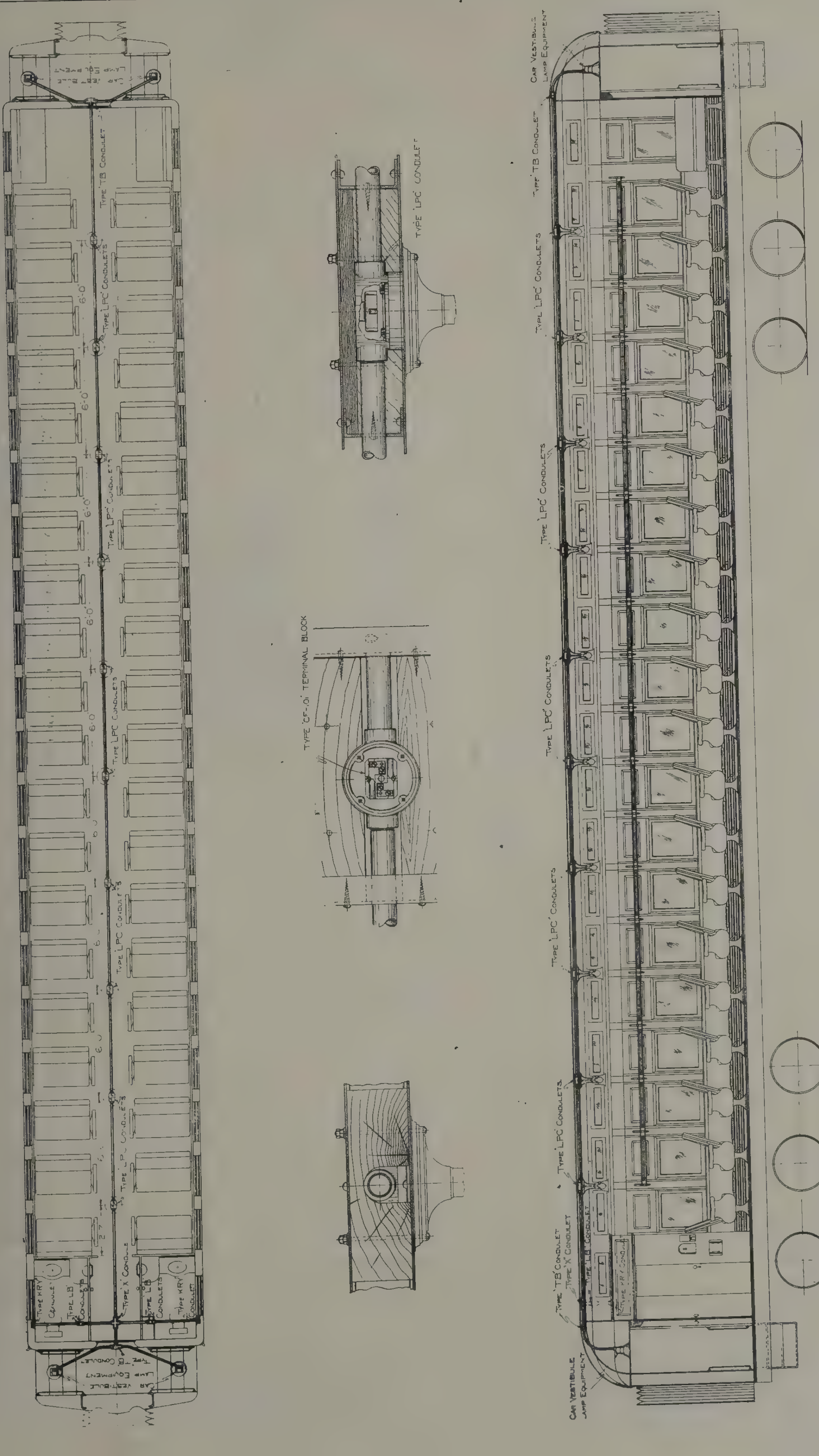


Fig. 2575—Condulets and Conduit Installation for 70-ft. Day Coach. Crouse-Hinds Company.

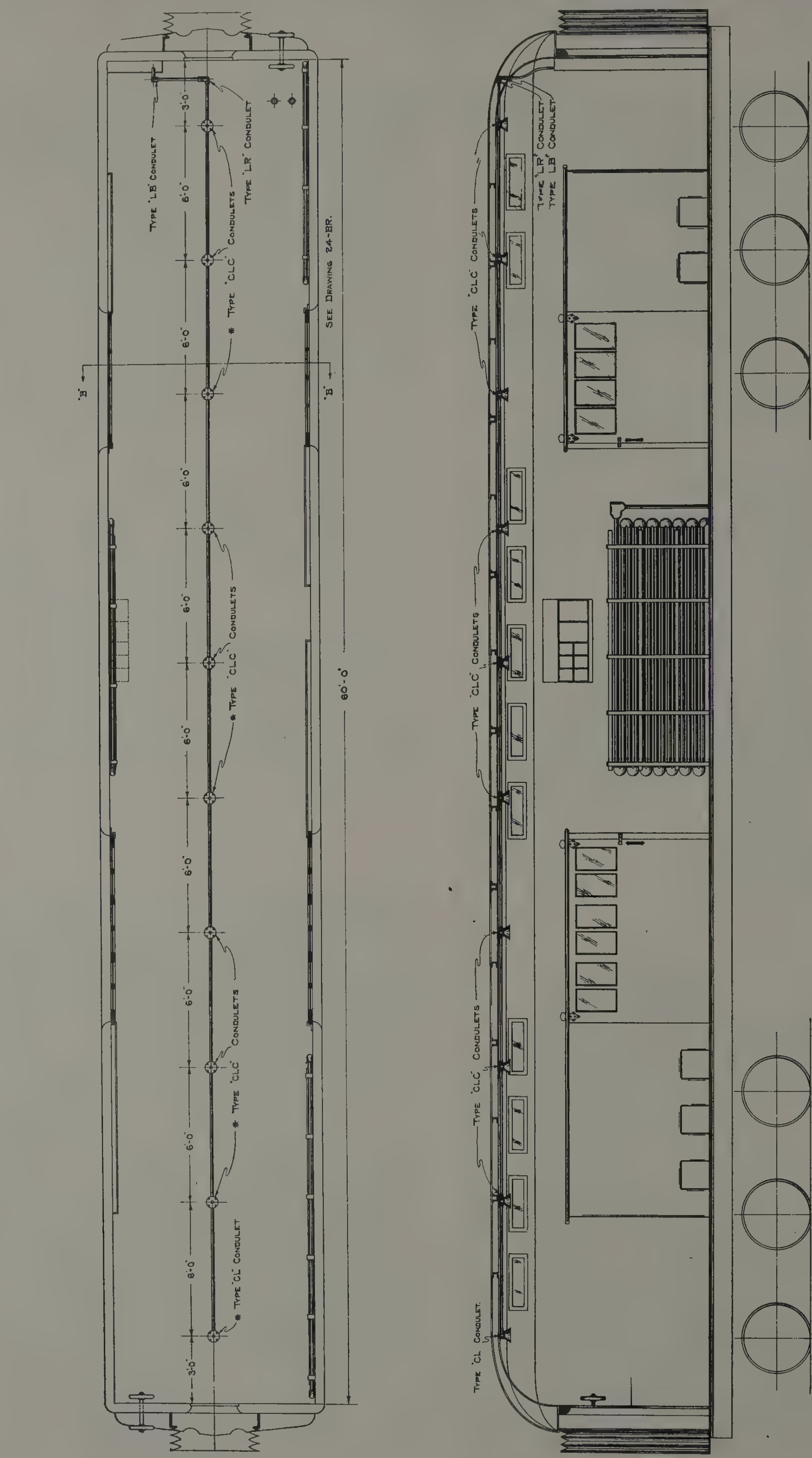


Fig. 2576—Condulet and Conduit Installation for 60-ft. Baggage Car. Crouse-Hinds Company.

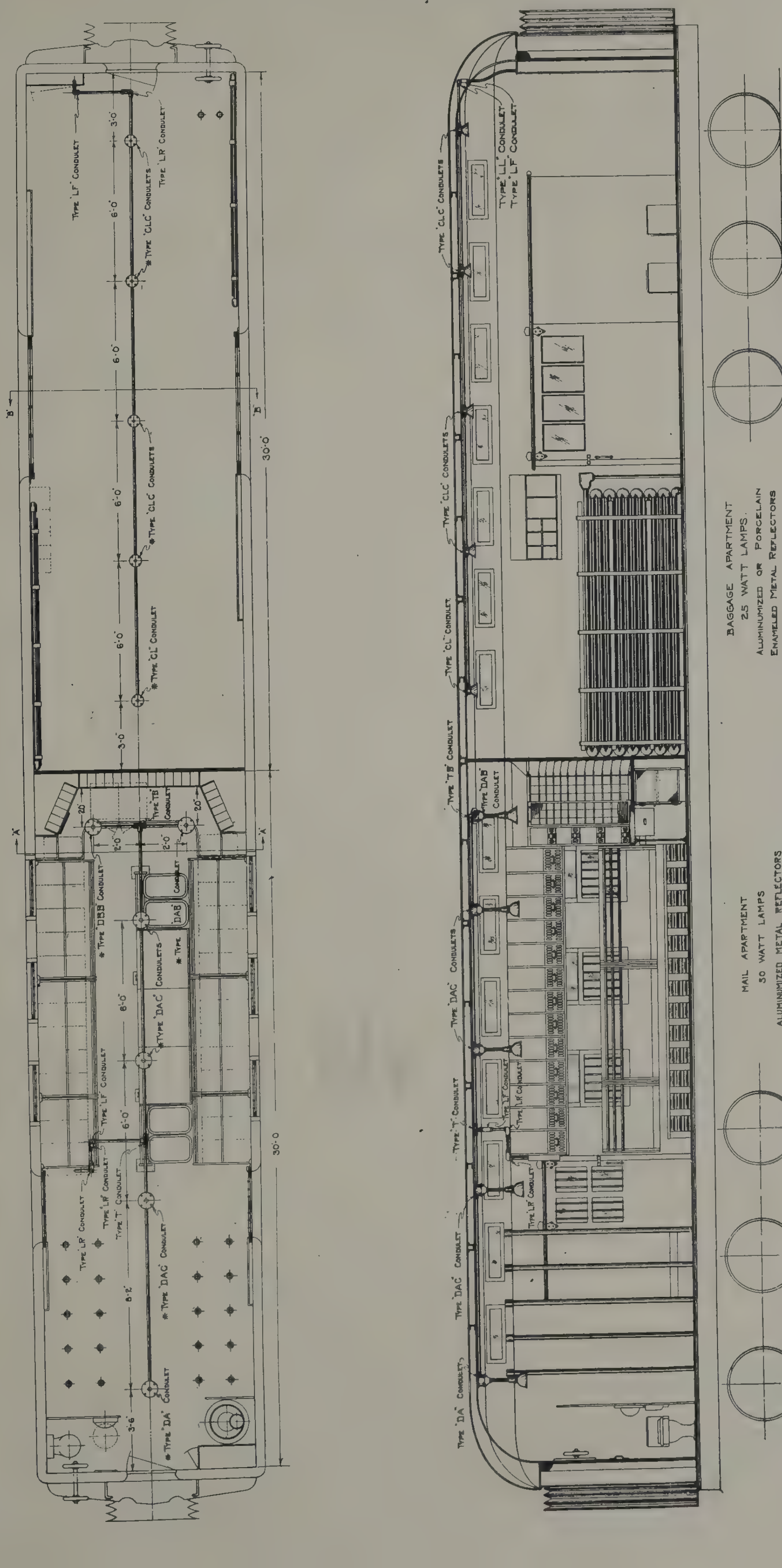


Fig. 2577—Condulet and Conduit Installation for Standard 30-ft. Mail and 30-ft. Baggage Compartments. Crouse-Hinds Company.

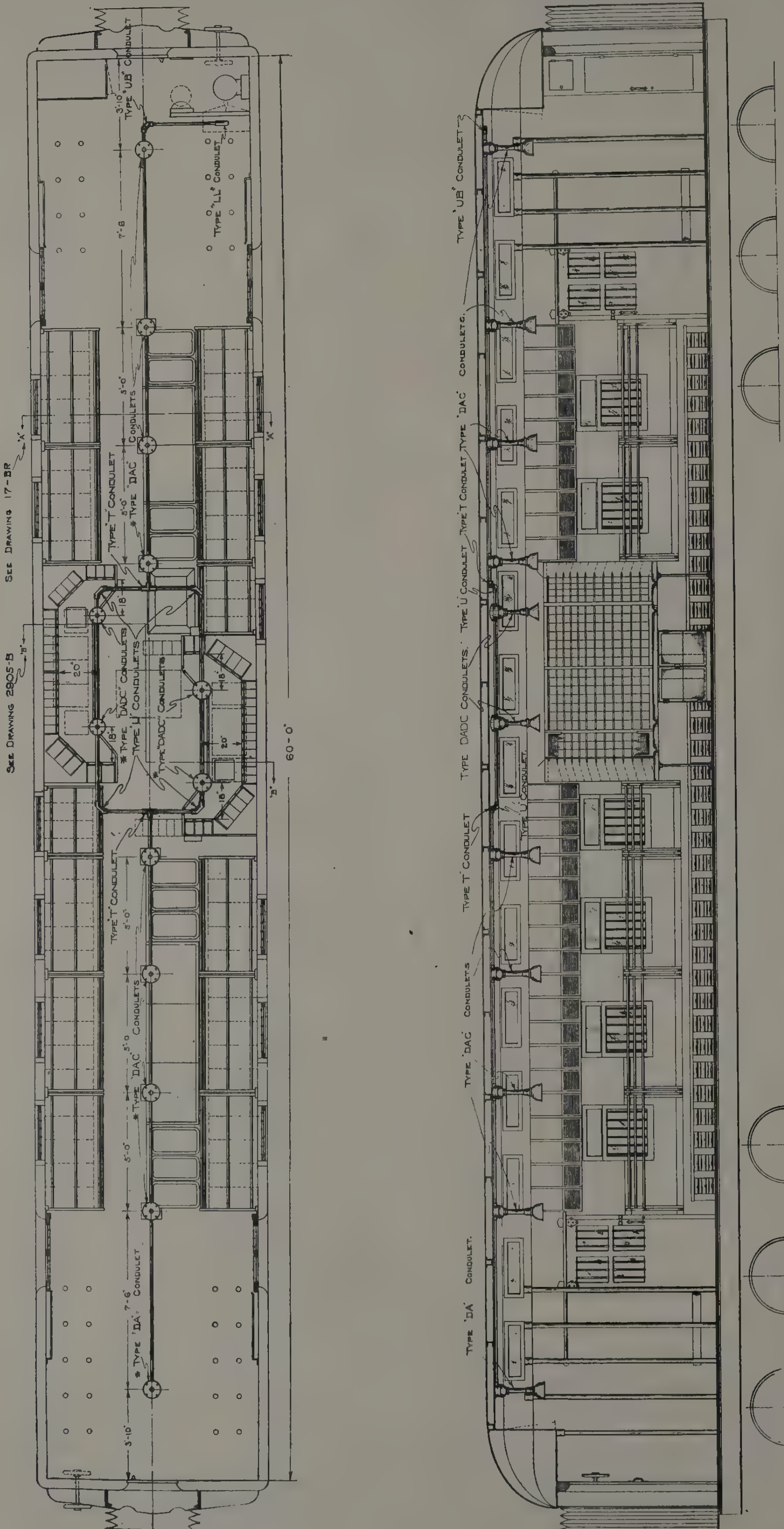


Fig. 2578—Lighting Installation Meeting United States Railway and Mail Service Specifications for Postal Cars. Crouse-Hinds Company.

(See Fig. 2579 for Transverse Sections.)

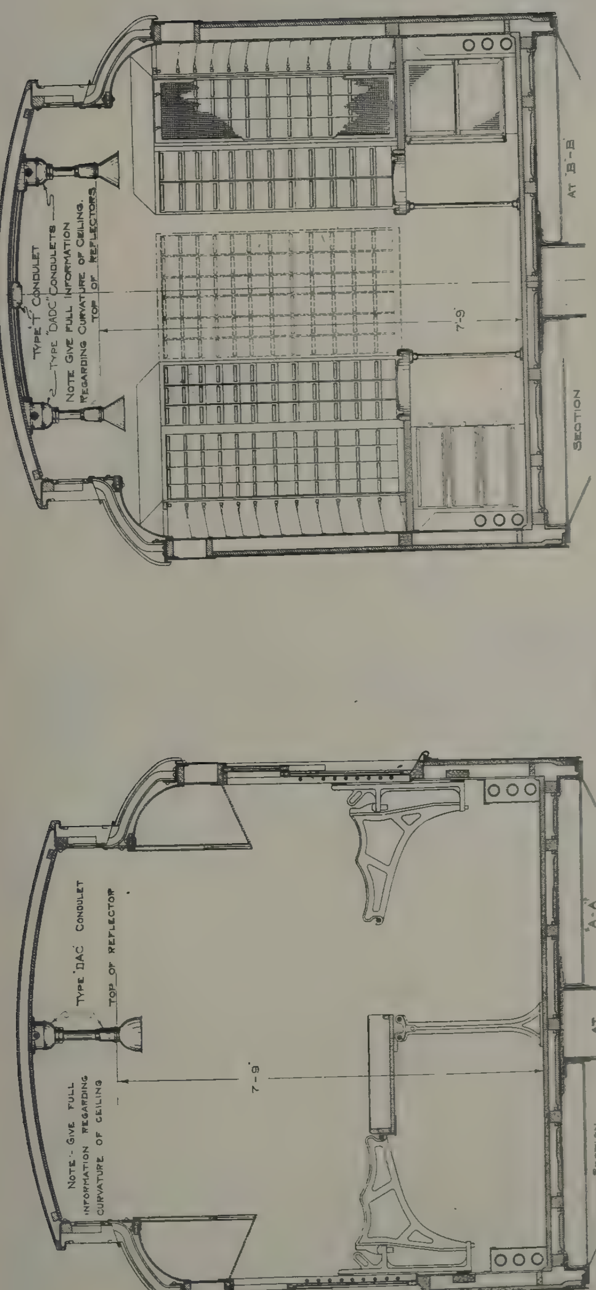


Fig. 2579—Transverse Sections of Mail Car Shown in Fig. 2578. Crouse-Hinds Company.

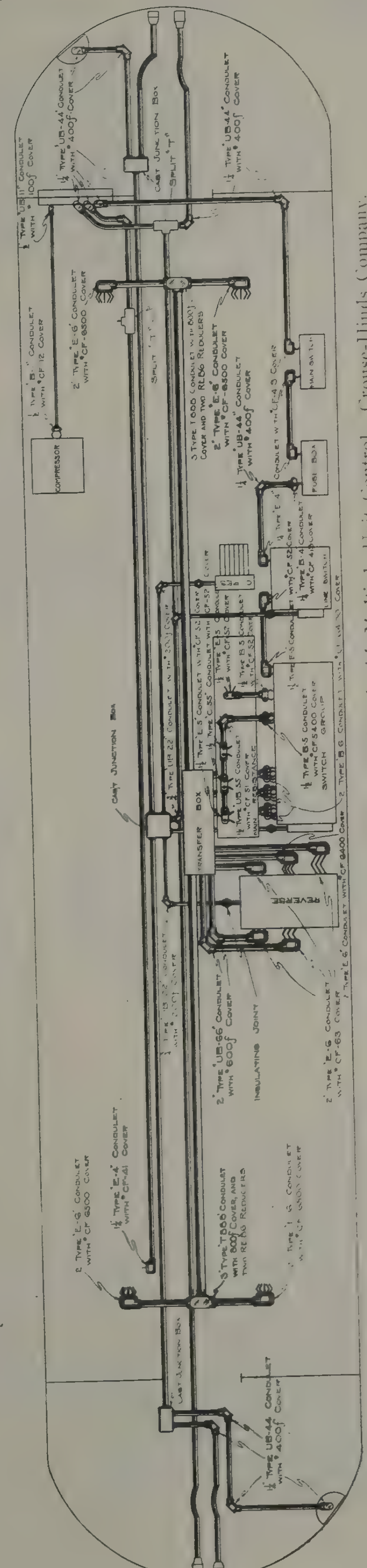


Fig. 2580—Condulet Installation for Underneath an Electric Car Equipped with Multiple Unit Control. Crouse-Hinds Company.

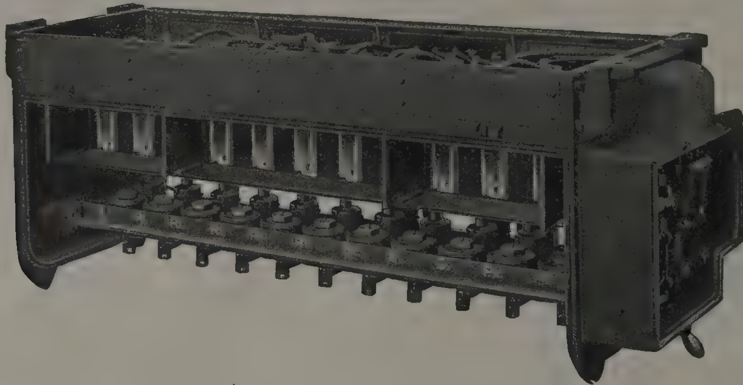


Fig. 2581—Switch Group for 1,500-Volt, Direct Current Control.

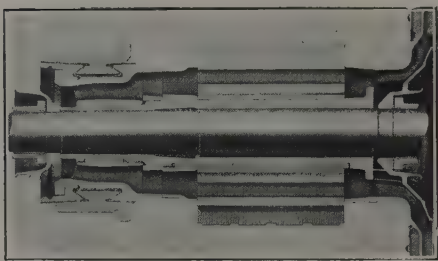


Fig. 2582—Cross Section of No. 333 V. Railway Motor Armature.

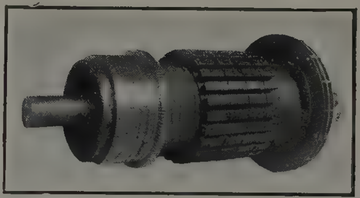


Fig. 2583—Commutator Core and Shaft.

Fig. 2584—Westinghouse Railway Motor Bearing.

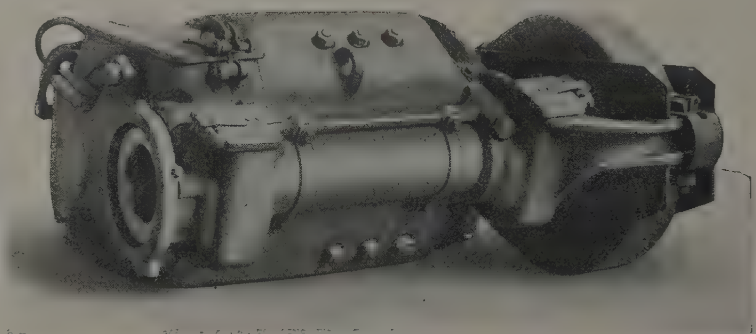


Fig. 2585—Westinghouse No. 562 Railway Motor.

Fig. 2586—Motor Car Equipped with 1,500-Volt Direct Current Apparatus.

Westinghouse Electric & Manufacturing Company.

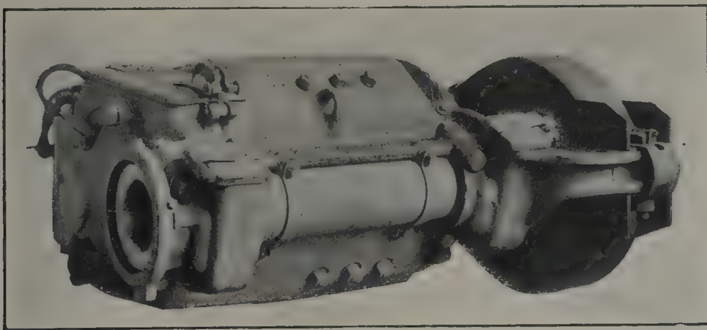


Fig. 2587—No. 334-V-8, 750-1500-Volt, Direct, Commutating Pole Railway Motor.

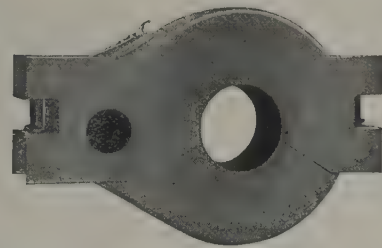


Fig. 2588—Gear Case for Railway Motors.

Fig. 2589—P. K. Control Head.

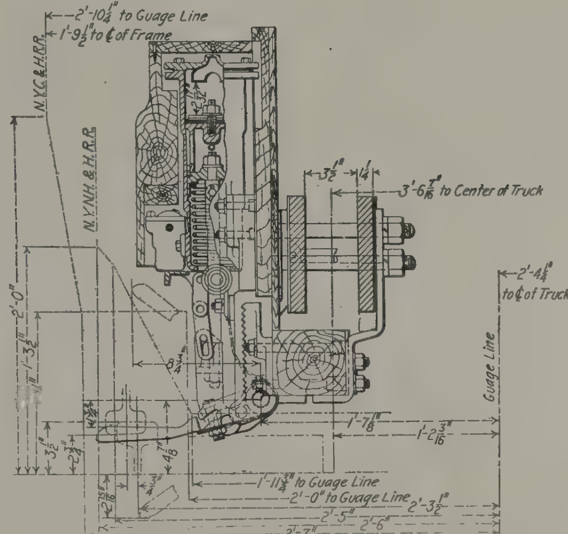


Fig. 2590—New York, New Haven & Hartford Third Rail Contact Shoe.

Fig. 2591—Type K Controllers for Railway Service.

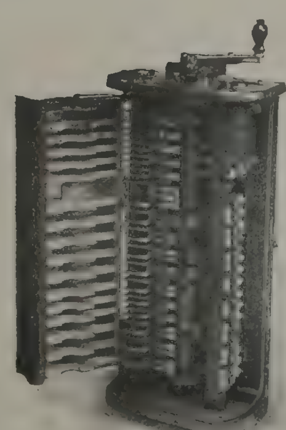


Fig. 2592—Interior of Type K-34-D Railway Controller.

Westinghouse Electric & Manufacturing Company.

Fig. 2593—Commutating Pole Railway Motor.

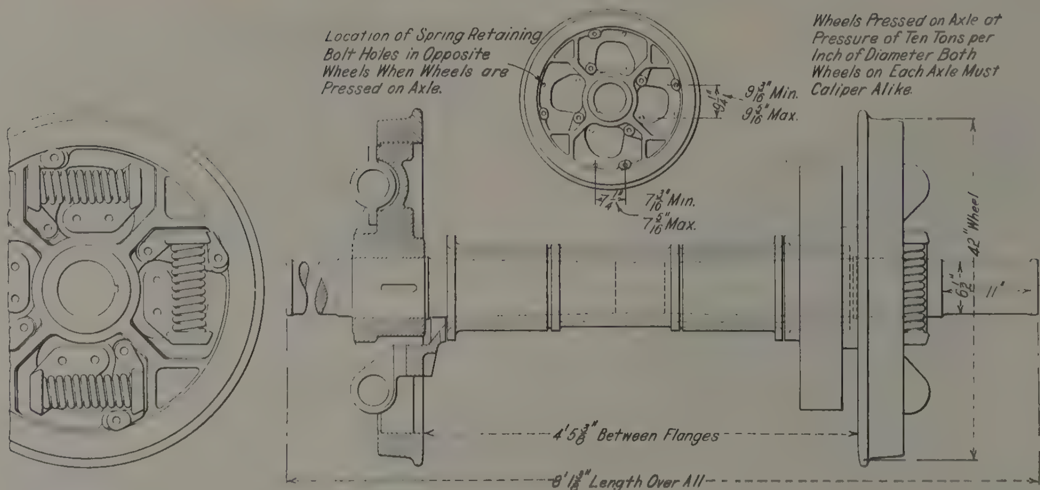


Fig. 2594—Quill and Spring Driving Arrangement for New York, New Haven & Hartford Motor Shown in Fig. 2595.

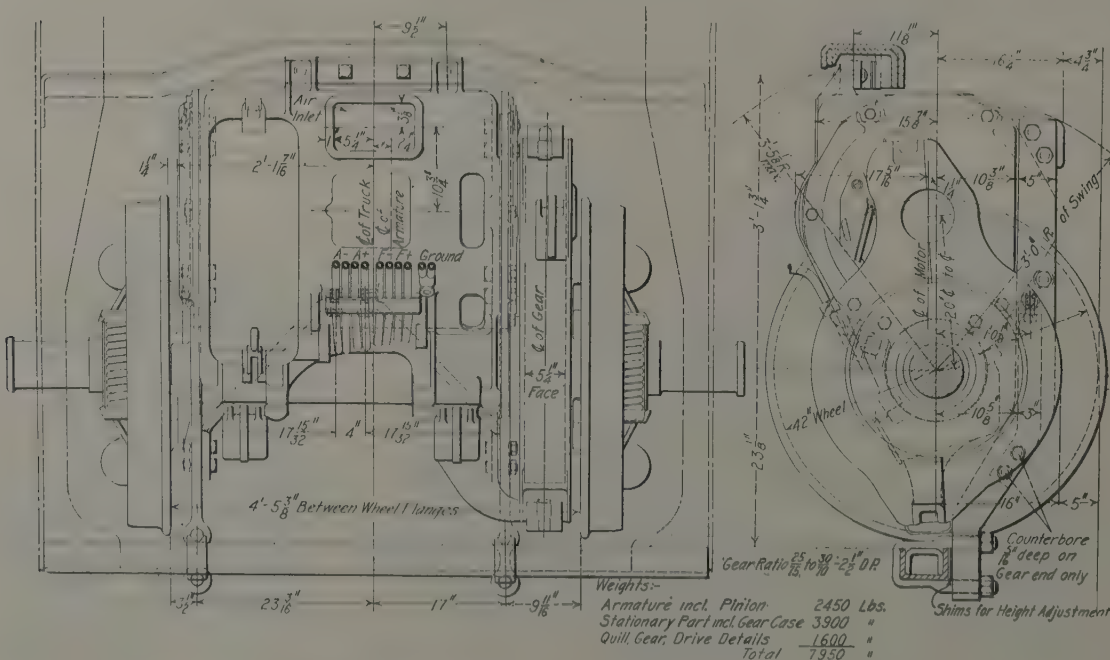


Fig. 2595—Motor Used on the New York, New Haven & Hartford.

Westinghouse Electric & Manufacturing Company.

Fig. 2596—Direct Current Car Circuit Breaker.

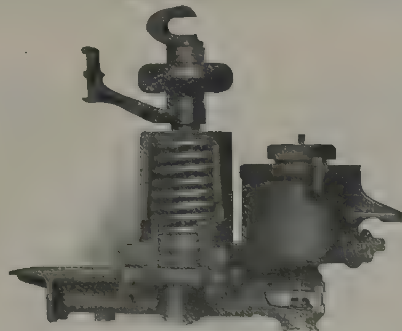


Fig. 2597—Unit Switch Magnet and Cylinders Cut to Show Working Parts of the Air Cylinder of Unit Switches.

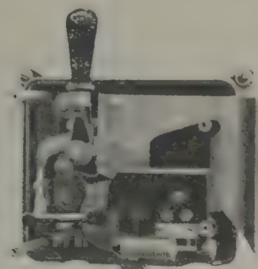


Fig. 2598—Open View of Circuit Breaker for Car Service.

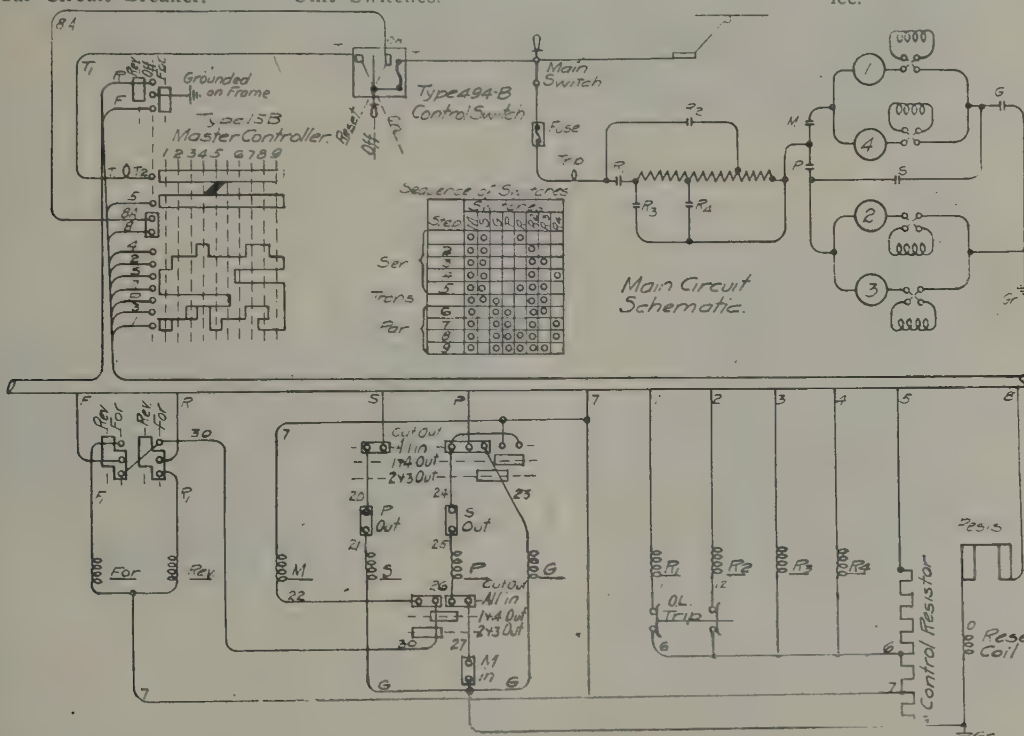


Fig. 2599—Wiring Diagram for Type Unit Switch Control for Quadruple Equipment of 75-H. P. Railway Motors.

Fig. 2600—Westinghouse Car Type Circuit Breaker.

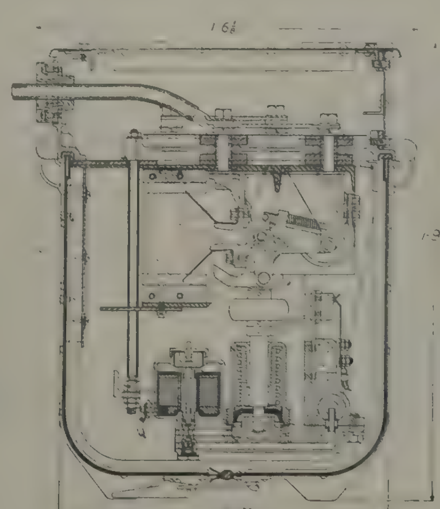


Fig. 2601—Section Through Unit Switch Group.

Fig. 2602—Type 28-D Master Controller.

Westinghouse Electric & Manufacturing Company.

Fig. 2603—Single Phase Transformer.

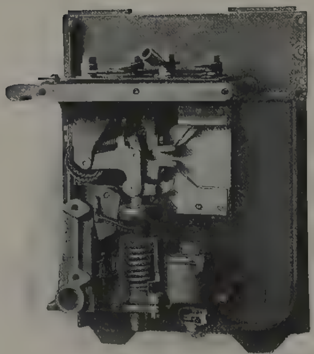


Fig. 2604—Type 264 Line Switch Without Cover.

Fig. 2605—Control Resistor.

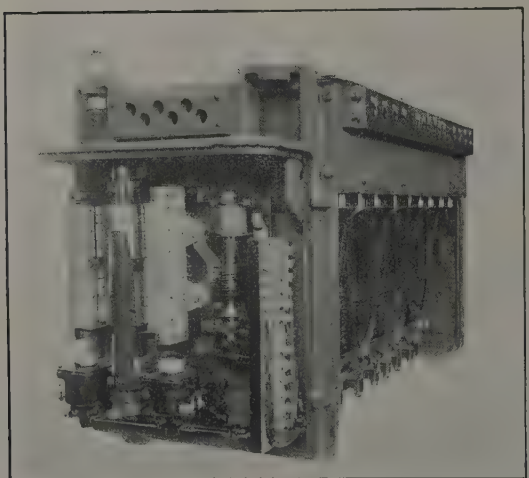


Fig. 2606—Single Phase Car Switch Group.

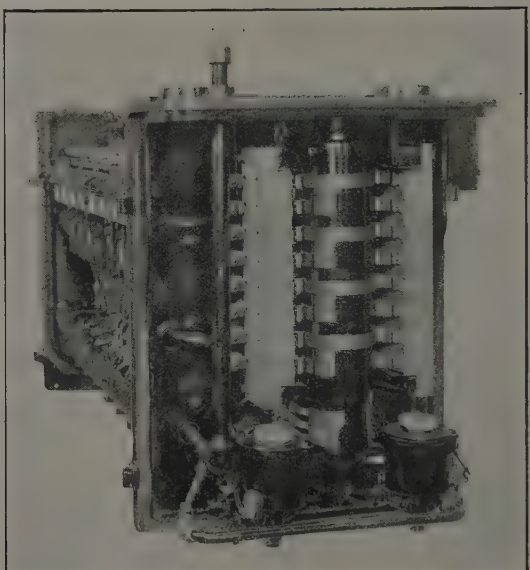


Fig. 2607—Westinghouse Standard HV Reverser.

Westinghouse Electric & Manufacturing Company.

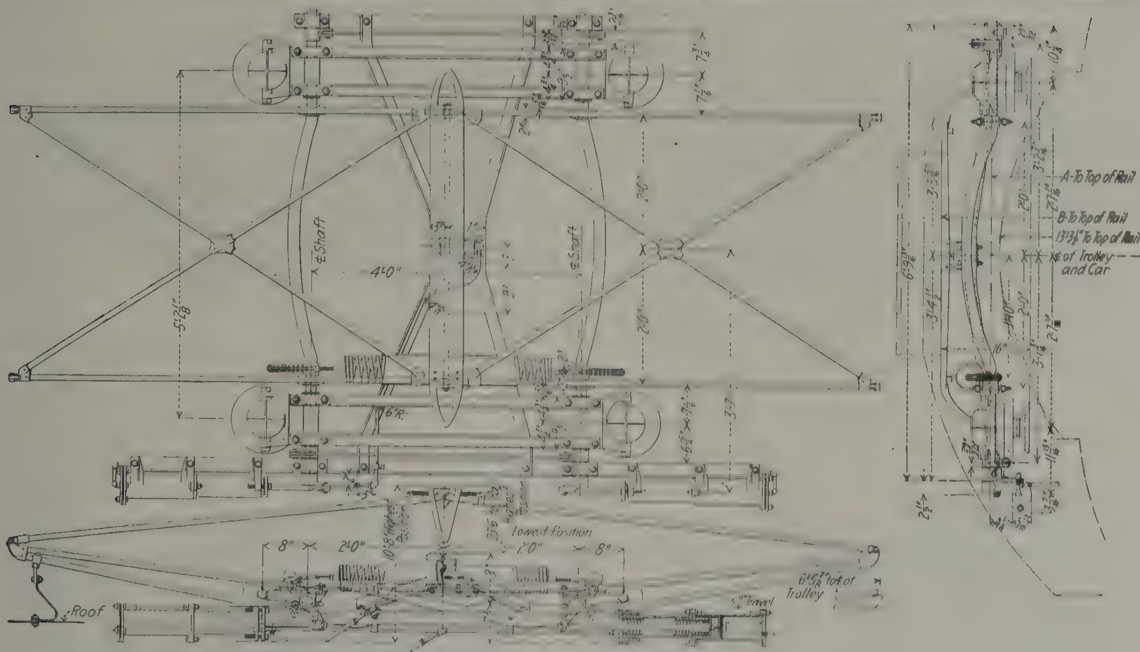


Fig. 2608—Pantagraph Trolley.

Fig. 2609—Spring Type Contact Shoe for Overrunning Third Rail. General Electric Company.

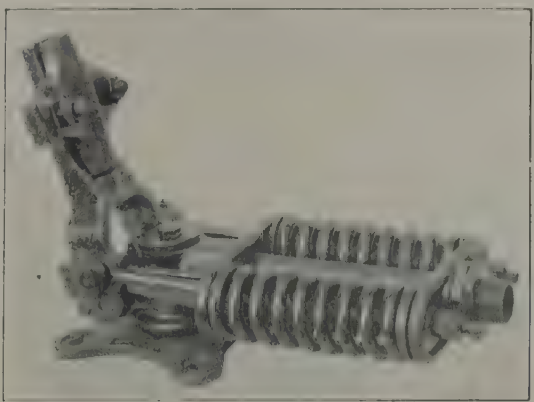


Fig. 2611—U. S. 15 Form C Trolley Base. General Electric Company.

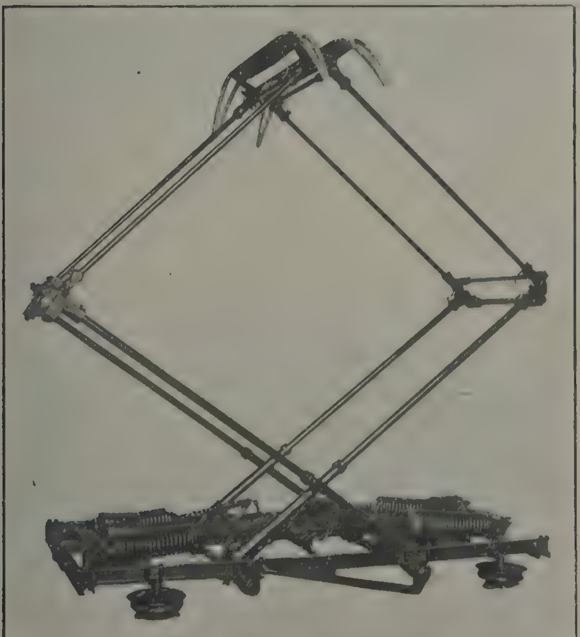


Fig. 2610—Type S-159-C Slide Trolley. General Electric Company.

Fig. 2612—U. S. 13 Form D Trolley Base. General Electric Company.

Westinghouse Electric & Manufacturing Company.

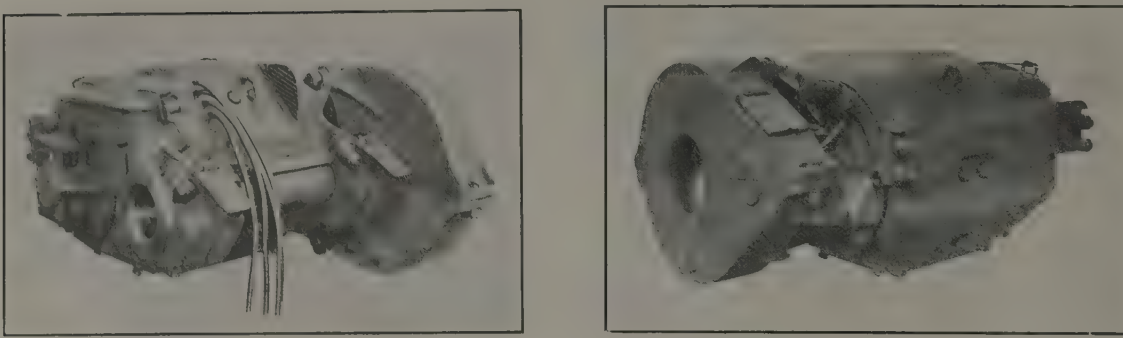


Fig. 2613—G. E. 303-P-50-Horsepower Motor.

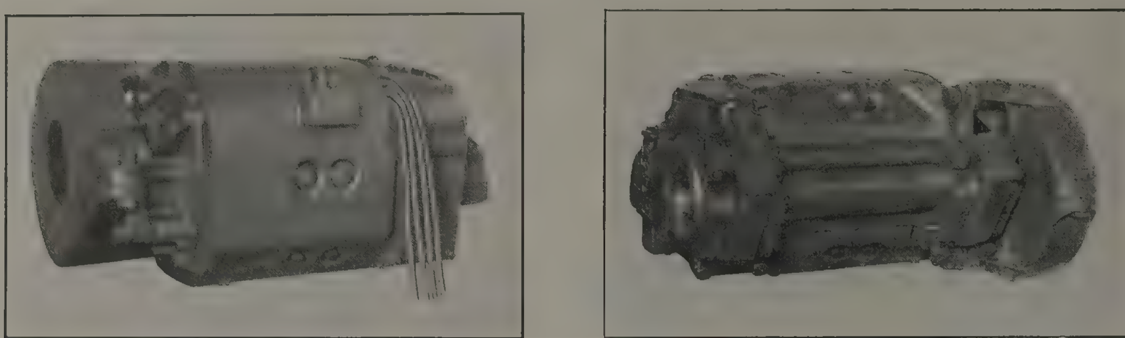


Fig. 2614—G. E. 240-110-Horsepower Motor.

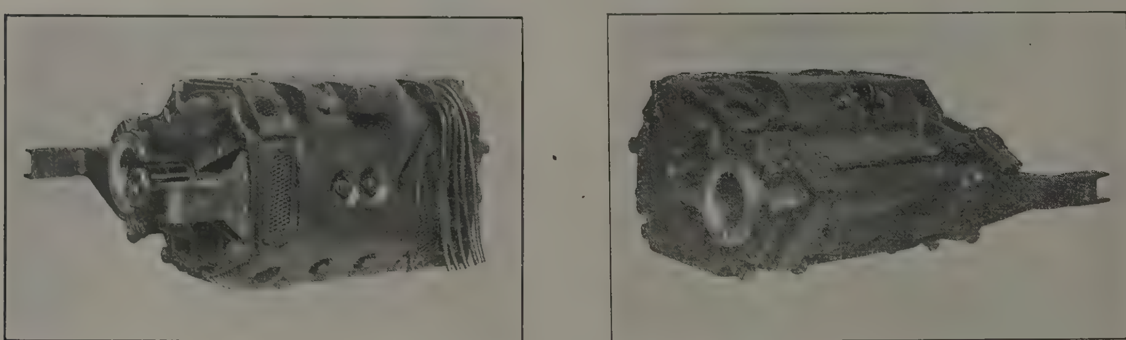


Fig. 2615—G. E. 259-120-Horsepower Motor.

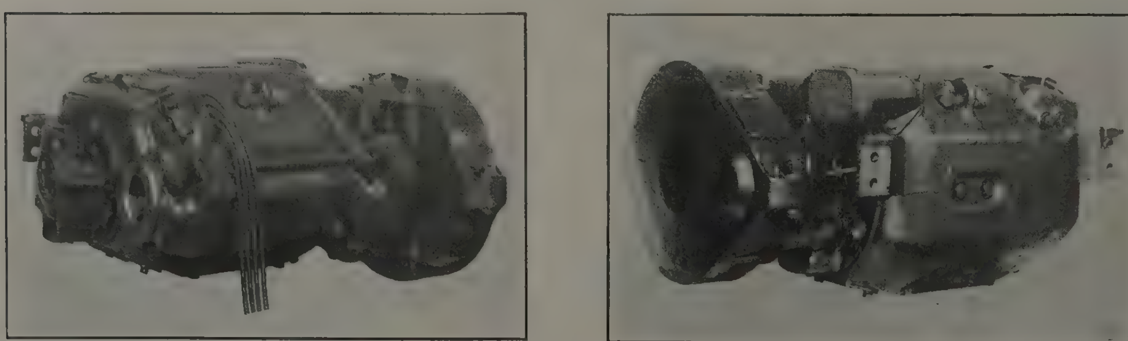


Fig. 2616—G. E. 201-G-65-Horsepower Motor.

General Electric Company.

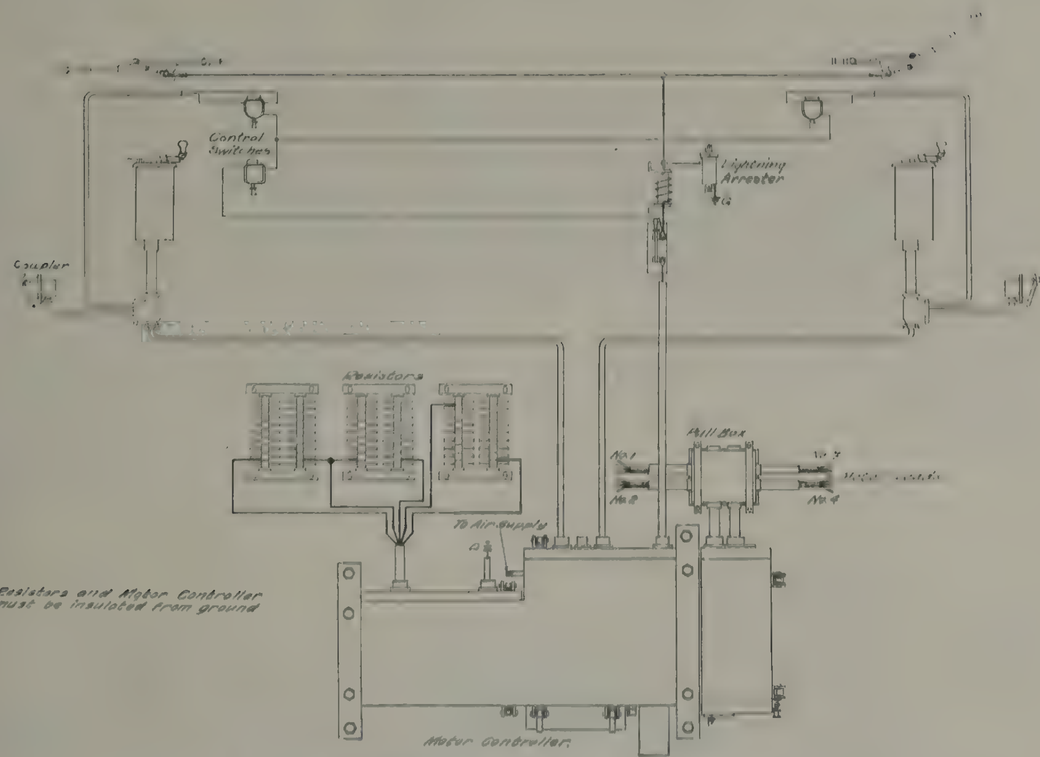


Fig. 2617—Arrangement of Car Equipment with PC5 Controller.

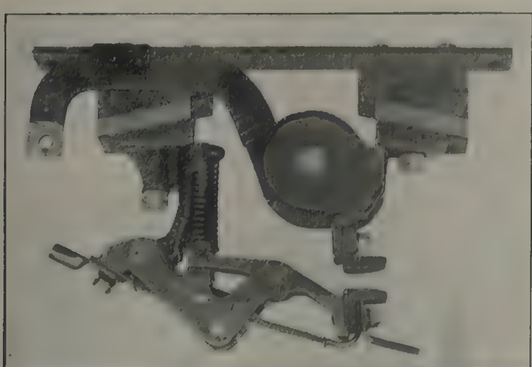


Fig. 2618—Type PC5, PC6 and PC9 Controller. Contactor Unit.

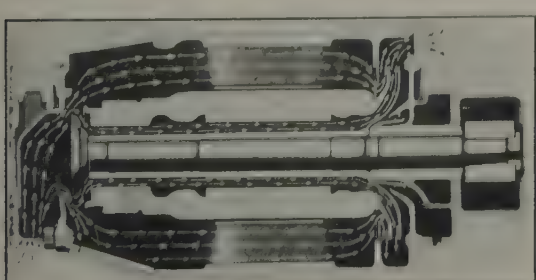


Fig. 2620—G-129 Controller (left), MS-46 Switch Ventilation with Multiple Fan.

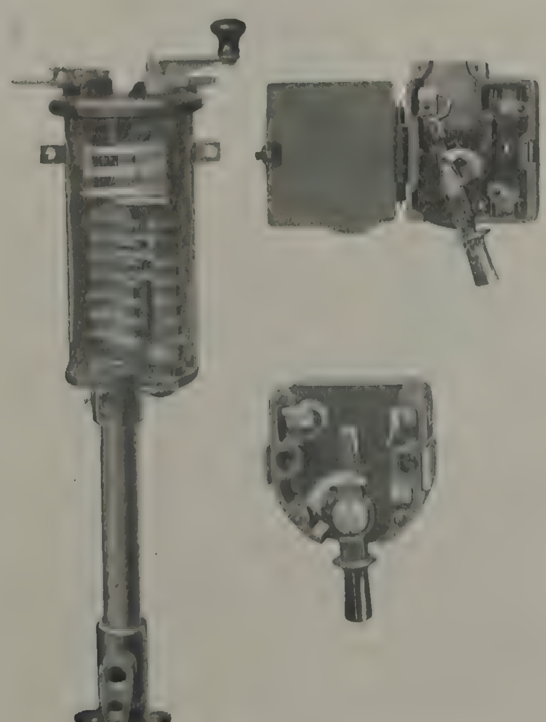


Fig. 2620—G-129 Controller (left), MS-46 Switch (top), MS-14 Switch (bottom).

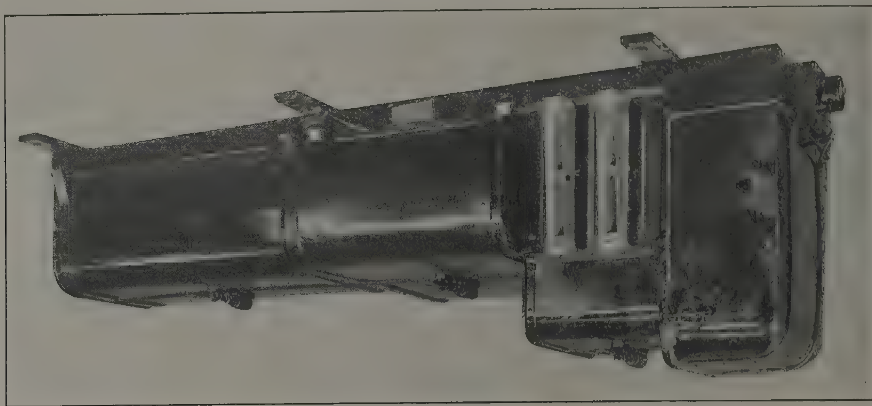


Fig. 2621—PC-2 Controller.

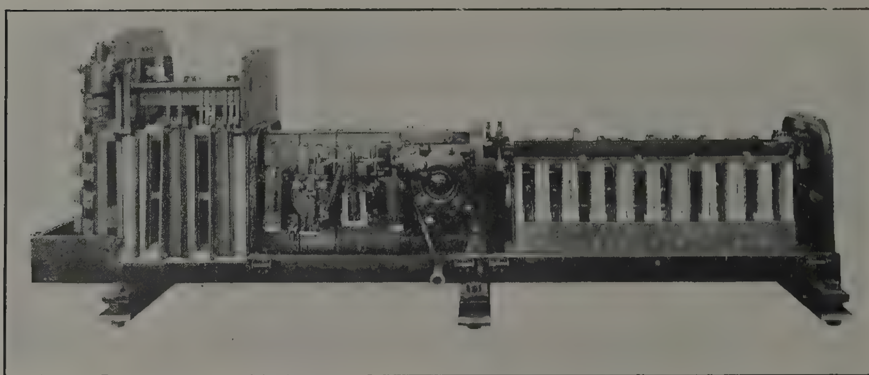


Fig. 2622—PC-10 Motor Controller.

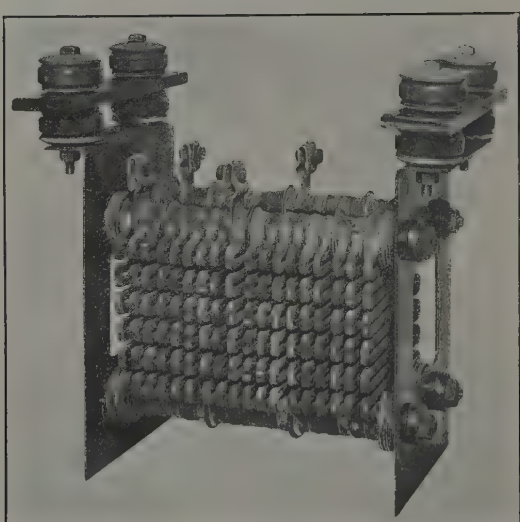


Fig. 2623—R. G. Form A Rheostat, with 600-Volt Porcelain Bolt Insulators.

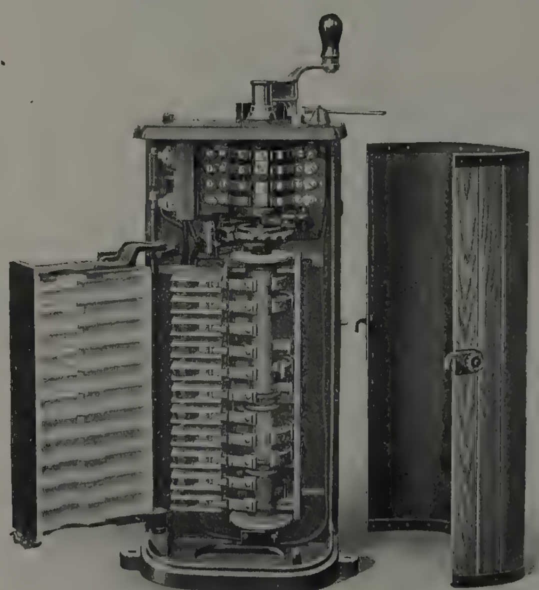


Fig. 2624—Type K, 36-F Controller.

General Electric Company.

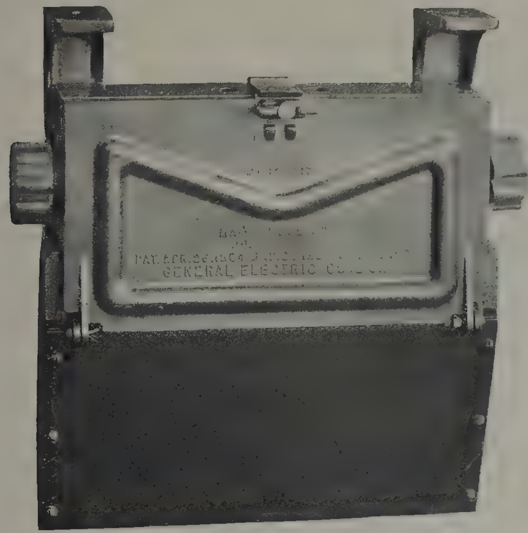


Fig. 2625—MA-13-B Fuse Box.

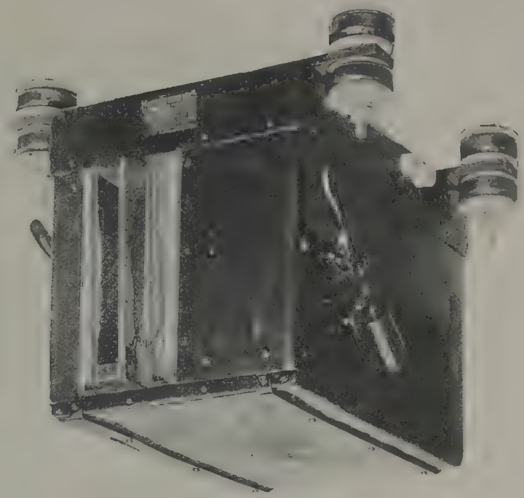


Fig. 2626—SB-61-11-A Contactor Box.

Fig. 2627—DA-35 Coupler Socket and DC-28 Plugs.

Fig. 2628—DC-54-C Coupler Socket.

Fig. 2629—DA-82 Coupler Socket.

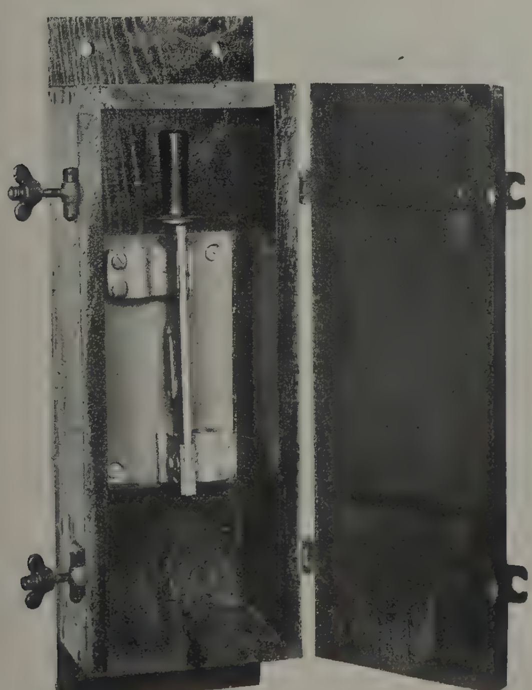


Fig. 2630—MS-118 Switch.

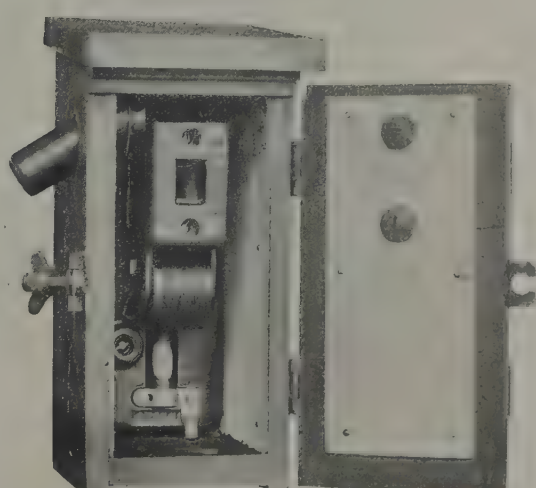


Fig. 2631—Type M Form D-3 Direct Current Lightning Arrestor for Line Service on 350-750-Volt Circuits.

General Electric Company.

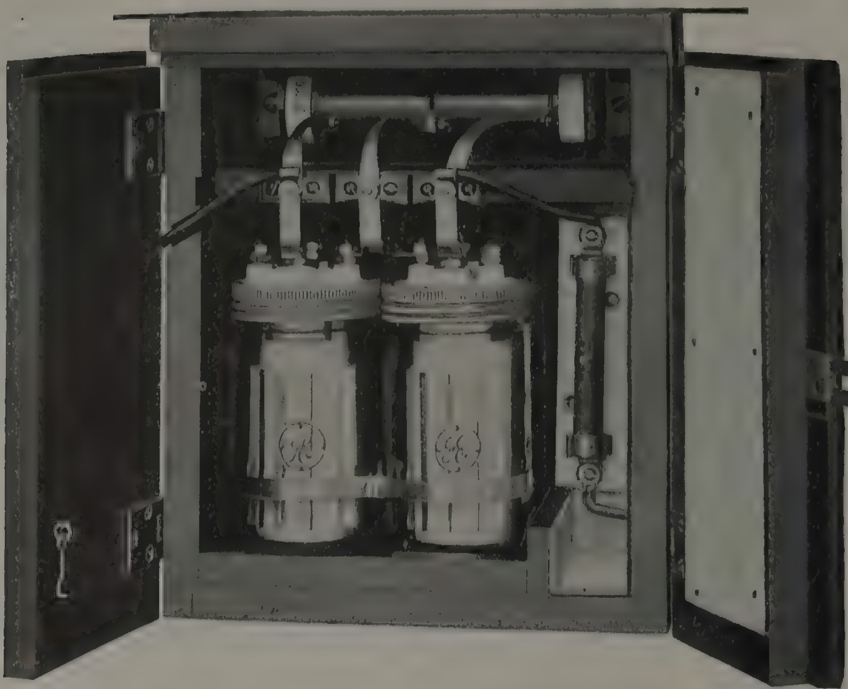


Fig. 2632—Type K, Form A, 600-Volt Direct Current Aluminum Lightning Arrestor for Car Service.

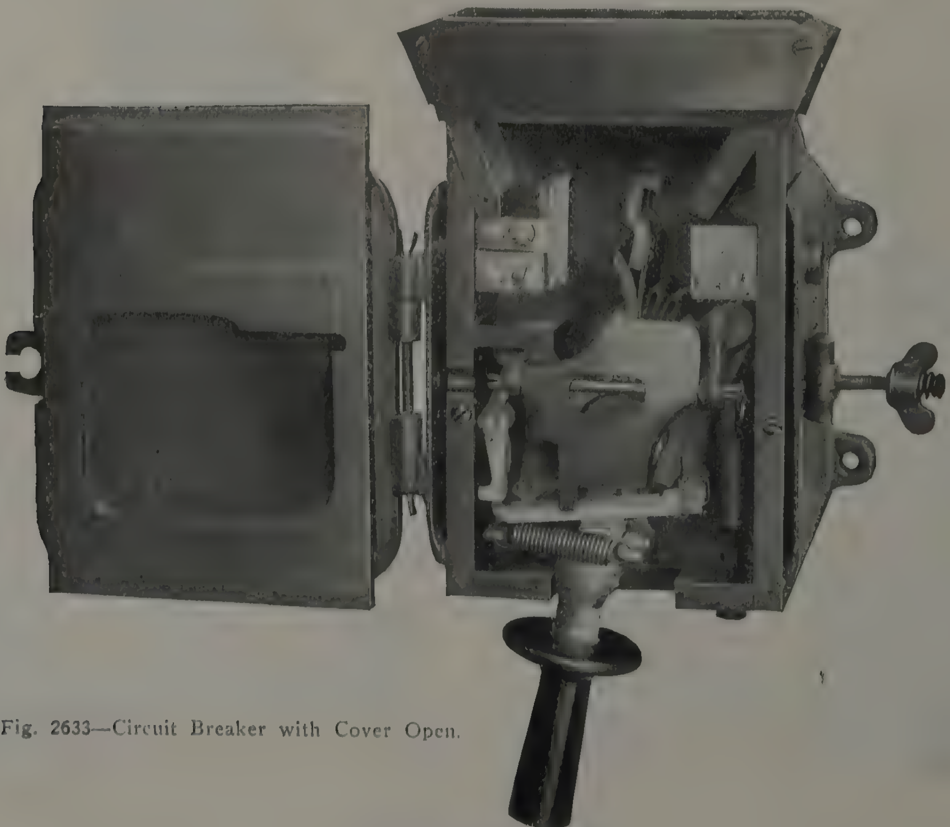


Fig. 2633—Circuit Breaker with Cover Open.

General Electric Company.

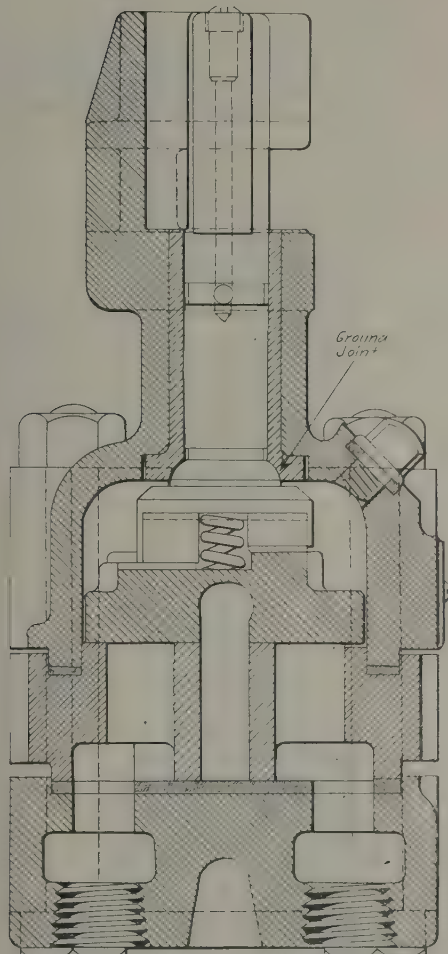


Fig. 2634—Type A, Form D-9, Motorman's Valve.

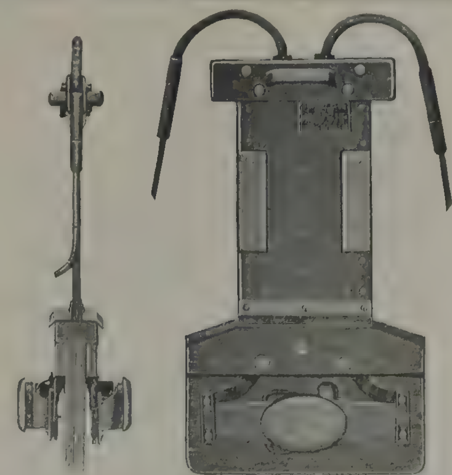


Fig. 2635—Open Conduit Plow or Current Collector.

Fig. 2636—600-Volt Receptacle.

Fig. 2637—1,200-Volt Lamp Receptacle.

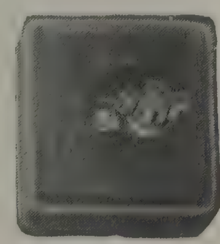


Fig. 2638—Three Ampere, 600-Volt, Single Pole, Combined Indicating Switch and Enclosed Fuse Cut-out.

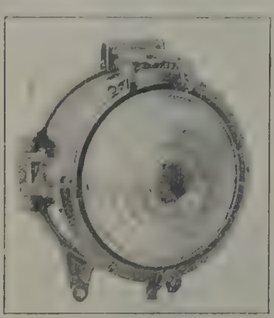


Fig. 2639—Form 10, 2 Ampere, 550-Volt, Direct Current, Luminous Arc Headlight.

Fig. 2640—Three-Way Snap Switch for Lighting Circuit.

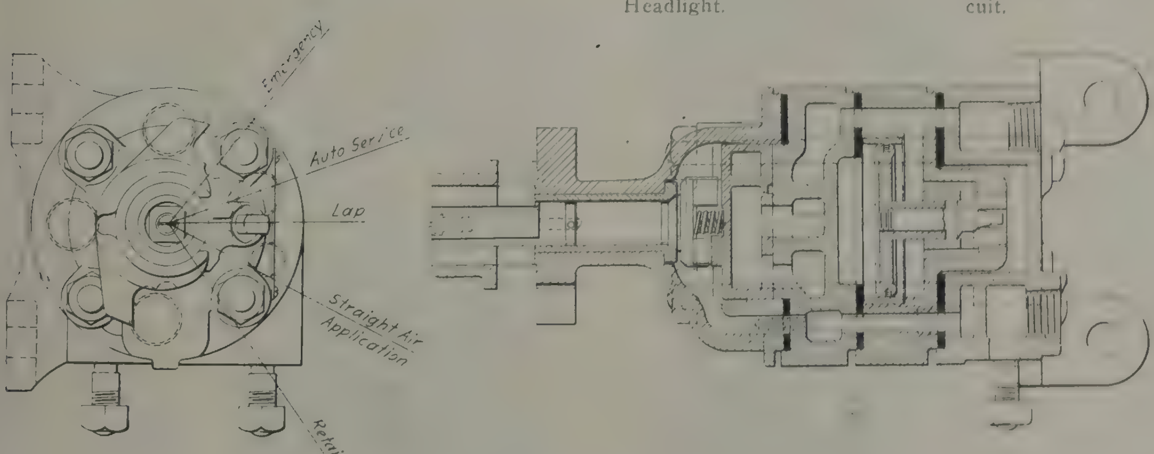


Fig. 2641—Type A, Form D-10, Motorman's Valve.

General Electric Company.

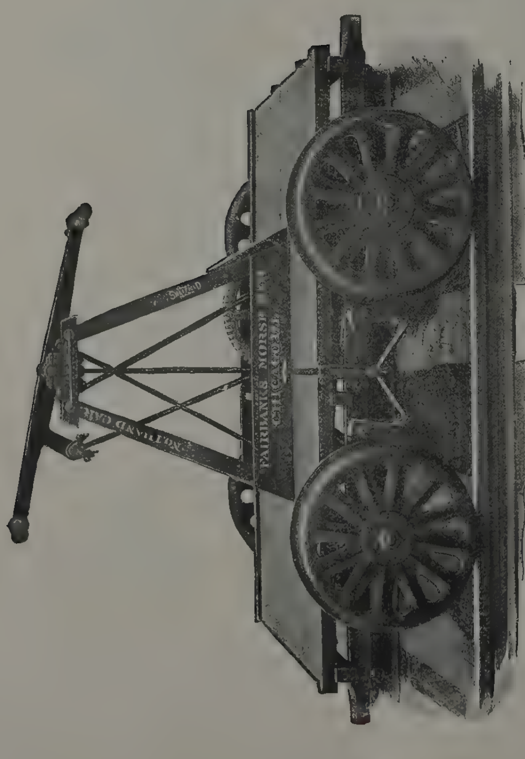


Fig. 2642—Standard Section Hand Car No. 14.

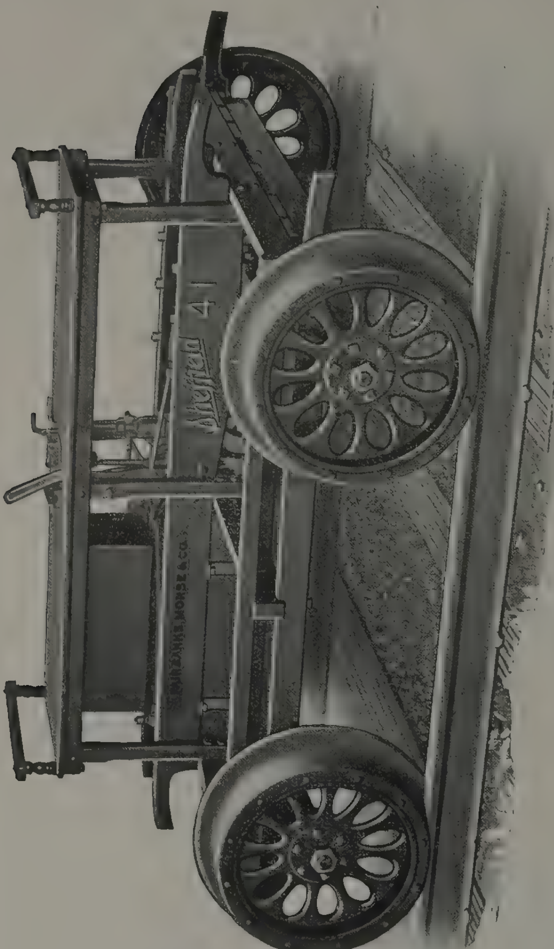


Fig. 2643—No. 41 Kerosene Motor Light Inspection Car.

Fig. 2644—No. 36 Signal Maintainer's Motor Car.

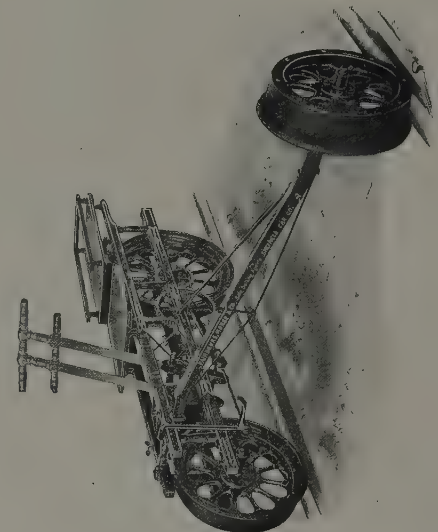


Fig. 2645—Ball Bearing Velocipede Car

Fairbanks, Morse & Company.

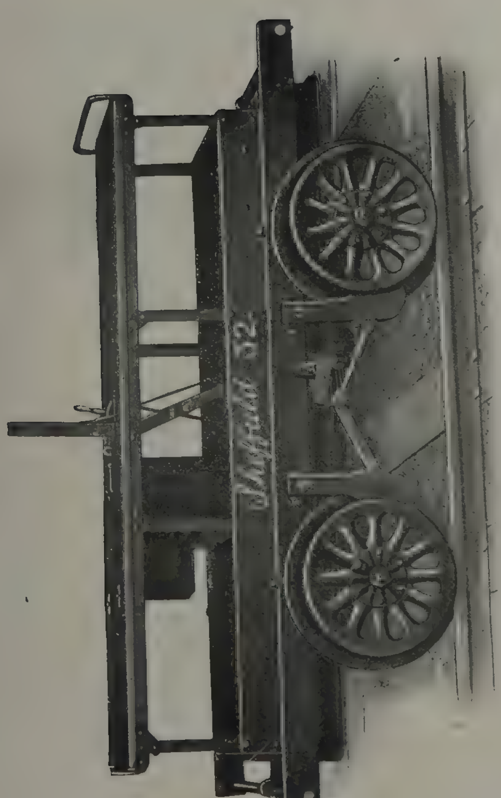


Fig. 2646—No. 32 Gasolene Motor Section Car.

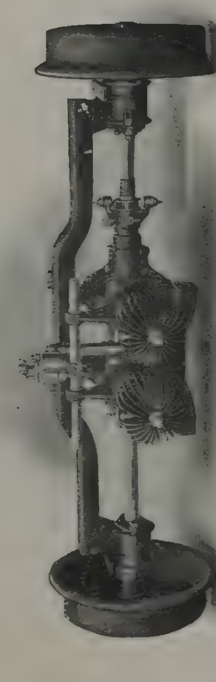


Fig. 2647—Power Unit of No. 32 Motor Car.

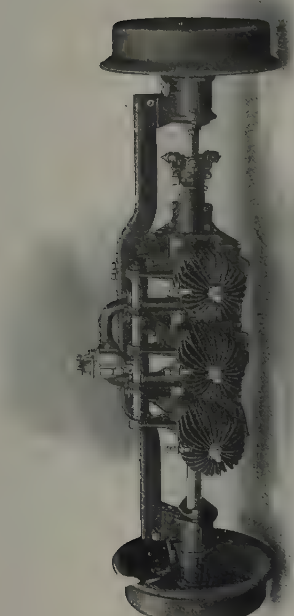


Fig. 2648—Power Unit of No. 33 Motor Car.

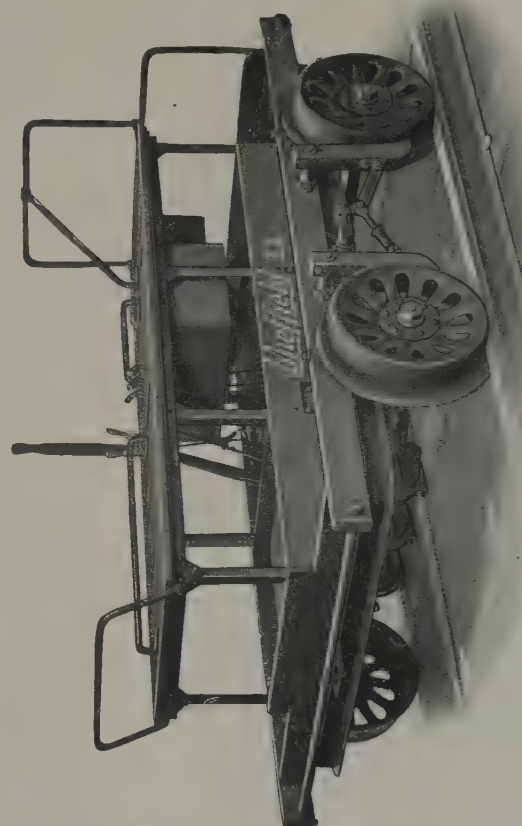


Fig. 2649—No. 33 Gasolene Motor Section Car.

Fairbanks, Morse & Company.

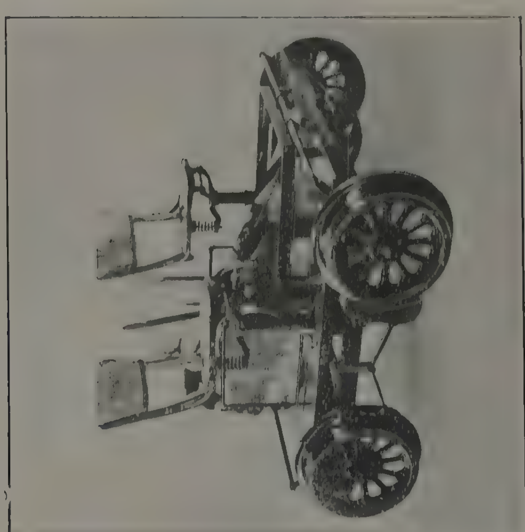


Fig. 2650—Motor Inspection car. Fairmont Gas Engine & Railway Motor Car Company.

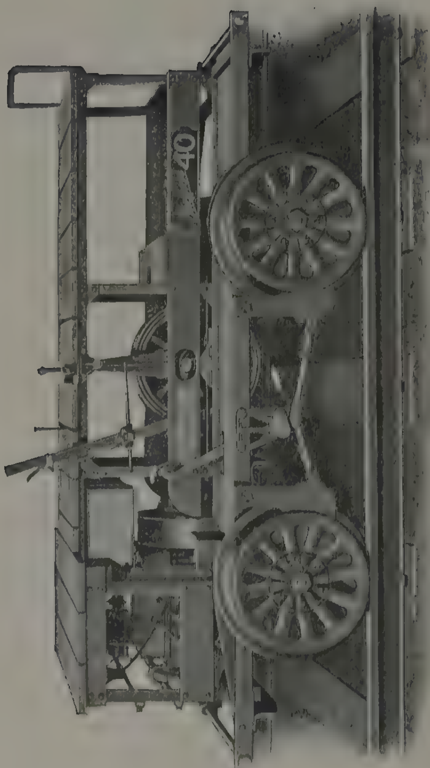


Fig. 2651—No. 40 Motor Car for Bridge Gang and Heavy Section Work. Fairbanks, Morse & Company.

Fig. 2652—No. 38 Kerosene Motor Car for Maintenance and Construction Work. Fairbanks, Morse & Company.

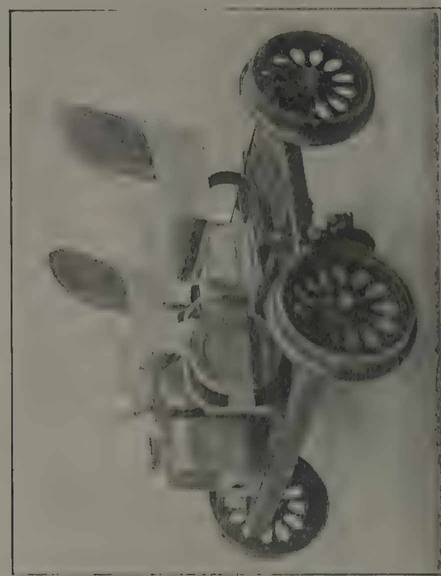


Fig. 2653—General Class M-218 SA Featherweight Inspection Car. Fairmont Gas Engine & Railway Motor Car Company.

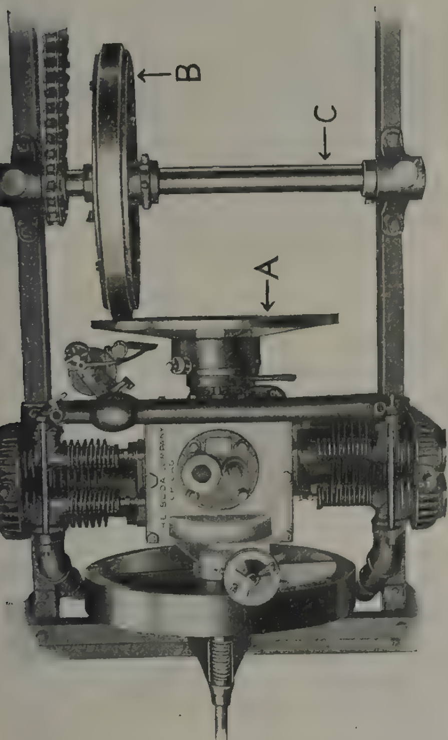


Fig. 2655—Friction Drive on Buda Motor Cars.

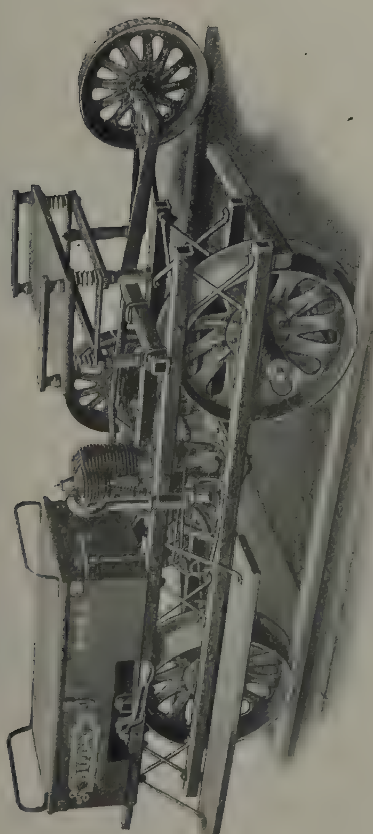


Fig. 2654—Buda No. 12A Motor Velocipede.

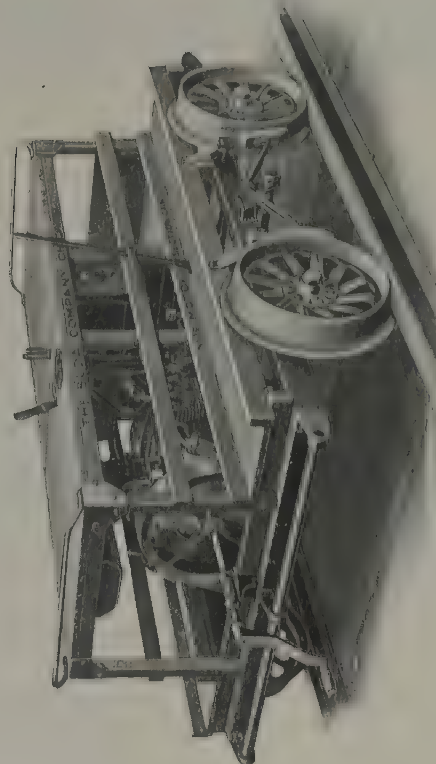


Fig. 2657—Buda No. [illegible] Motor Car.

Fig. 2656—Buda No. [illegible] Motor Car.

The Buda Company.

Fig. 2658—No. 116 Buda Motor Inspection Car.
The Buda Company.

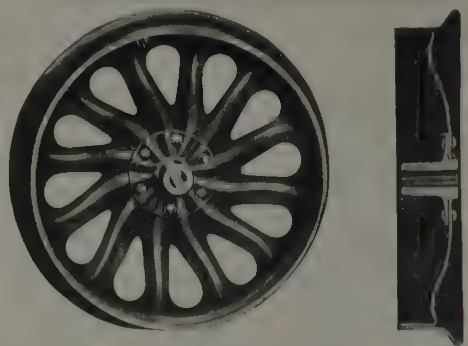


Fig. 2659—Pressed Steel Hand Car Wheel.
The Buda Company.

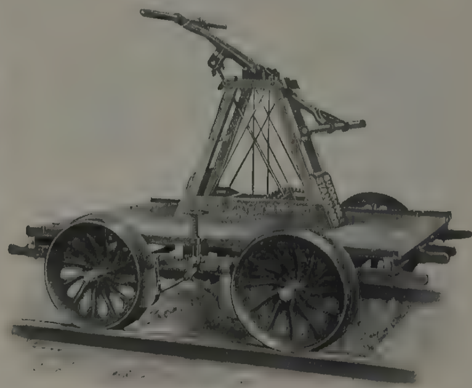


Fig. 2660—No. 1 Hand Car.
The Buda Company.

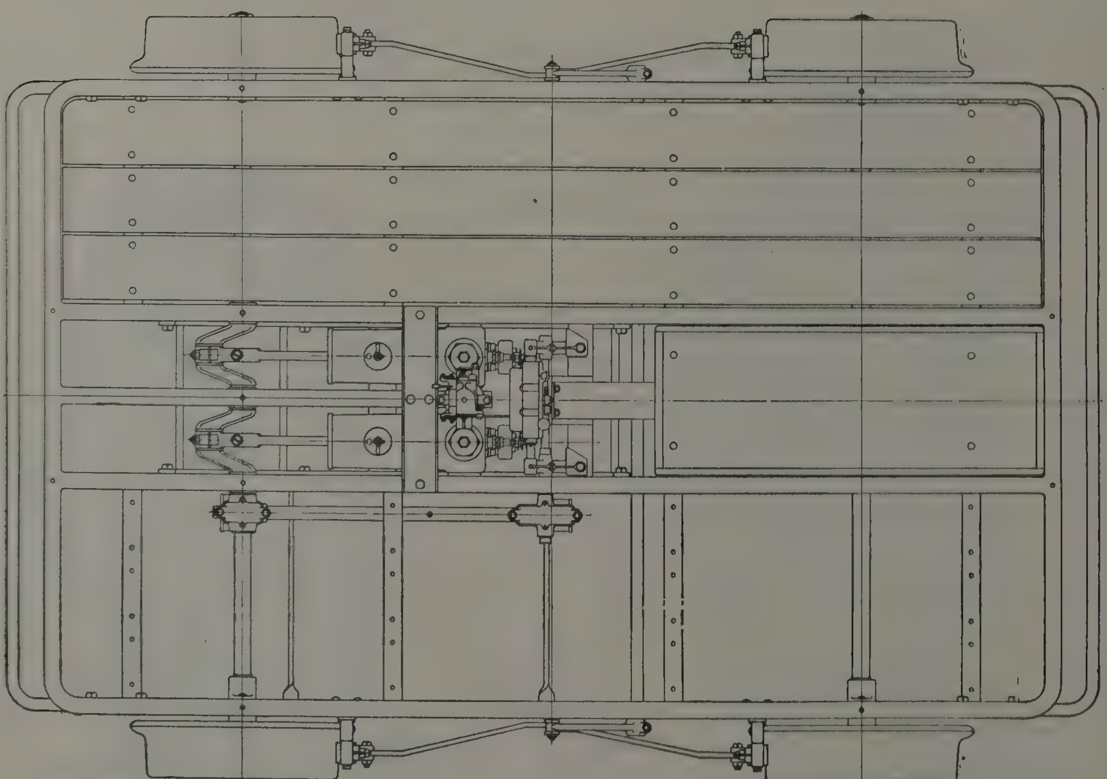


Fig. 2661—Bottom View of Rockford Motor Car, Showing Engine Arrangement. Chicago Pneumatic Tool Company.

Fig. 2662—Mudge Class F1, 4 H. P. Inspection Car. 3-Man Capacity.

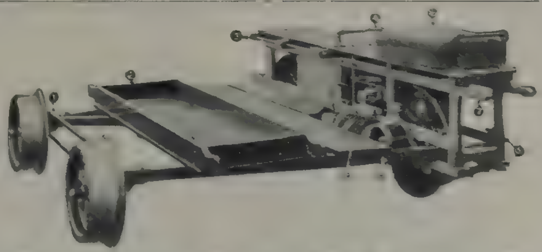


Fig. 2663—Mudge Class E3, 4 H. P. Inspection Car. 3-Man Capacity

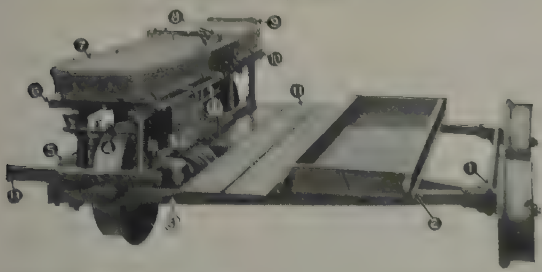


Fig. 2664—Mudge Class E4, 8 H. P. Inspection Car, 4-Man Capacity.

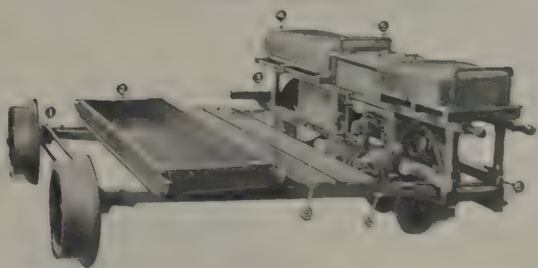


Fig. 2665—Mudge Class G2, 6 H. P. Inspection Car, 4-Man Capacity.

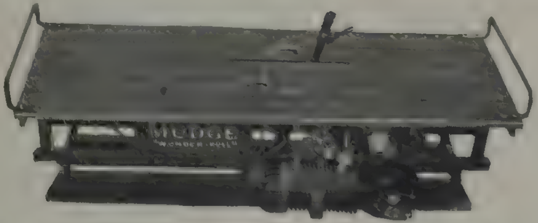


Fig. 2666—Mudge Class GQ2 "Wonderpull," 6 H. P. Motor Car Top for Old Hand Cars.

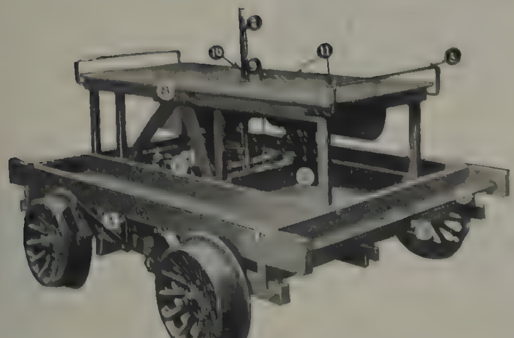


Fig. 2667—Mudge Class GS2, 12 H. P. Bridge Gang Motor Car.

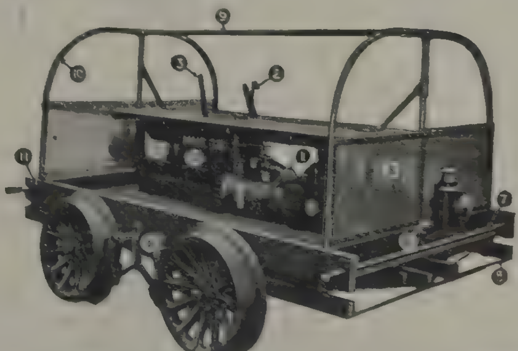


Fig. 2668—Mudge Class GS3, 6 H. P. Section Motor Car, Equipped with Mudge Patented Safety Railings. These Railings Can Be Applied to Other Mudge Section Cars and Also to Section Motor Cars of Other Makes.

Fig. 2669—Mudge Class ES2, 8 H. P. Section Motor Car.

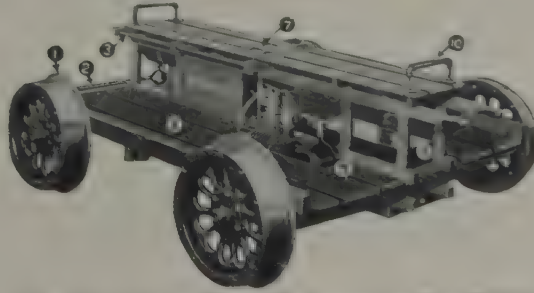


Fig. 2670—Mudge Class E6, Inspection Car "Safety First" Center Load, 4 H. P., 4-Man Capacity.

Mudge & Company.

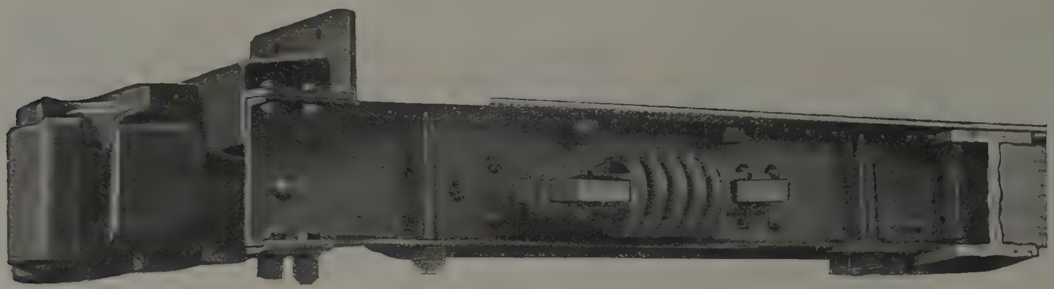


Fig. 2671—Bradford Structural Draft Arms and Three Spring Draft Gear. Side View.

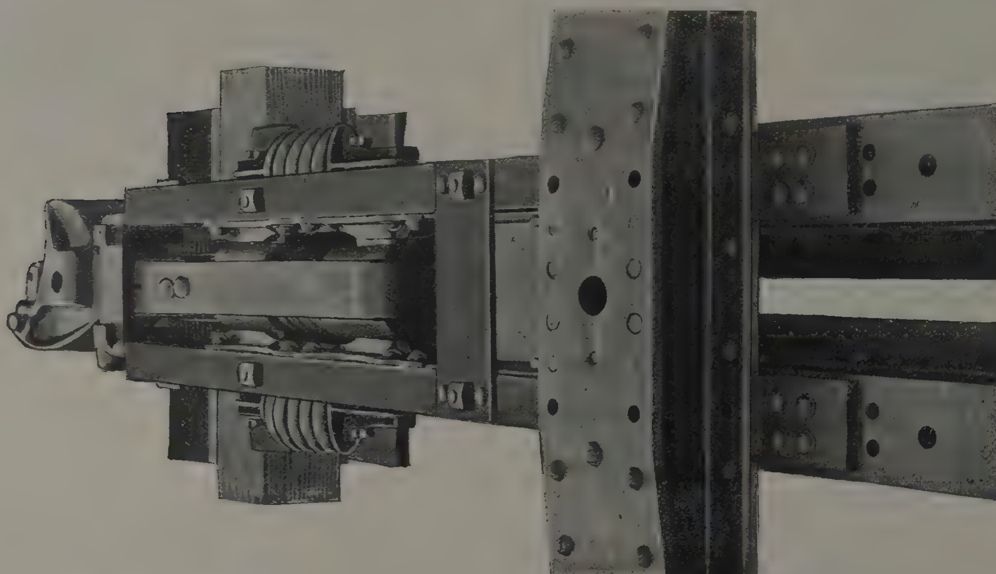


Fig. 2672—Bradford Structural Draft Arms and Three Spring Draft Gear. Bottom View.

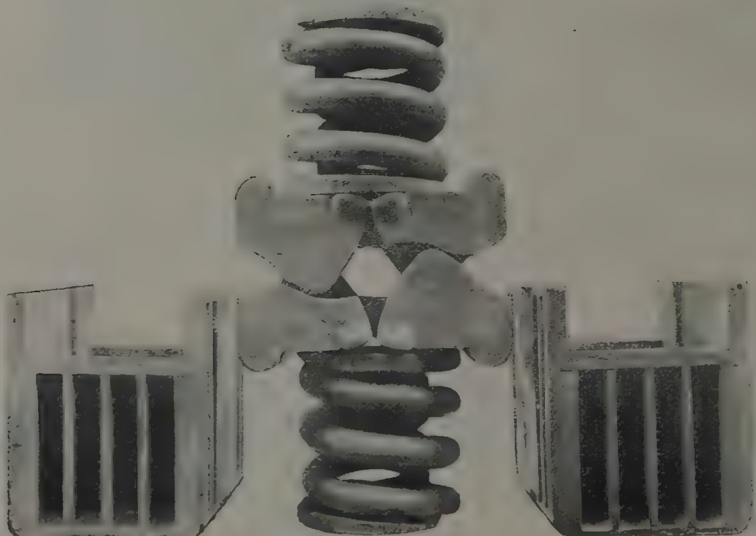


Fig. 2673—Bradford Type K Draft Gear with Cages Removed.

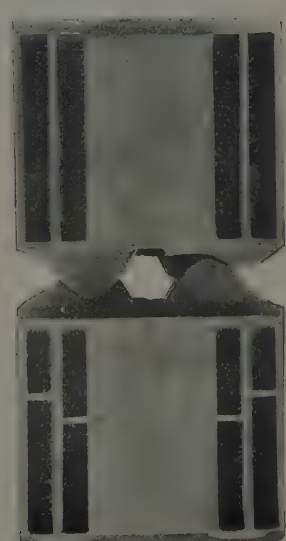


Fig. 2674—Bradford Type K Draft Gear Assembled with Cages.

Bradford Draft Gear Company.

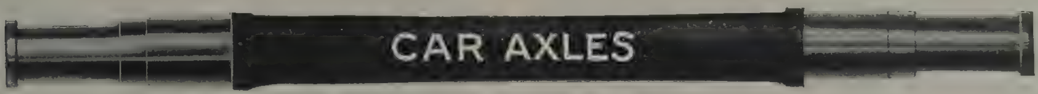


Fig. 2675—Forged Steel Axle for Freight and Passenger Service. J. R. Johnson & Company.

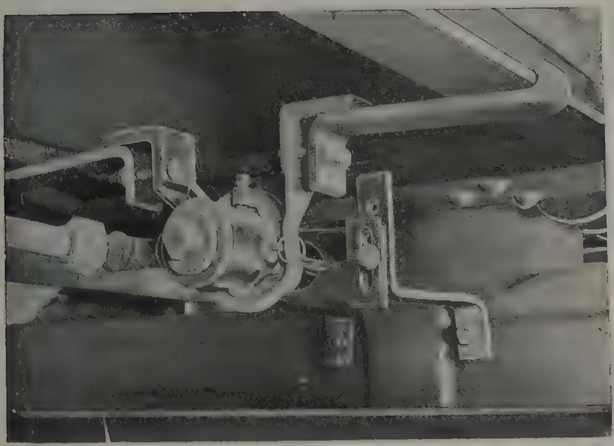


Fig. 2676—The "Wright Little Watchman" Air Brake Appliance.

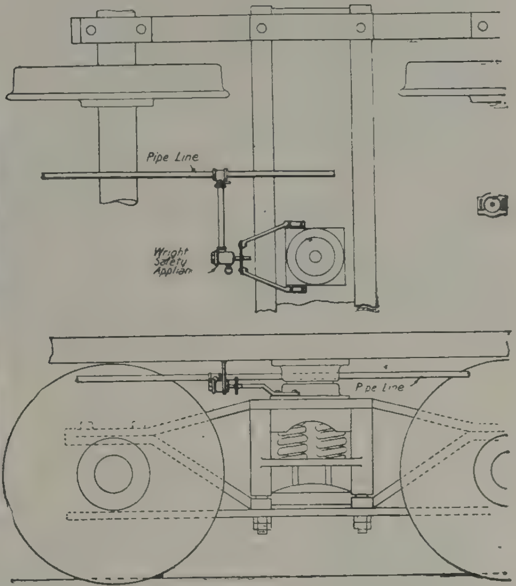


Fig. 2677—The "Wright Little Watchman" Applied to a Freight Car.

Wright Safety Air Brake Co.

Fig. 2678—All Steel Ore Hopper Car. Builder, The Ralston Steel Car Company.

Fig. 2679—Interior of Dining Car of New York Central Wreck Train.

Fig. 2680—Interior of Tool Car of New York Central Wreck Train.

Fig. 2681—Arrangement of Cars in New York Central Wreck Train. From Left to Right—Crane Tender, Crane, Truck Cars, Tool Cars, Sleeping and Dining Cars.

Fig. 2682—Interior of New York Central Tool Car.

Fig. 2683—Interior of New York Central Tool Car.

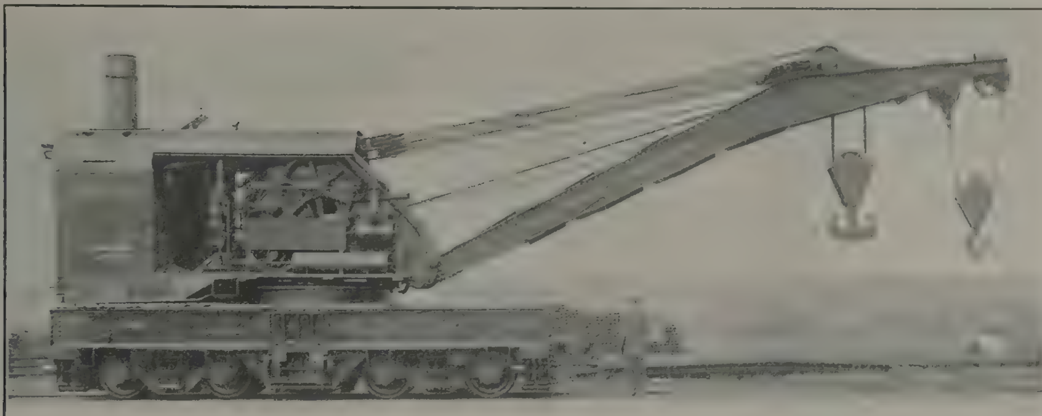


Fig. 2684—Steam Wrecking Crane. Lifting Capacity, 150 Tons at 17 ft. Radius. Builder, Industrial Works.

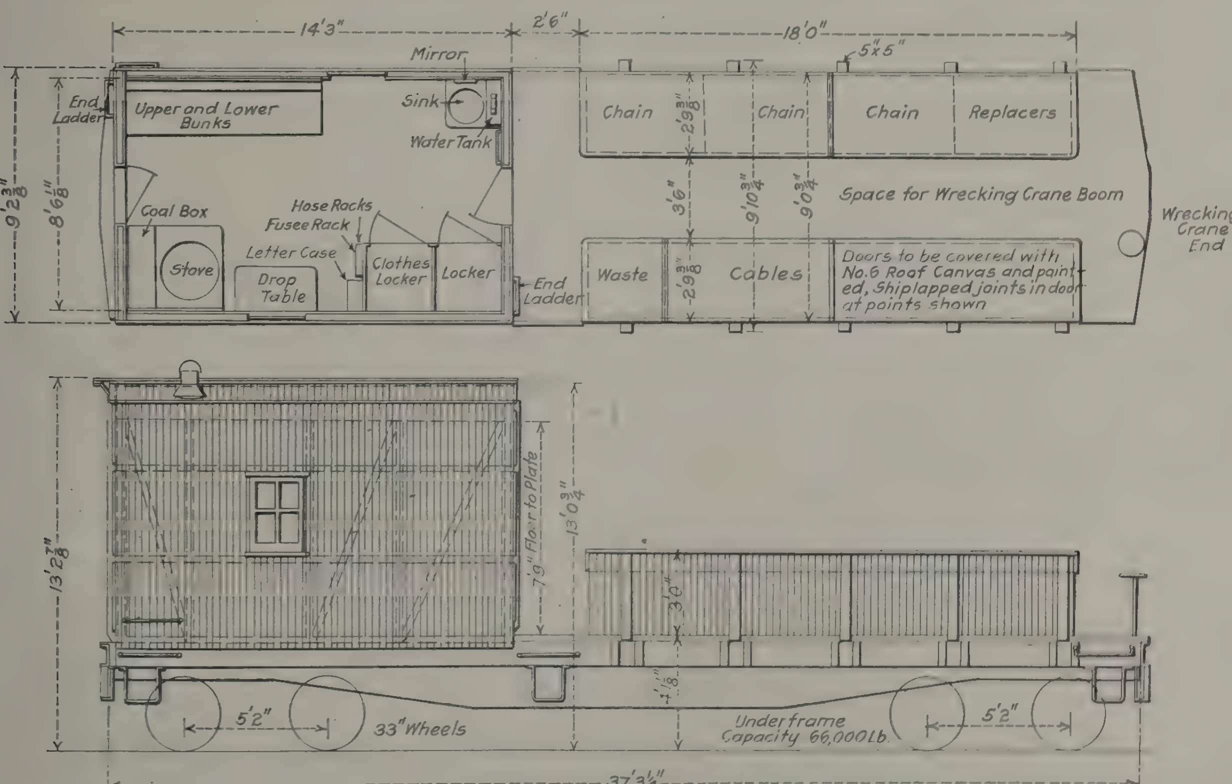


Fig. 2685—Canadian Northern Auxiliary Car for Wrecking Crane.

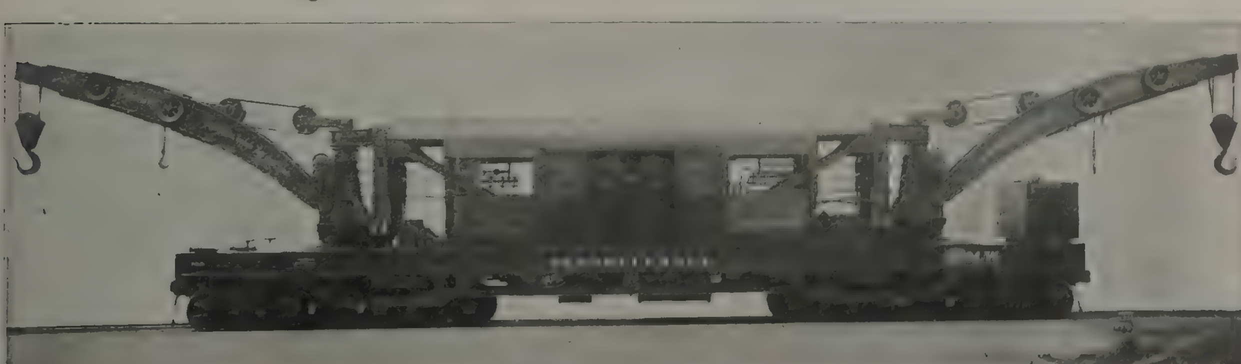


Fig. 2686—Electric Wrecking Crane for Use in Tunnels. Weight, 326,000 lb.; Lifting Capacity at 17 ft. Radius, 50 Tons. Builder, Industrial Works.

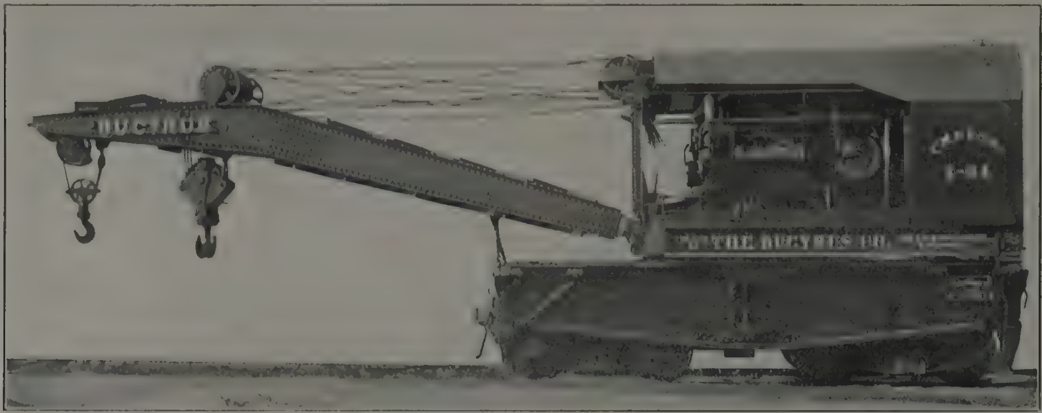


Fig. 2687—Steam Wrecking Crane. Lifting Capacity, 100 Tons. Builder, Bucyrus Company.

Equipment for 150 or 160 Ton. See Fig. 2689.

(Recommended by Bucyrus Company.)

1—160-*Ton Transom Beam* (1)
2—*Link* (2)
3—*Special Shackle* (2)
4—45-*Ton Transom Beam* (1)
5—*Center Clevis* (2)
6—*End Clevis* (2)
7—*Special Shackle* (2)
8—*Pin* (*Locomotive Lift*) (1)
9—*Sling* (*Locomotive Lift*) (1)
10—*Sling* (*Locomotive Lift*) (1)
11—*Coupler Yoke Attachment* (1) *Link No.* 12, 2 *chains No.* 32, 1 *Yoke No.* 13
12—*Link* (1)
13—*Yoke* (1)
14—*End Sill Hook* (2) *For Steel Underframe Cars*
15—*End Sill Hook* (2) *For Wood Underframe Cars*
16—*Side Sill Hook* (4) *For Steel Underframe Cars*
17—*Side Sill Hook* (4) *For Wood Underframe Cars*
18—*Sling* (4)
19—*Sling* (2)
20—*Sling* (2)
21—*Sling* (2)
22—*Corner Protecting Casting* (2)
23—*Connecting Link* (2)
24—*Truck Sling, Axle Lift* (1)
25—*Truck Sling, Arch Bar Lift* (1)
26—*Girder Hook* (1)
27—*Chain Sling*, ¾-*in.*, (2)
28—*Chain Sling*, 1-*in.*, (2)
29—*Emergency Cable Socket* (2)
30—*Double Wedge Socket* (1)
31—*Fire Door Hook* (1)
32—*Coupler Lift Chain* (2)

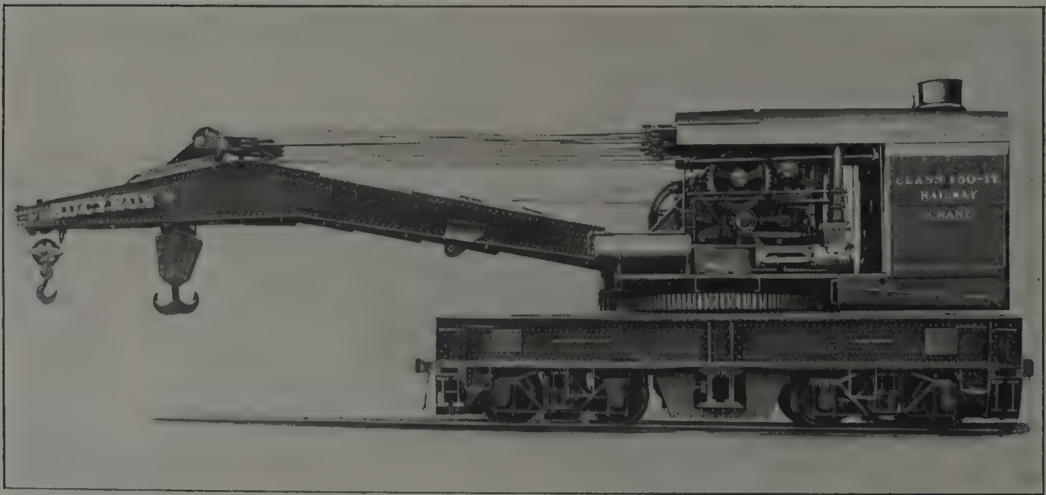


Fig. 2688—Class 150-17 Railway Crane. Lifting Capacity, 150 Tons at 17 ft. Radius. Builder, Bucyrus Company.

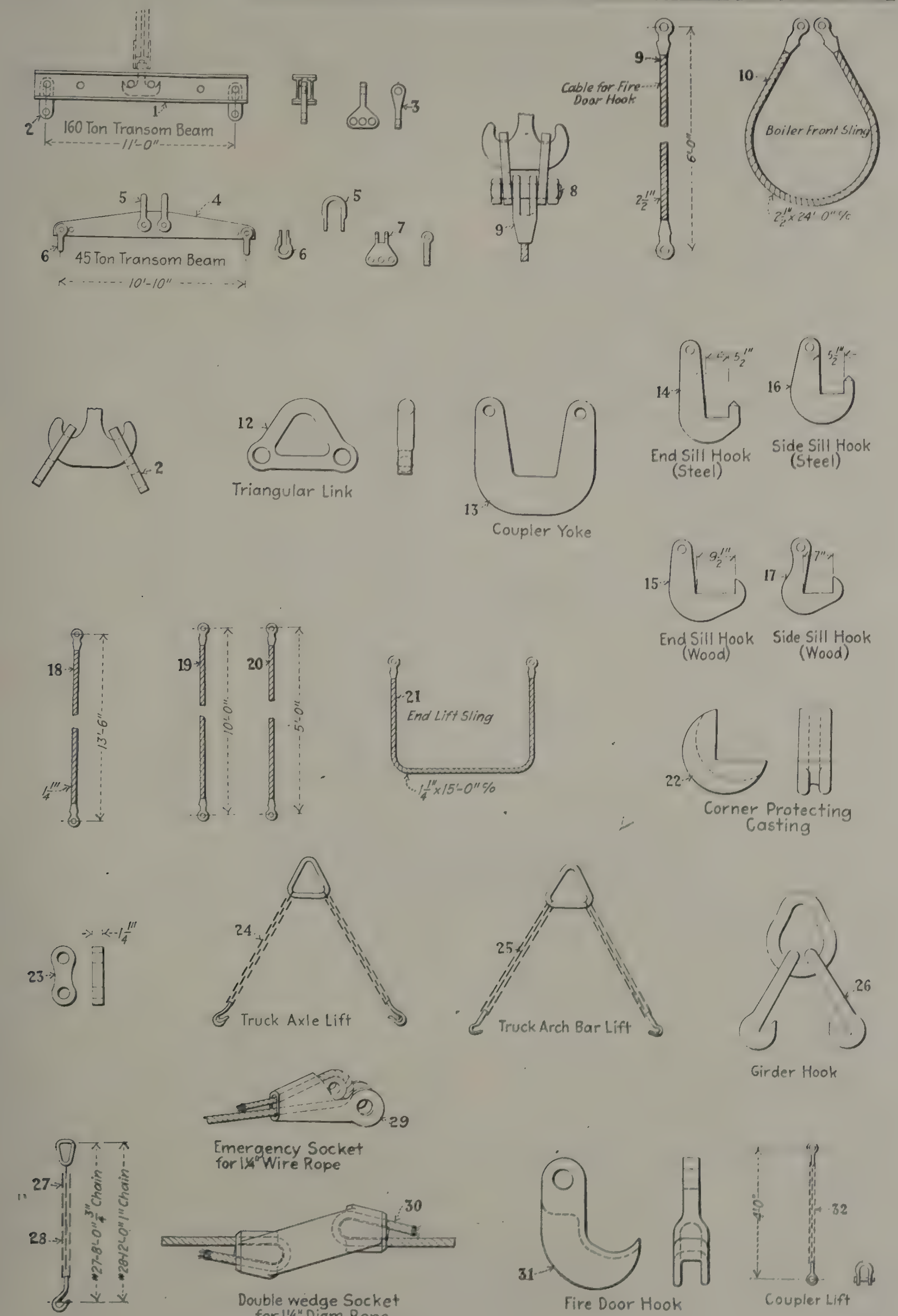


Fig. 2689—Wrecking Crane Equipment. Bucyrus Company.
(See List on page 924.)

Cars and Tools Used in Northern Pacific Wreck Trains.

1 100-Tons Capacity Steam Wreck Crane.

Tools in Tool Car.

2	40-Ton Hydraulic Jacks with Levers
2	30-Ton Norton Jacks with Levers
2	Foot Lifts for Hydraulic Jacks
4	12 in. Pony Jacks
600	ft. in. Rope
600	ft. 2 in. Rope
300	ft. 1½ in. Rope
300	ft. 1¼ in. Rope
300	ft. 1 in. Rope.
2	Pieces 1¼ in. Rope, 100 ft. Long
1	Piece 3 in. Rope, 300 ft. Long, for Rolling Line
1	Complete Set of Splicing Tools
2	2½ in. Rope Slings, 50 ft. Long
2	Wire Cables, 1½ in. diameter, 60 ft. Long, with Heavy Links at Each End
1	3-Sheave Tackle Block for 3 in. Rope
1	2-Sheave Tackle Block for 3 in. Rope with Becket
1	3-Sheave Tackle Block for 2 in. Rope
1	2-Sheave Tackle Block for 2 in. Rope with Becket
2	2-Sheave Tackle Blocks for 1¼ in. Rope, One with Becket
2	2-Sheave Tackle Blocks for 1 in. Rope, One with Becket
2	3½ in. Iron Snatch Blocks
2	2½ in. Iron Snatch Blocks
2	1½ in. Iron Snatch Blocks
1	1¼ in. Iron Snatch Block
1	1 in. Iron Snatch Block.
2	1¼ in. Chains, 25 ft. Long, with Ring in Center and Grabs at Both Ends
2	¾ in. Chains, 30 ft. Long, with Ring in Center and Grabs at Both Ends
1	⅝ in. Chain, with Ring in Center and 4 Ends with Hooks
6	½ in. Chains, 4 to 6 ft. Long, Ring at One End, Hooks at Other End
6	1¼ in. Switch Chains, 16 ft. Long
20	⅞ in. Switch Chains, 16 ft. Long
2	Coupling bars
12	Coupling Links
24	Knuckle Pins, Assorted Sizes
4	Clevises, 1½ in., with 3½ in. Jaws
2	Links, with Thimbles for Rope
6	S Hooks, 2 in. to 3 in. in diameter
2	Wells-Buckeye Lights No. 5
2	Extra Burners for Wells-Buckeye Lights
1	Tent for Field Telegraph Service
1	Complete Telegrapher's Outfit
1	Portable Telephone, Complete with All Attachments
3	5 gallon Cans of Headlight Oil.
2	3 gallon Cans of Car Oil
3	Buckets of Prepared Packing for Journal Boxes
3	Packing Irons
3	Packing Hooks
2	Small Squirt Cans
1	Small Funnel
1	5 gallon Can of Wood Alcohol for Hydraulic Jacks
12	Hand Torches
4	White Lanterns
4	Red Lanterns
6	White Globes, Extra
4	Red Globes, Extra
2	Blue Globes, Extra
6	1¼ in. Air Brake Hose
2	Dummy Hose
2	Signal Hose
6	Pairs Rubber Boots
6	Cant Hooks
2	Cutting Bars, 4 ft. Long
3	Axes
4	Axe Handles
1	Hand Axe
2	Carpenter's Foot Adzes
1	5 ft. Cross Cut Saw
2	30 in. Hand Saws
12	Scoop Shovels
6	No. 2 Track Shovels
2	Long Handled Shovels
4	Picks
4	Extra Pick Handles
4	Spike Mauls
2	Spike Maul Handles
4	Lining Bars
2	Claw Bars
1	Track Level
2	12 lb. Sledges
1	16 lb. Sledge
1	8 lb. Sledge
2	3 lb. Hammers
2	2 lb. Hammers
6	Cold Chisels
4	Track Chisels
1	18 in. Stilson Wrench
2	18 in. Monkey Wrenches
2	15 in. Comb Wrenches
4	12 in. Monkey Wrenches
15	Assorted Open End Wrenches
1	5 Wheel Pipe Cutter
	Assortment of Brasses and Wedges for Cars
2	Center Pin Drifts
2	Cranes at Side Door for Handling Jacks
2	Hand Barrows for Carrying Jacks
2	Fire Extinguishers
2	Fire Axes
200	Grain Sacks
2	Pairs Aldon Car Replacers for 90 lb. Rails
3	Pairs Aldon Car Replacers for Lighter Rails
2	Pairs Alexander Car Replacers for Lighter Rails
2	Iron Wedges, 8 in. Wide, 2 ft. 9 in. long, 5 in thick
1	Track Gauge
4	Track Wrenches
12	Iron Buckets and 12 Iron Baskets for Handling Grain
1	Car Wheel Gauge
1	Box with Assortment of Nails
5	Pipe Rollers, 3 in. by 2 ft. Long
1	Carpenter's Brace
1	¾ in. Car Bit
1	⅞ in. Car Bit
1	1 in. Car Bit
1	2 in. Auger
2	Heavy Iron Dollies
1	Tool Chest for Small Tools
4	Drifts, for ¾ in., ⅞ in., 1 in. and 1¼ in. Bolts
4	Gilman Emergency Knuckles
25	lbs. Nuts and Bolts, Assorted Sizes
200	lbs. Assorted Bolts
2	Tarpaulins, 20 ft. by 40 ft., for Protecting Freight
1	First Aid Medicine Case

Material on Truck Car.

2	80,000 lbs. Capacity Steel Car Trucks
2	60,000 lbs. Capacity Steel Car Trucks
150	Pieces Blocking
25	Oak Wedges
6	30 ft. Cables
2	1½ in. Cable Slings, with Heavy Links at Each End
4	1½ in. Chains, 20 ft. to 30 ft. Long, Rings Each End
4	Kegs Track Spikes in Cellar
30	Pairs Angle Bars
4	Kegs Track Bolts

Material on Tie and Rail Car.

75	Ties
8	85 lb. Rails
8	72 lb. Rails
12	66 lb. Rails

Material in Bunk Car.

10	Bunks
10	Mattresses
	Complete Set of Cooking Utensils
1	Steel Kitchen Range
1	Ice Box
	Complete Set of Porcelain Dishes
1	Stretcher, Complete with Blankets, Pillows, etc.

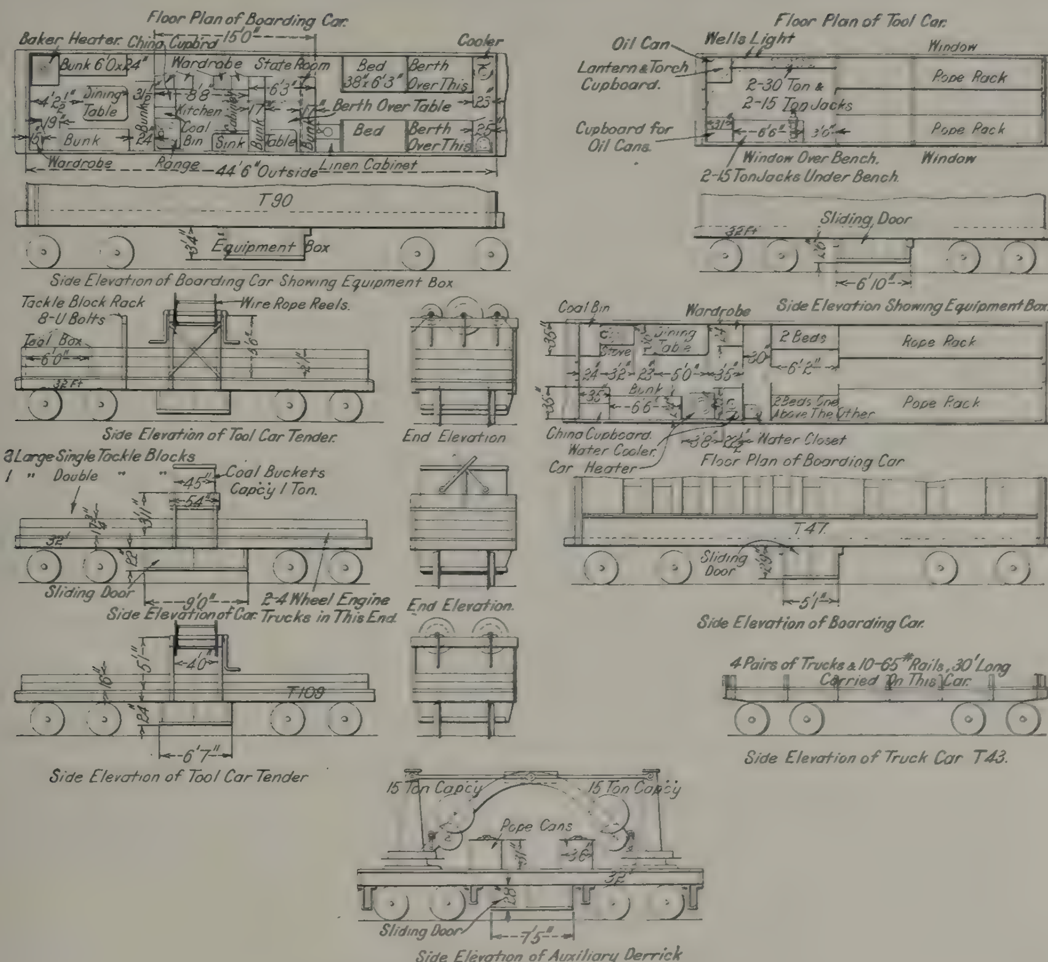


Fig. 2690—Southern Railway Wreck Train Cars.

Fig. 2691—Buda Repair Links for Wrecking Chains. The Buda Company.

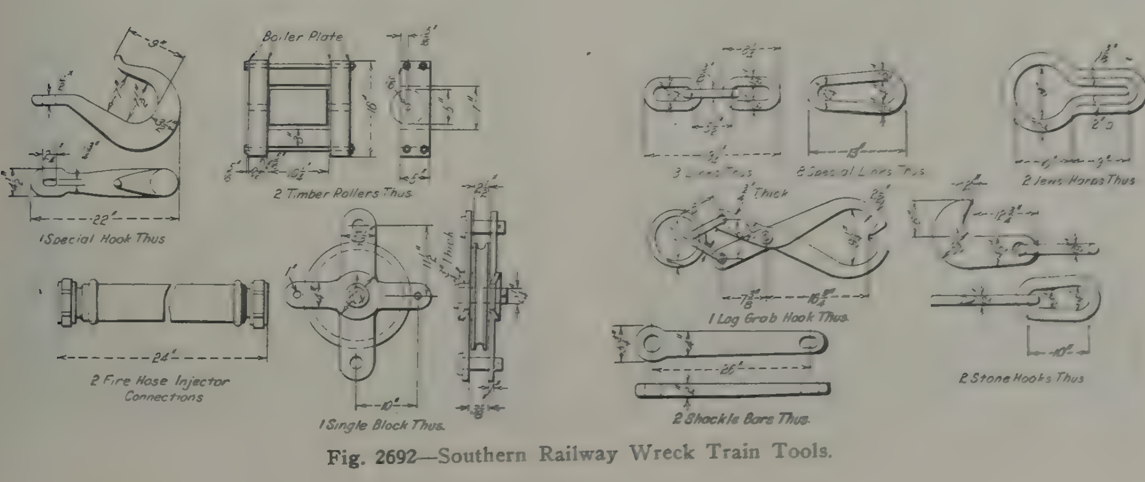


Fig. 2692—Southern Railway Wreck Train Tools.

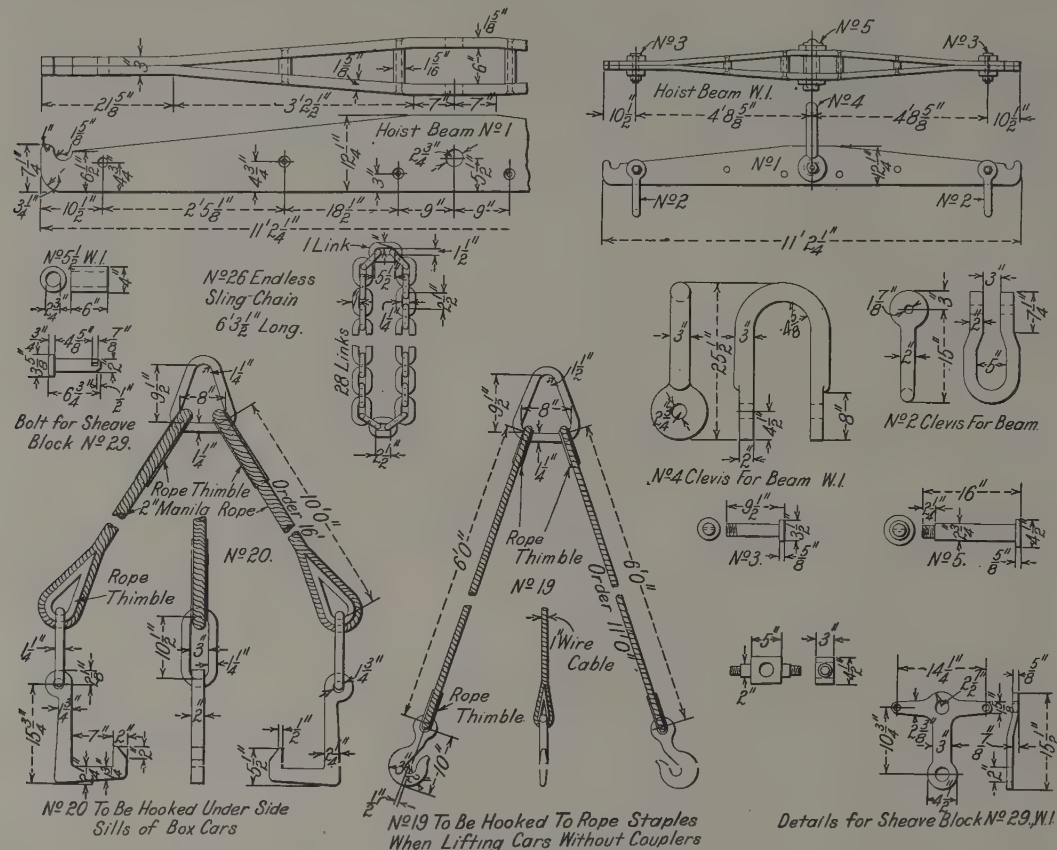


Fig. 2693—Chicago, Burlington & Quincy Wreck Train Tools.

Fig. 2694—Interior of Erie Railroad Tool Car.

Fig. 2695—Interior of Baltimore & Ohio Tool Car.

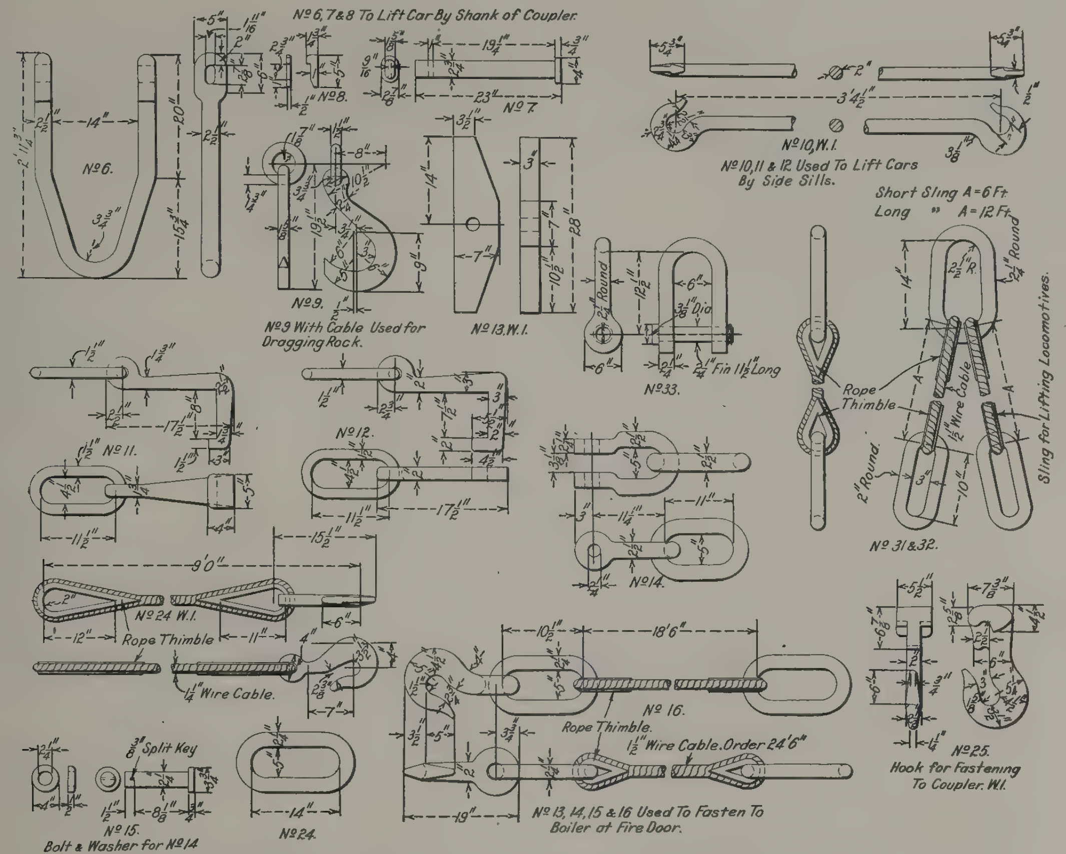


Fig. 2697—Chicago, Burlington & Quincy Wreck Train Tools.

Fig. 2698—Interior of Chicago, Burlington & Quincy Sleeping Car.

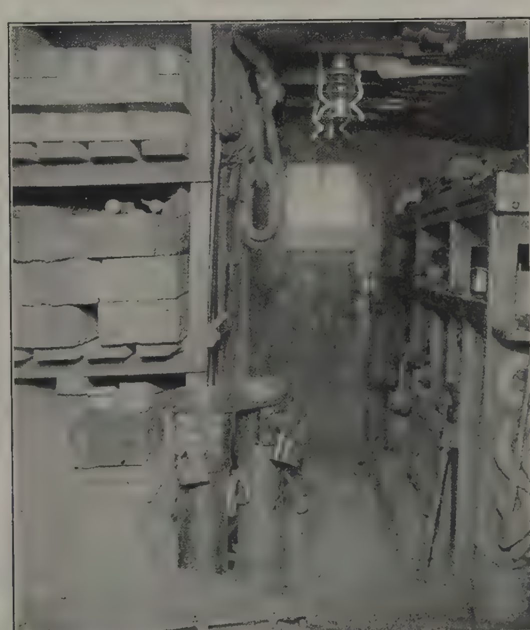


Fig. 2699—Interior of Chicago, Burlington & Quincy Tool Car, Showing Arrangement of Blocking.

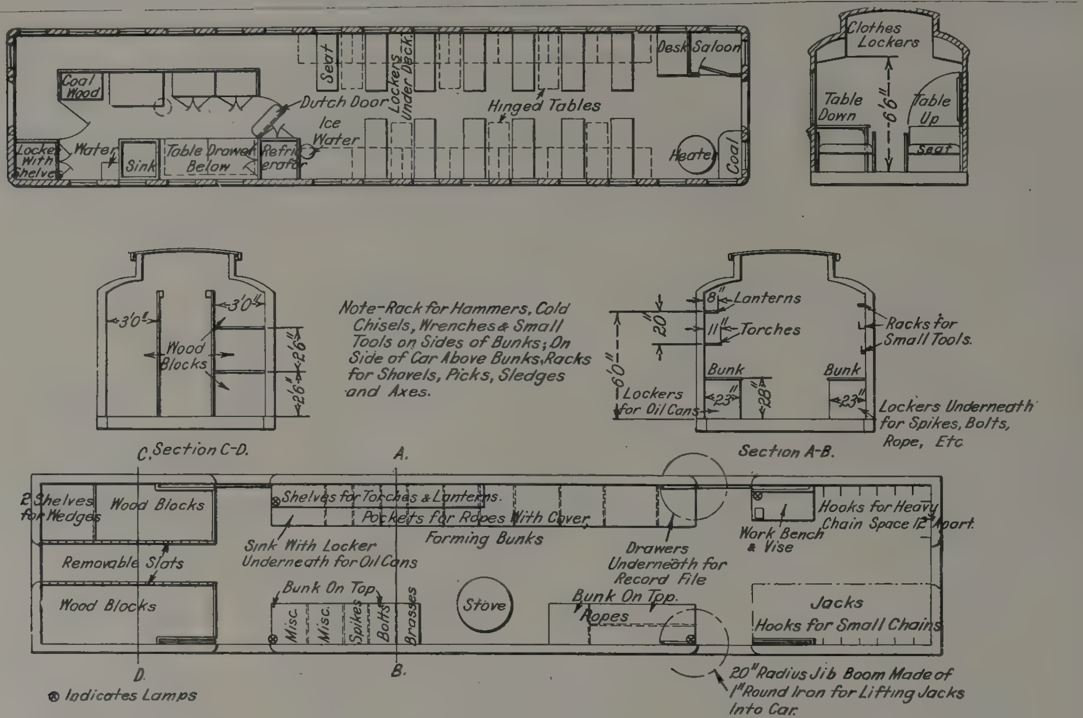
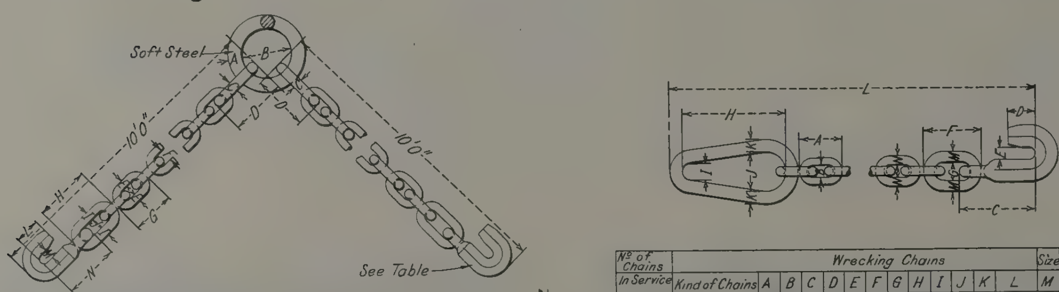


Fig. 2700—New York, New Haven & Hartford Dining, Tool and Sleeping Cars.



Ring	Hook	A	B	C	D	E	F	G	H	I	J	K	L	M	N
O.S.O 13"	2 1/2" □	2 1/2"	8"	1 1/2"	9 1/2"	1 1/4"	1 1/2"	6 1/4"	9"	1 1/2"	2"	1 5/8"	5"	1 3/8"	11"
... 15 1/2"	2 5/8" □	2 3/4"	10"	1 3/4"	10 1/4"	1 1/2"	2"	7 3/4"	10"	1 3/4"	2 1/4"	1 7/8"	5"	1 5/8"	11"
... 16"	2 3/4" □	3"	10"	2"	11"	1 5/8"	2 1/4"	8 1/2"	10 1/2"	2"	2 1/2"	2 1/4"	5 1/2"	1 3/4"	11 1/2"

No. of Chains	Wrecking Chains														Size	Size	Hook
In Service	Kind of Chains		A	B	C	D	E	F	G	H	I	J	K	L	M	N	Size
10	Common		4 1/2"	1 1/4"	8"	3 1/2"	1 1/8"	6"	2"	10 1/2"	2"	4"	1 1/4"	16'-0"	1"	7/8"	1 3/4" □ Iron
4		Special	5 1/2"	1 1/2"	10"	4 1/2"	1 1/4"	8"	2 1/4"	11"	2 1/4"	4"	1 3/8"	22'-0"	1 1/8"	1"	2" □ Iron
6		"	5 3/4"	1 1/2"	10"	5"	1 1/4"	8 1/4"	2 1/4"	11"	2 1/4"	4"	1 1/2"	22'-0"	1 1/4"	1 1/8"	2 1/8" □ Iron
8		"	6"	1 3/4"	10 1/2"	5"	1 3/8"	8 1/2"	2 1/4"	11"	3"	4 1/2"	1 3/4"	24'-0"	1 3/8"	1 1/4"	2 1/4" □ Iron
		"	7"	2"	11 1/2"	6"	1 3/4"	9"	2 1/2"	12"	3 1/4"	5 1/2"	2"	20'-0"	1 5/8"	1 1/2"	2 3/4" □ Iron

Fig. 2701—Dimension of Southern Railway Wreck Chains.

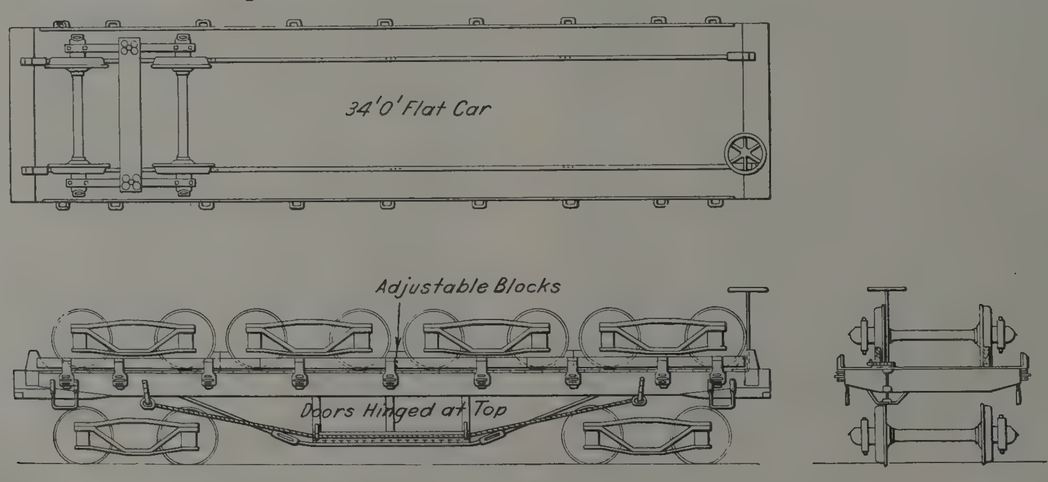


Fig. 2702—New York, New Haven & Hartford Truck Car.

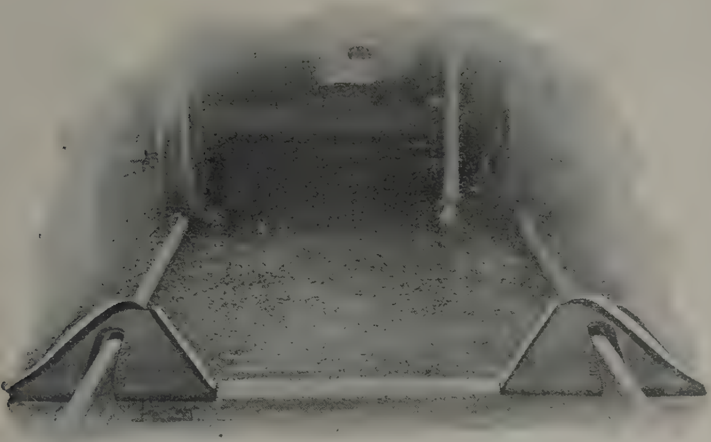


Fig. 2703—Johnson Wrecking Frog. Johnson Wrecking Frog Company.

Fig. 2704—Alexander Car Replacers. Alexander Car Replacer Company.

Fig. 2705—Inside and Outside Car Replacers. The Buda Company.

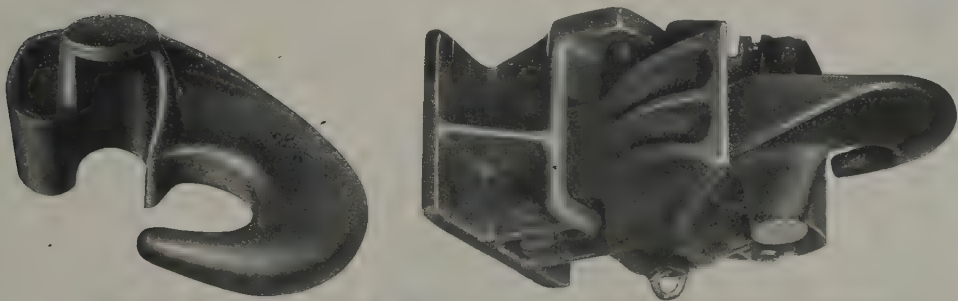


Fig. 2706—Goodman Wrecking Hook. The National Malleable Castings Company.

Fig. 2707—Fewings Wrecking Frogs. The Q. & C. Company.

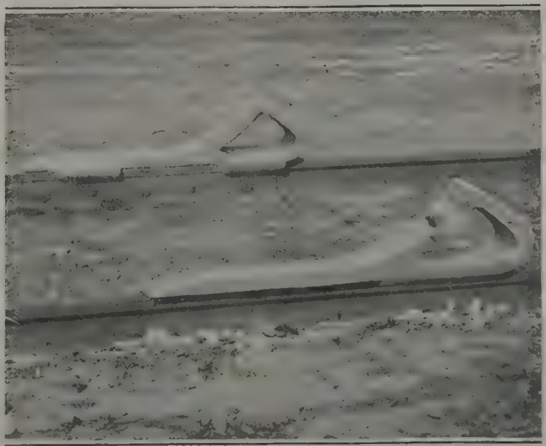


Fig. 2708—R. A. Skid Shoe for Sliding Damaged Wheels. The Q. & C. Company.

Fig. 2709—Screw Jack. **Buckeye Jack Mfg. Co.**

Fig. 2710—Barrett Automatic Lowering Jack. The Duff Manufacturing Company.

Fig. 2711—High Speed Ball Bearing Jack. The Duff Manufacturing Company.

Fig. 2712—Geared Automatic Lowering Jack. The Duff Manufacturing Company.

Fig. 2714—Automatic Lowering Jack. Buckeye Jack Manufacturing Company.

Fig. 2713—Improved Ball Bearing Journal Jack. The Duff Manufacturing Company.

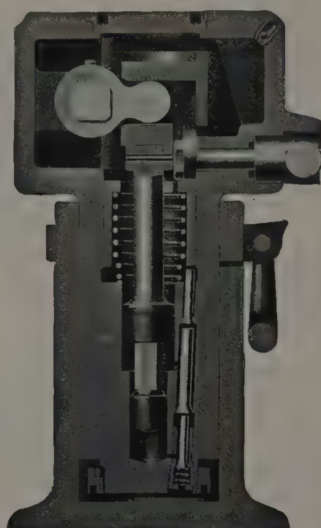
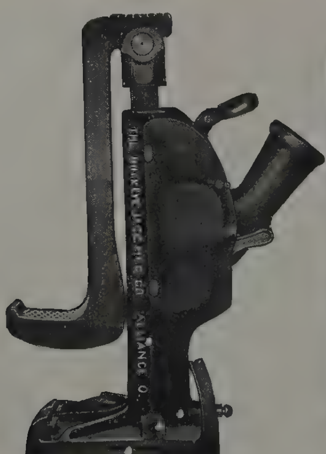


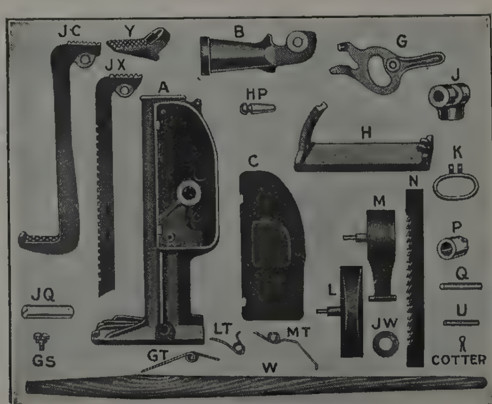
Fig. 2715—Hydraulic Plain Type Car Inspector's Double Pump Jack. Richard Dudgeon.

Name of Parts, Fig. 2716

A	*Base.*	U	*Long Pawl Pin*
B	*Socket Lever*	JR	*Pin for Top*
C	*Shield*	LT	*Long Pawl Spring*
G	*Reversing Block*	MT	*Short Pawl Spring*
J	*Top*	W	*Handle*
JC	*Claw Foot*	GS	*Reversing Block Screw*
K	*Carrying Handle*		*Shield Cotter Pin*
L	*Long Pawl*	GT	*Reversing Block Spring*
M	*Short Pawl*	JX	*Adjustable Claw*
N	*Rack*	Y	*Adjustable Foot*
P	*Bushing*	H	*Heel Plate*
Q	*Fulcrum Pin*	HP	*Heel Plate Pin*



In Upright Position.



Parts (See list above).

In Tilted Position.

Fig. 2716—Automatic Lowering Emergency Car Jack. Buckeye Jack Manufacturing Co.

Fig. 2717—Cone Bearing Postop Journal Jack. The Buda Company.

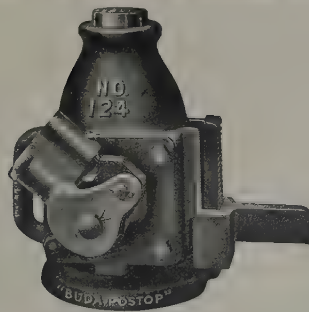


Fig. 2718—Cone Bearing Postop Journal Jack for Car Inspectors. The Buda Company.

Fig. 2719—Ball Bearing Journal Jack with Wheel Holding Device. The Buda Company.

Fig. 2720—Jack No. 110, Equipped with Foot Lift. The Buda Company.

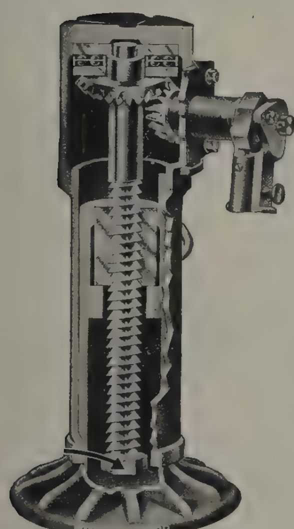


Fig. 2721—Buda Postop Ball Bearing Jack. The Buda Company.

Fig. 2722—Car Jack No. 101. The Buda Company.

Fig. 2722A—Ball Bearing Journal Jack. A. O. Norton, Inc.

Fig. 2723—Single Acting, Automatic Lowering, Geared Ratchet Jack; Capacity, 40 Tons. The Buda Company.

Fig. 2724—Hydraulic Journal Box Jack, Low Type. Watson-Stillman Company.

Fig. 2725—Hydraulic Journal Box Jack, Base Type. Watson-Stillman Company.

Fig. 2726—Ball Bearing Ratchet Screw Jack. A. O. Norton, Inc.

Fig. 2727—Self-Lowering, 50-75 Ton Capacity, High Speed Jack. A. O. Norton, Inc.

Fig. 2728—Hydraulic Wrecking Jack. Watson-Stillman Company.

Fig. 2729—Hydraulic Wrecking Jack. Watson-Stillman Company.

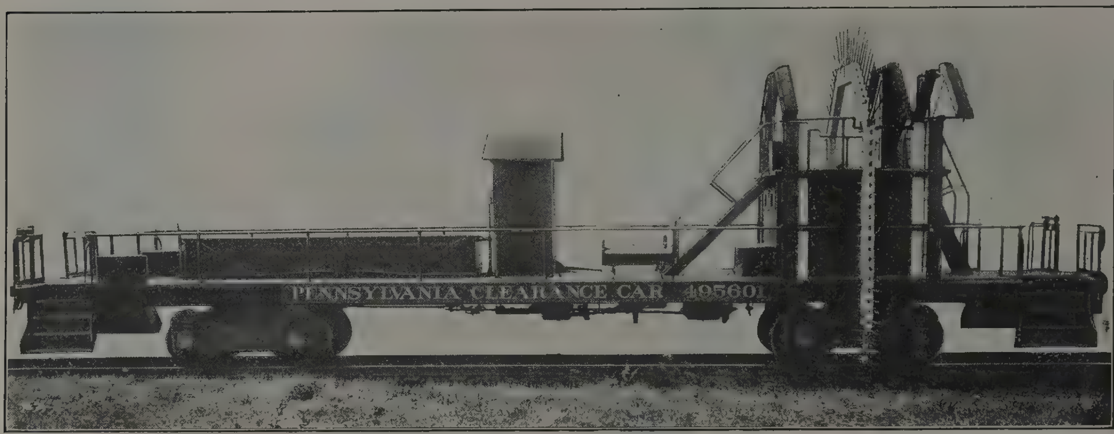


Fig. 2730—Clearance Car for Pennsylvania Railroad.
(See Fig. 2730-A.)

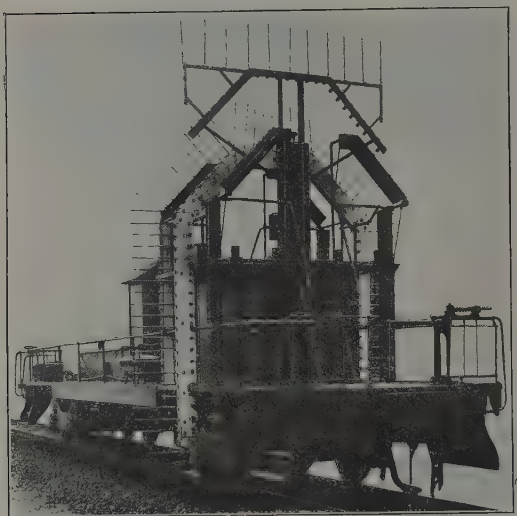


Fig. 2730-A—Front Elevation of Clearance Car Shown in Fig. 2730.

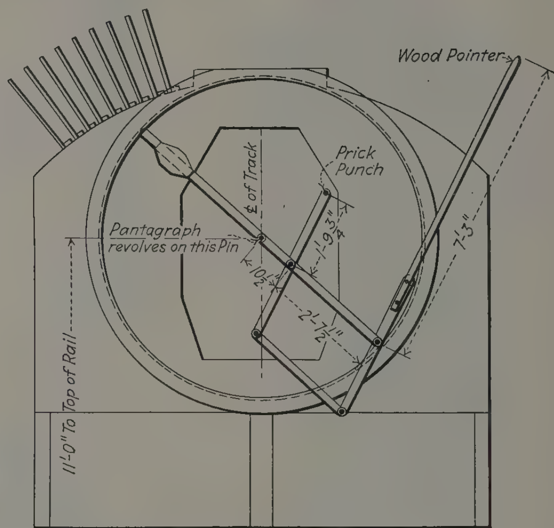


Fig. 2731—Pantagraph as Used on New York Central Clearance Car Shown in Fig. 2731-A.

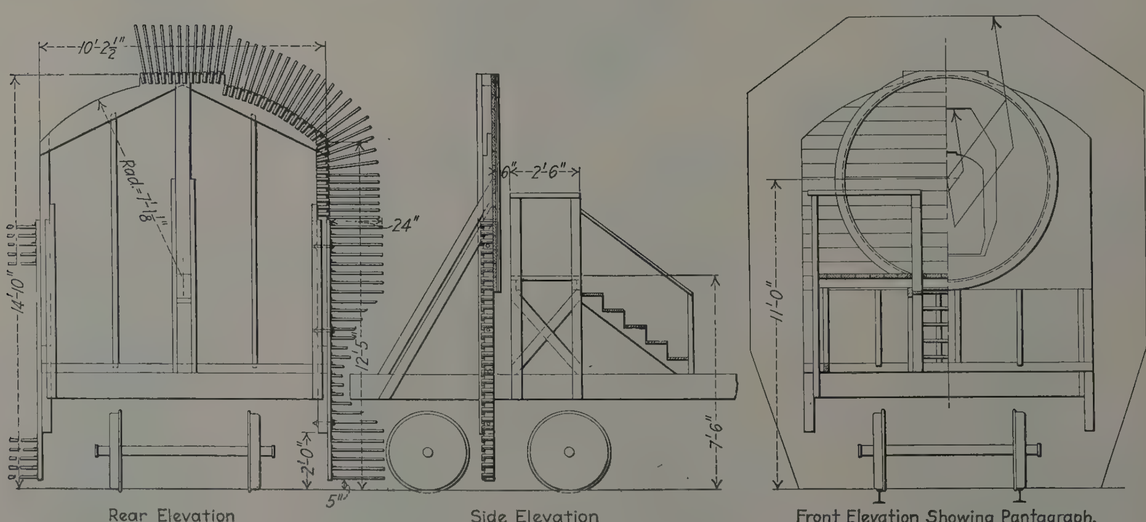


Fig. 2731-A—Clearance Car as Operated on New York Central Lines.
(See Fig. 2731.)

CLEARANCE AND WEIGHT LIMITS.

UNITED STATES RAILROAD ADMINISTRATION.
WALKER D. HINES, Director General of Railroads.

GEORGIA RAILROAD.

LOCAL.

Heights above Top of Rail. ft. in.	.... Division. Atlanta, Ga. and Augusta, Ga. Diagram No. 1 Width ft. in.	.... Division. Union Point, Ga. and Athens, Ga. Diagram No. 2 Width ft. in.	.... Division. Camak, Ga. and Macon, Ga. Diagram No. 3 Width ft. in.	.... Division. Barnett, Ga. and Washington, Ga. Diagram No. 4 Width ft. in.	.... Division. Bell St., Atlanta and Atlanta Terminal. Diagram No. 5 Width ft. in.	Heights above Top of Rail. ft. in.
22 0						22 0
21 6						21 6
21 0						21 0
20 9						20 9
20 6						20 6
20 3						20 3
20 0						20 0
19 9	10 10					19 9
19 6	" "					19 6
19 3	" "	10 4				19 3
19 0	" "	" "				19 0
18 9	" "	" "				18 9
18 6	" "	" "	12 2			18 6
18 3	" "	" "	" "			18 3
18 0	" "	" "	" "			18 0
17 9	" "	" "	" "			17 9
17 6	" "	" "	" "			17 6
17 3	" "	" "	" "			17 3
17 0	" "	" "	" "			17 0
16 9	" "	" "	" "			16 9
16 6	" "	" "	" "			16 6
16 3	" "	" "	" "			16 3
16 0	" "	" "	" "		10 0	16 0
15 9	" "	" "	" "		" "	15 9
15 6	" "	" "	" "		" "	15 6
15 3	" "	" "	" "		" "	15 3
15 0	" "	" "	" "		" "	15 0
14 9	" "	" "	" "		" "	14 9
14 6	" "	" "	" "		" "	14 6
14 3	10 10	" "	" "		10 0	14 3
14 2	....	" "	" "		....	14 2
14 1	....	" "	" "		....	14 1
14 0	12 2	" "	" "		12 2	14 0
13 9	" "	" "	" "		" "	13 9
13 6	" "	" "	" "		" "	13 6
13 3	" "	" "	" "		" "	13 3
13 0	" "	" "	" "		" "	13 0
12 6	" "	" "	" "		" "	12 6
12 0	" "	" "	" "		" "	12 0
11 6	" "	" "	" "		" "	11 6
11 0	" "	" "	" "		" "	11 0
10 6	" "	" "	" "		" "	10 6
10 0	" "	" "	" "		" "	10 0
9 6	" "	" "	" "		" "	9 6
9 0	" "	" "	" "		" "	9 0
8 6	" "	" "	" "		" "	8 6
8 0	" "	" "	" "		" "	8 0
7 6	" "	" "	" "		" "	7 6
7 0	" "	" "	" "		" "	7 0
6 6	" "	" "	" "		" "	6 6
6 0	" "	" "	" "		" "	6 0
5 6	" "	" "	" "		" "	5 6
5 0	12 2	" "	12 2		12 2	5 0
4 6	....	" "	....	No Obstructions in Height or Width above 4 feet.	....	4 6
4 0	11 2	" "	11 6	10 5	11 2	4 0
3 9	" "	" "	" "	" "	" "	3 9
3 6	" "	" "	" "	" "	" "	3 6
3 3	" "	" "	" "	" "	" "	3 3
3 0	" "	" "	" "	" "	" "	3 0
2 9	" "	" "	" "	" "	" "	2 9
2 6	" "	" "	" "	" "	" "	2 6
2 3	" "	" "	" "	" "	" "	2 3
2 0	" "	" "	" "	" "	" "	2 0
1 9	" "	" "	" "	" "	" "	1 9
1 6	" "	" "	" "	" "	" "	1 6
1 3	" "	" "	" "	" "	" "	1 3
1 0	" "	" "	" "	" "	" "	1 0
0 9	" "	" "	" "	" "	" "	0 9
0 6	" "	" "	" "	" "	" "	0 6
0 3	" "	" "	" "	" "	" "	0 3
0 0	11 2	10 4	11 6	10 5	11 2	0 0
A	....	....	....	....	....	
B	10%	10%	10%	10%	10%	

Note A—MAXIMUM GROSS WEIGHT OF CAR AND LADING SHOWN UNDER EACH COLUMN.
Note B—LIMIT OF LOAD WEIGHT ABOVE MARKED CAPACITY.

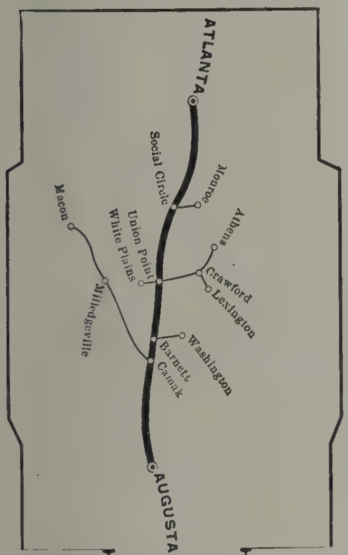


Diagram No. 1.
Atlanta and Augusta.

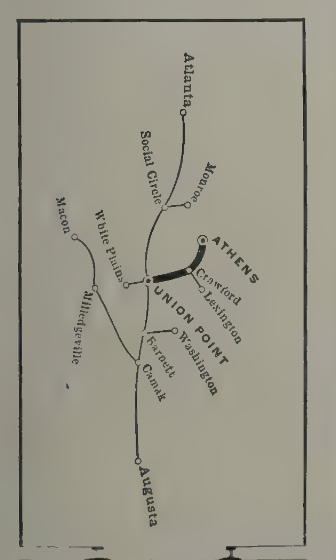


Diagram No. 2.
Union Point and Athens.

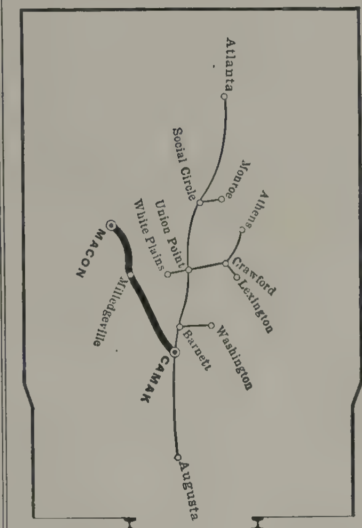


Diagram No. 3.
Camak and Macon.

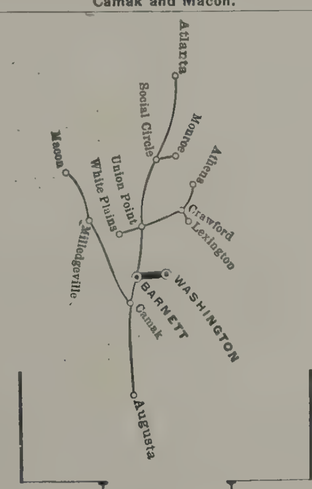


Diagram No. 4.
Barnett and Washington.

Diagram No. 5.
Bell St., Atlanta and Atlanta Terminal.

Fig. 2732—Typical Clearance Diagrams. Courtesy of the Railway Equipment and Publication Company.

BOSTON, MASS.—Gateway.

THROUGH CLEARANCES GROUPED TO SHOW SEPARATE ROUTES VIA RESPECTIVE POINTS NAMED.

CLEARANCE LIMITATION TABLE.

BOSTON, MASS. (To or From Points Given Below).

Heights above Top of Rail. ft. in.	1 Albany, N. Y. 1a	1b	1c	2 Binghamton, N. Y. 2a	2b	2c	3 Buffalo, N. Y. 3a	3b	3c	4 Montreal, Que. 4a	4b	5 New York, N. Y. 5a	5b	5c	6 Philadelphia, Pa. 6a	6b	6c	7 Portland, Me. 7a	7b	8 Quebec, Que. 8a	8b	9 Washington, D. C. 9a	9b	9c	Heights above Top of Rail. ft. in.
	Boston & Albany.	Boston & Maine. Rutland.	Boston & Maine.	Boston & Albany. Delaware & Hudson.	Boston & Maine. Rutland. Delaware & Hudson.	Boston & Maine. Delaware & Hudson.	Boston & Maine. Rutland. New York Central.	Boston & Albany. New York Central.	Boston & Maine. New York Central.	Boston & Maine. Canadian Pacific.	Boston & Maine. Central Vermont.	N. Y., N. H. & H. Note C	N. Y., N. H. & H. Note D	N. Y., N. H. & H. Note E	(Via New York). N. Y., N. H. & H. C. R. R. of N. J.—P. & R.	(Via New York). N. Y., N. H. & H. Pennsylvania.	(Via Maybrook.) N. Y., N. H. & H.—C. N. E. L. & H. R.—Pennsylvania.	Boston & Maine."		Boston & Maine. Quebec Central.	Boston & Maine. Grand Trunk.	(Via New York). N. Y., N. H. & H.—B. & O. C. R. R. of N. J.—P. & R.	(Via New York). N. Y., N. H. & H. Pennsylvania.	(Via Maybrook). N. Y., N. H. & H.—C. N. E. L. & H. R.—Pennsylvania.	
	Width ft. in.	Width ft. in.	Width ft. in.	Width ft. in.	Width ft. in.	Width ft. in.	Width ft. in.	Width ft. in.	Width ft. in.	Width ft. in.		Width ft. in.	Width ft. in.		Width ft. in.	Width ft. in.	Width ft. in.	Width ft. in.	Width ft. in.	Width ft. in.	Width ft. in.	Width ft. in.	Width ft. in.	Width ft. in.	
22 0																									22 0
21 9																									21 9
21 6																									21 6
21 3																									21 3
21 0																									21 0
20 9																									20 9
20 6																									20 6
20 3																									20 3
20 0																									20 0
19 9																									19 9
19 6																									19 6
19 3																									19 3
19 0																									19 0
18 9																									18 9
18 6																									18 6
18 3																									18 3
18 0																									18 0
17 9																									17 9
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17 3																									17 3
17 0																									17 0
16 9																									16 9
16 6																									16 6
16 3																									16 3
16 0																									16 0
15 9																									15 9
15 6																									15 6
15 3																									15 3
15 0										7 0		7 0	6 0		7 0	7 0	7 0			7 0		5 8	7 0	7 0	15 0
14 9	8 0	4 6		8 0	4 6		4 6	8 0		......		7 0	6 6		7 0	7 0	7 0	9 0		......		6 4	7 0	7 0	14 9
14 6	8 8	10 8		8 8	9 10		10 8	8 8		......		8 6	7 1		8 6	8 6	8 6	9 6		......		7 0	8 6	8 6	14 6
14 3	9 0	......		9 0	......			9 0		8 6		8 6	7 7		8 6	8 6	8 6	9 10		8 6		7 5	8 6	8 6	14 3
14 0	9 10	10 6		9 10	10 6		10 6	9 10		......		9 10	8 1		9 10	9 10	9 10	10 3		......	8 6	8 0	9 10	9 10	14 0
13 9	9 10	"		9 10	"		"	9 10		......		9 10	8 7		9 10	9 10	9 10	10 6		......	......	8 4	9 10	9 10	13 9
13 6	10 8	"	9 0	10 6	"	9 0	"	10 2	9 0	9 6		10 2	9 2		10 2	10 2	10 2	"		9 6	......	8 9	10 2	10 2	13 6
13 3	"	"	9 8	"	"	9 8	"	"	9 8	......		10 2	9 8		10 2	10 2	10 2	"		......	......	9 2	10 2	10 2	13 3
13 0	"	"	......	"	"	......	"	10 6	......	9 11		10 6	10 8		10 6	10 6	10 8	"		9 11	9 8	9 6	10 6	10 8	13 0
12 6	"	"	10 0	"	"	10 0	"	"	10 0	10 6		"	"		"	"	"	"		10 6	......	9 11	"	"	12 6
12 0	"	"	......	"	"	......	"	"	......	"		"	"		"	"	"	"		"	10 6	10 4	"	"	12 0
11 6	"	"	10 6	"	"	10 6	"	"	10 6	"		"	"		"	"	"	"		"	"	10 6	"	"	11 6
11 0	"	"	"	"	"	"	"	"	"	"		"	"		"	"	"	"		"	"	"	"	"	11 0
10 6	"	"	"	"	"	"	"	"	"	"		"	"		"	"	"	"		"	"	"	"	"	10 6
10 0	"	"	"	"	"	"	"	"	"	"		"	"		"	"	"	"		"	"	"	"	"	10 0
9 6	"	"	"	"	"	"	"	"	"	"		"	"		"	"	"	"		"	"	"	"	"	9 6
9 0	"	"	"	"	"	"	"	"	"	"		"	"		"	"	"	"		"	"	"	"	"	9 0
8 6	"	"	"	"	"	"	"	"	"	"		"	"		"	"	"	"		"	"	"	"	"	8 6
8 0	"	"	"	"	"	"	"	"	"	"		"	"		"	"	"	"		"	"	"	"	"	8 0
7 6	"	"	"	"	"	"	"	"	"	"		"	"		"	"	"	"		"	"	"	"	"	7 6
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3 9	10 5	"	"	10 5	"	"	"	"	"	"		"	"		10 5	"	"	"		"	"	10 2	"	"	3 9
3 6	"	"	"	"	"	"	"	"	"	"		"	"		10 5	"	"	"		"	"	10 1	"	"	3 6
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3 0	"	"	"	"	"	"	"	"	"	10 6		10 8	"		10 3	10 8	10 3	"		10 6	"	10 3	10 8	10 3	3 0
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2 6	"	10 0	"	"	10 0	"	10 0	"	"	"		"	"		9 9	"	"	"		"	"	9 9	"	"	2 6
2 3	"	"	"	"	"	"	"	"	"	"		"	"		"	"	"	10 6		"	10 6	"	"	"	2 3
2 0	10 5	"	"	10 5	"	"	10 0	10 5	10 5	"		10 8	10 8		"	10 8	10 8	9 4		"	10 0	"	10 8	10 8	2 0
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0 6	9 8	9 2	9 2	9 8	9 2	9 2	9 2	......	9 2	9 4		8 8	8 8		......	8 8	8 8	9 0		9 4	9 0	......	8 8	8 8	0 6
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B	......	10%	10%	......	10%	10%	......	......	......	10%	10%	......	......		......	......	......	10%	......	10%	10%	......	......	......	

Note A—MAXIMUM GROSS WEIGHT OF CAR AND LADING SHOWN UNDER EACH COLUMN.
Note B—LIMIT OF LOAD WEIGHT ABOVE MARKED CAPACITY.
Note C—Via Shore Line from Boston, Mass. (Freight Terminal) to New York City (Woodlawn, Harlem River and Fresh Pond Junction).
Note D—Via Shore Line from Boston, Mass. (South Station) to New York City (Woodlawn, Harlem River, Fresh Pond Junction and Bay Ridge).
Note E—Via Shore Line from Boston, Mass. (Freight Terminal) to New York City (Bay Ridge).

Fig. 2733—"Boston Gateway." Line Clearance. Courtesy of the Railway Equipment & Publication Company.

American Built Cars for Use in Foreign Lands

This section illustrates typical cars manufactured by American builders. It includes passenger, box, gondola, general service, hopper and flat cars; cane cars of both rack and gondola design, and dump cars; also car trucks and miscellaneous appliances, such as draft gear, couplers, journal boxes, stake pockets, etc.

Fig. 2734—Sleeping Car for Unidos de la Habana. Builder, Wason Manufacturing Company.

(*See Fig.* 2735.)

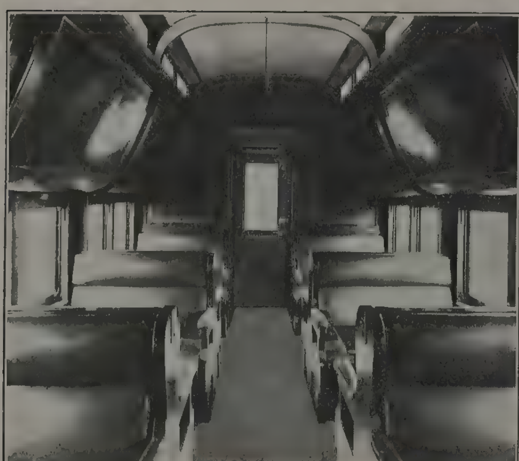


Fig. 2735—Interior of Sleeping Car for Unidos de la Habana shown in Fig. 2734.

Fig. 2736—Interior of Third Class Car for Ferrocarril del Pacifico, Colombia, shown in Fig. 2737.

Fig. 2737—Third Class Car for Ferrocarril del Pacifico, Colombia. Builder, Wason Manufacturing Company.

(*See Fig.* 2736.)

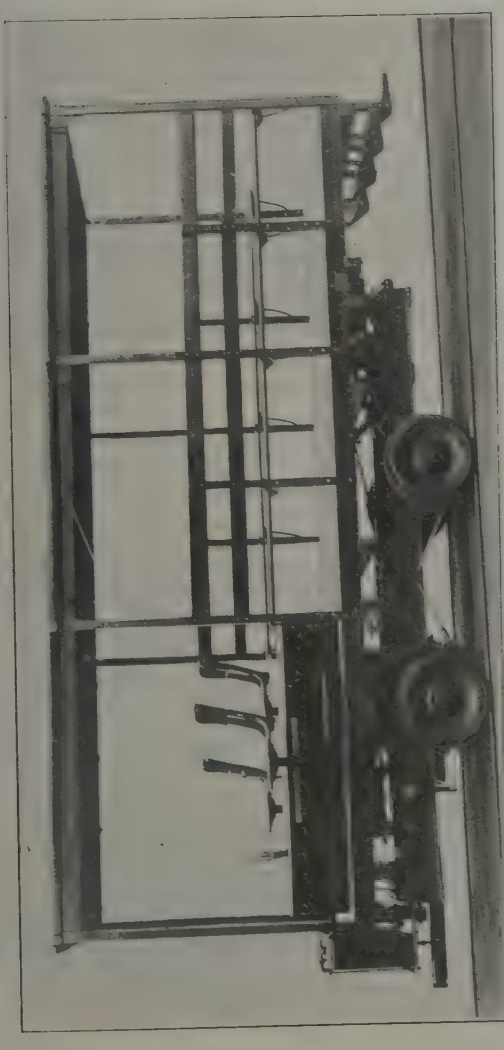


Fig. 2738 Motor Passenger Car for Use on Central American Short Line Railway. Seating Capacity 20.

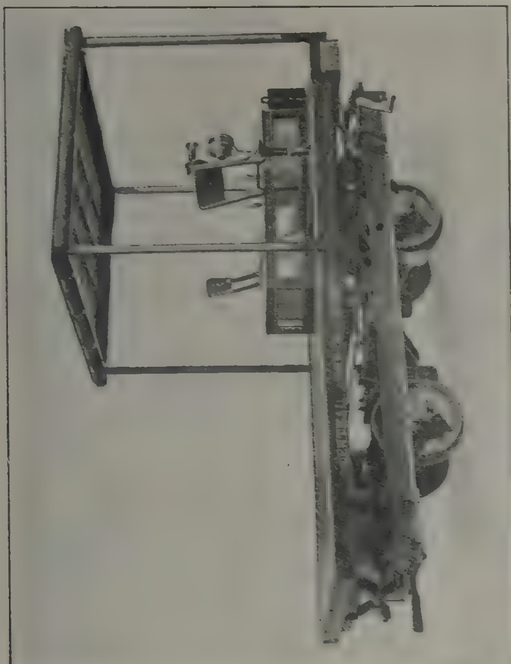


Fig. 2739—Six-ton Motor Freight Car for Cuban Service.

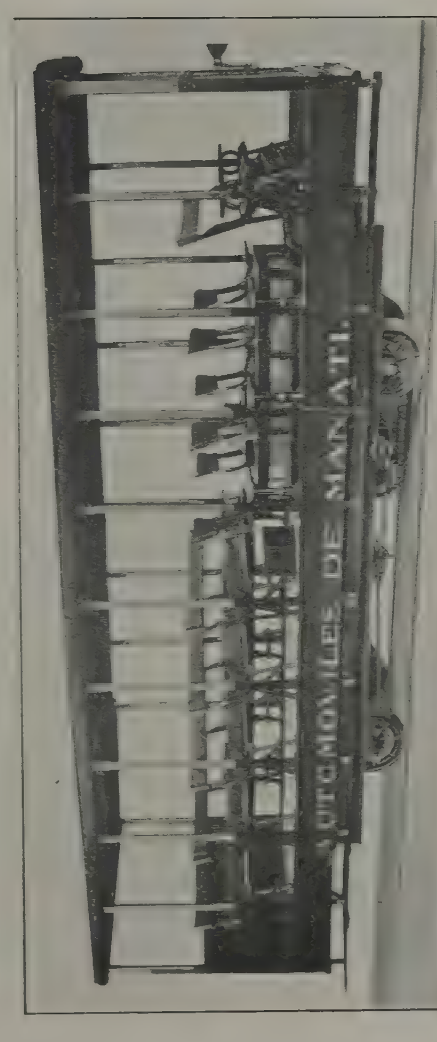


Fig. 2740—Motor Car for Freight and Passenger Service. Seating Capacity 35. Used on Plantations and for Amusement Resorts

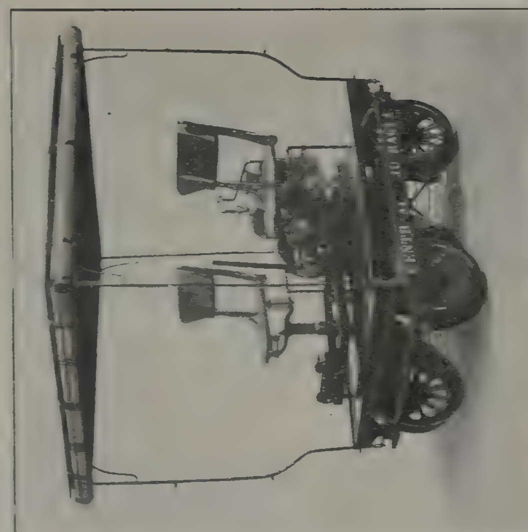


Fig. 2741 Motor Plantation Inspection Car for Cuban Plantations.

Fairmont Gas Engine and Railway Motor Car Company.

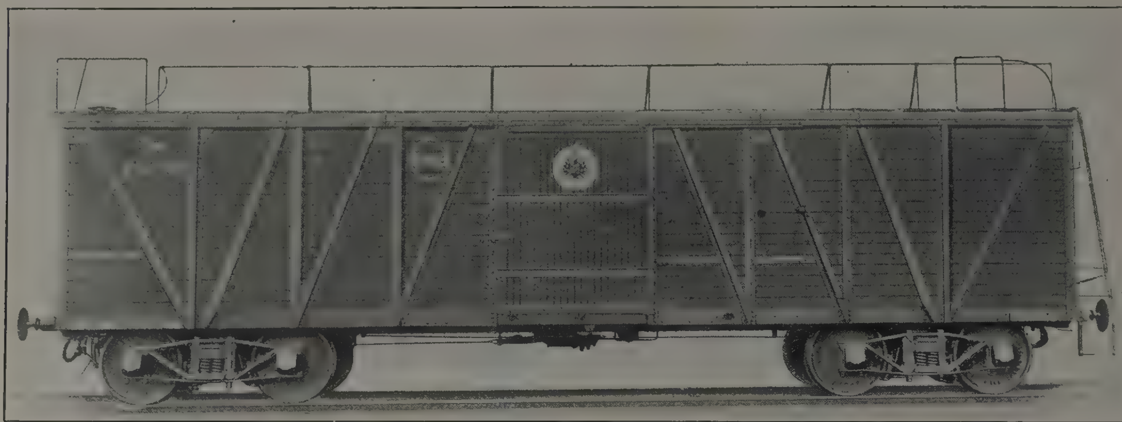


Fig. 2742—Steel Frame Box Car for the Russian Government Railways. Builder, American Car & Foundry Company.

Fig. 2743—Steel Framed 40-Metric Ton, Single Sheath Box Car for Russian Government Railways. Weight, 44,670 lb. Inside Length, 41 ft. 5⅝ in. Inside Width, 8 ft. 9 in. Inside Height, 7 ft. 9½ in. Builder, Pressed Steel Car Company.

Fig. 2744—All Steel 30-Ton Box Car for Tientsin Pukow Railway. Weight, 38,500 lb. Inside Length, 32 ft. 6 in. Inside Width, 9 ft. 6 in. Inside Height, 7 ft. 6 in. Builder, Western Steel Car & Foundry Company.

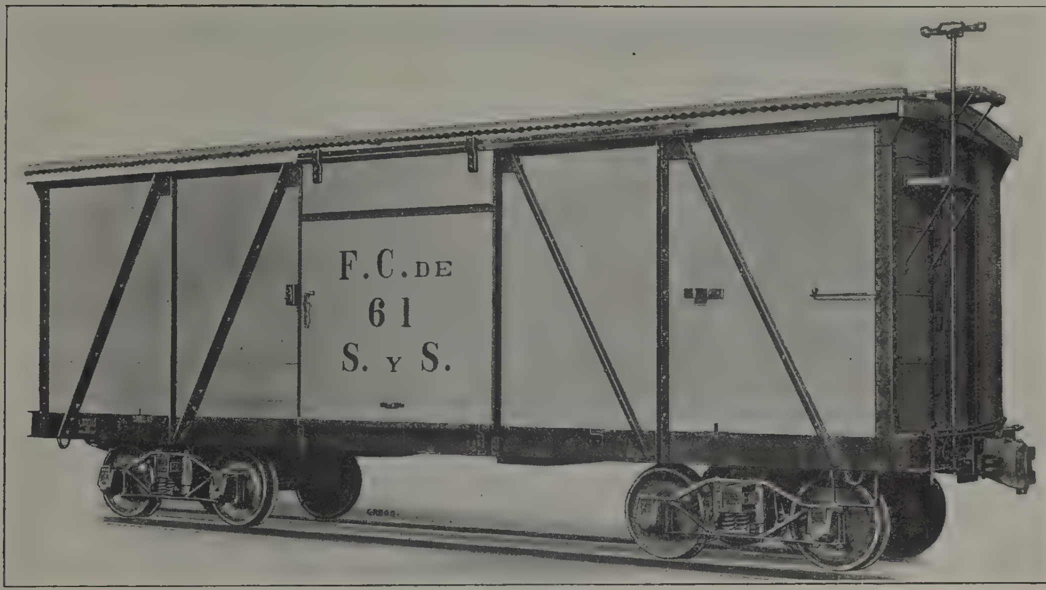


Fig. 2745—Composite Type Box Car, Framework of Steel; Floor and Superstructure Lining of Wood; Roof of Corrugated Iron; Capacity 15-Tons; Gage, 42 in.; Inside Length, 24 ft.; Inside Width, 6 ft. 9 in.; Inside Height, 6 ft. 3 in.; Fitted with Hand Wheel Brake Acting on One Truck; Automatic Couplers. Builder, The Gregg Company, Ltd.

Fig. 2746—All-Steel Van for Nigerian Railway. National Steel Car Company.

Fig. 2747—Two-Axle, 1200-Pood (20-Ton) Box Car for the Russian Government Railways. Builder, Eastern Car Company.

Fig. 2748—Box Car Similar to Car Shown in Fig. 2747 with Platform for Brakeman. Builder, Canadian Car and Foundry Company.

Fig. 2749—Two-Axle Box Car for the Russian Government Railways. Builder, Canadian Car & Foundry Company.

Fig. 2750—Composite Box Car. Steel Frame with Wood Floor and Sheathing. Capacity 8 Tons. Link and Pin Self Contained Spring Coupl rs, Semi-Elliptic Steel Springs, Rolled Steel Tire and Wrought Iron Center Wheels, Ventilator with Cover in Ends for Transporting Sugar, Gage One Meter. Inside Length, 15 ft. 6 in. Inside Width, 6 ft. 6 in. Inside Height, 6 ft. 6 in. Builder, The Gregg Company, Ltd.

Fig. 2751—Covered Goods Wagon, Capacity 20 Metric Tons, for Northern Railway of France. Builder, National Steel Car Company.

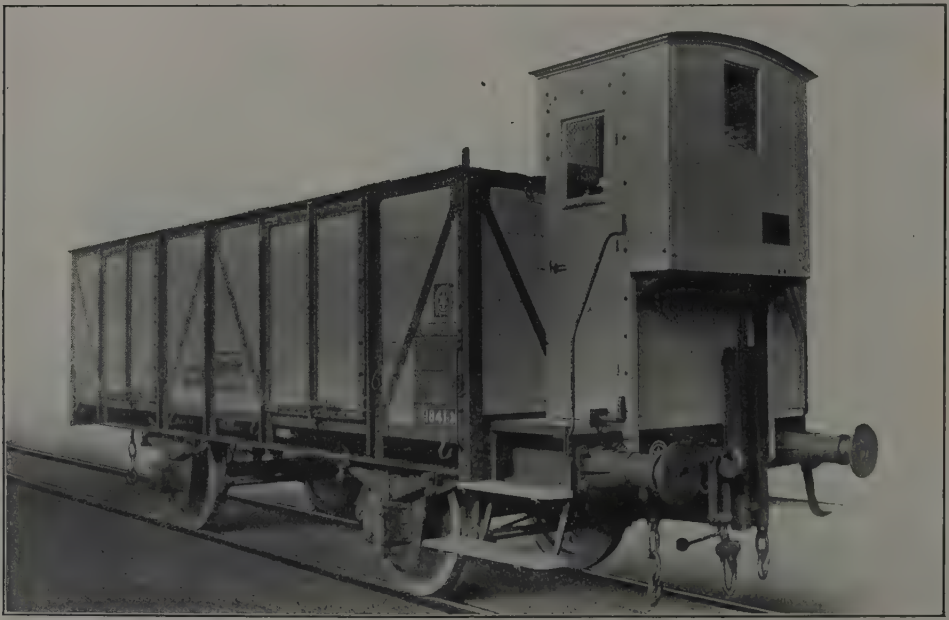


Fig. 2752—Steel Frame 20-Metric Ton Gondola Car for the French State Railways. Builder, The Eastern Car Company.

(Drawing of a Similar Car Shown in Fig. 2753.)

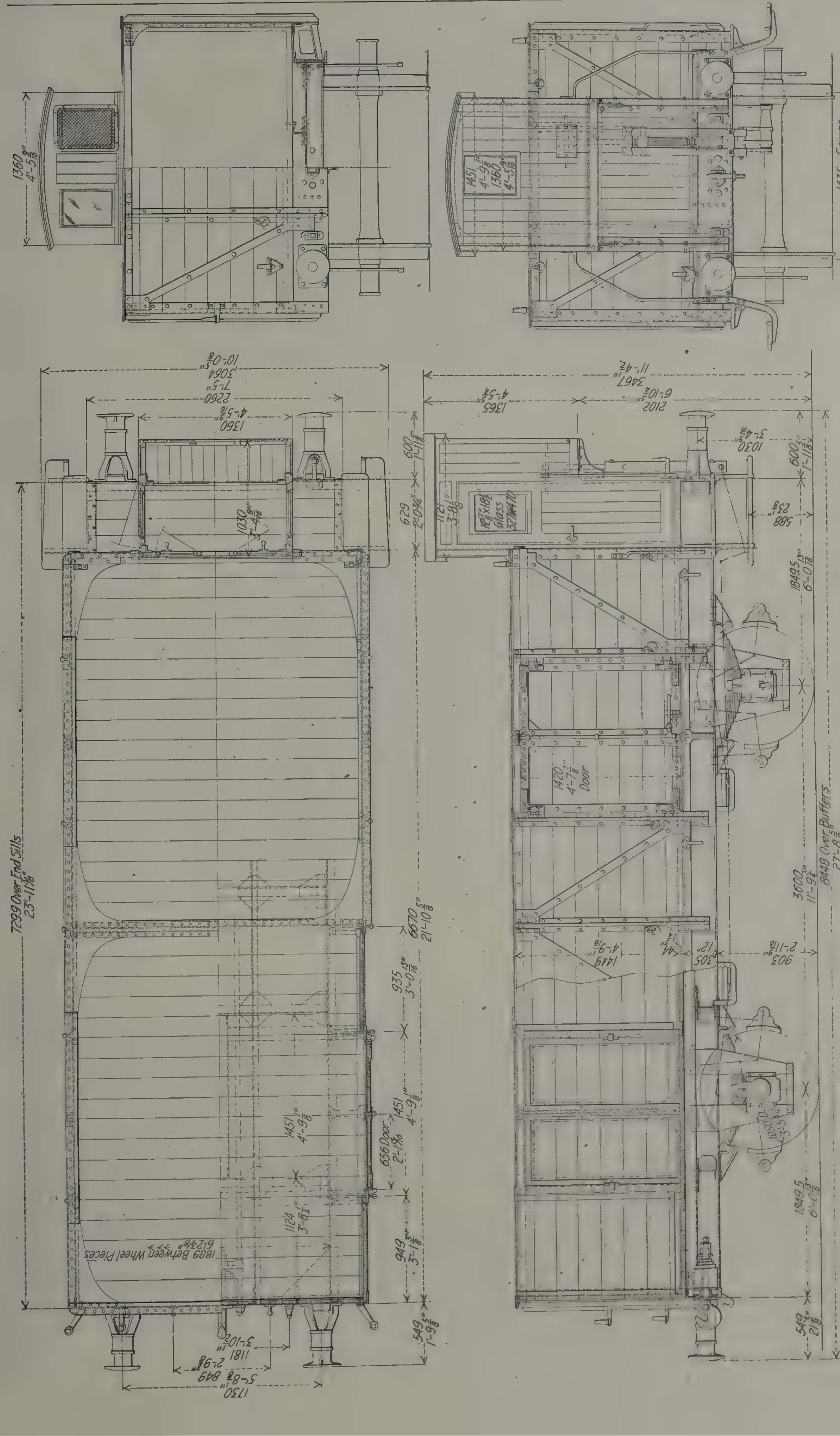


Fig. 2753—Steel Frame, 20-Metric Ton Gondola Car for the French State Railways. Builder, Canadian Car & Foundry Company.

(See Similar Car in Fig. 2752.)

Fig. 2754—Steel Frame High Side Gondola, General Service Car with Side and End Doors; Inside Length, 20 ft. 6 in.; Width, 9 ft. 8 in.; Height, 5 ft.; Capacity, 20,000 Kilos; Wide Gage. Built for the Compañia de los Caminos de Hierro del Norte de España, by the Gregg Company, Ltd.

Fig. 2755—Steel Frame High Side Gondola Car similar to Car shown in Fig. 2754, with Shelter for Brakeman. Built for the Compañia de los Caminos de Hierro del Norte de España, by the Gregg Company, Ltd.

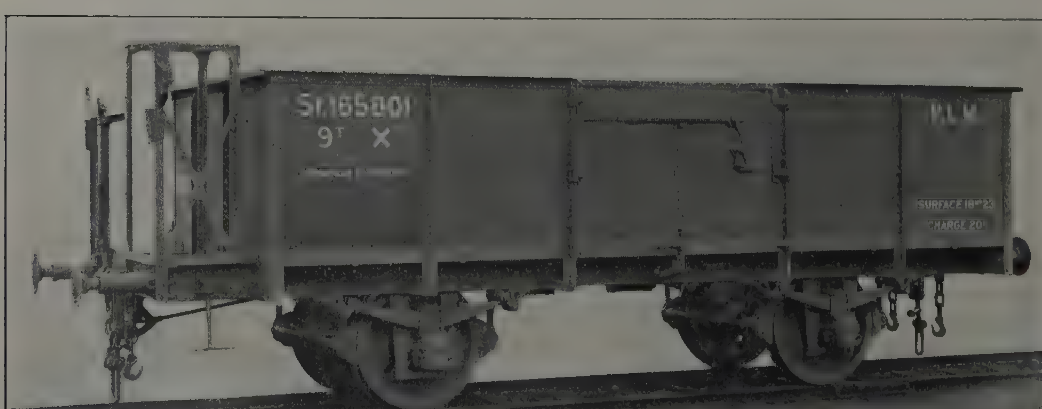


Fig. 2756—Steel, Wood Floor, 20-Ton, 4-Wheel Gondola Car for Paris, Lyons & Mediterranean. Builder, Pressed Steel Car Company.

Fig. 2757—Steel Frame, Side Door Gondola Car for Italian State Railways. Builder, American Car & Foundry Company.

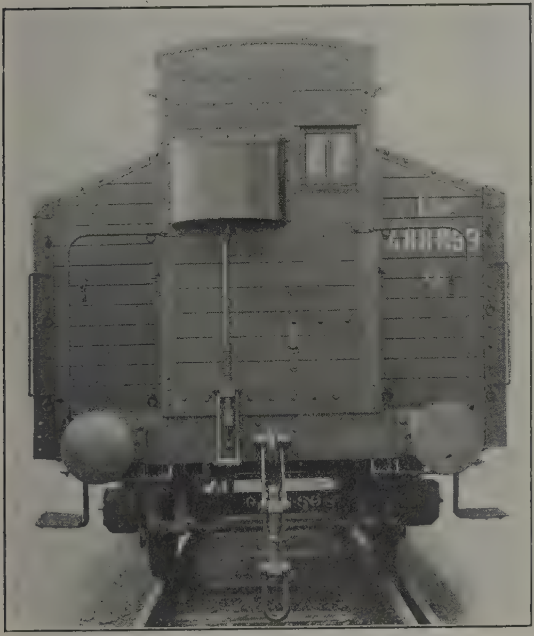


Fig. 2758—End of Car Shown in Fig. 2757.

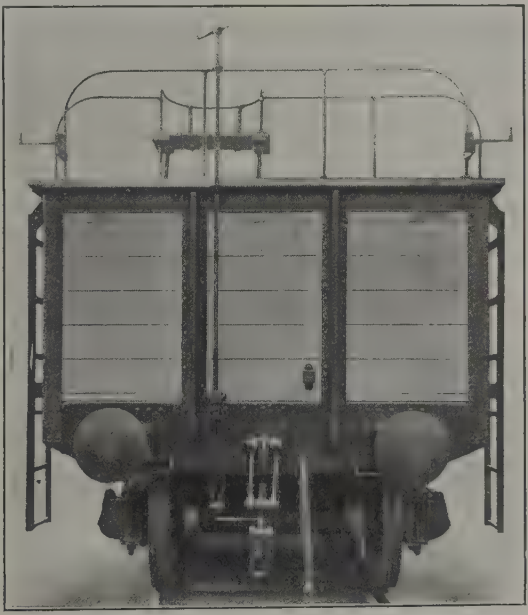


Fig. 2759—End of Car Shown in Fig. 2760.

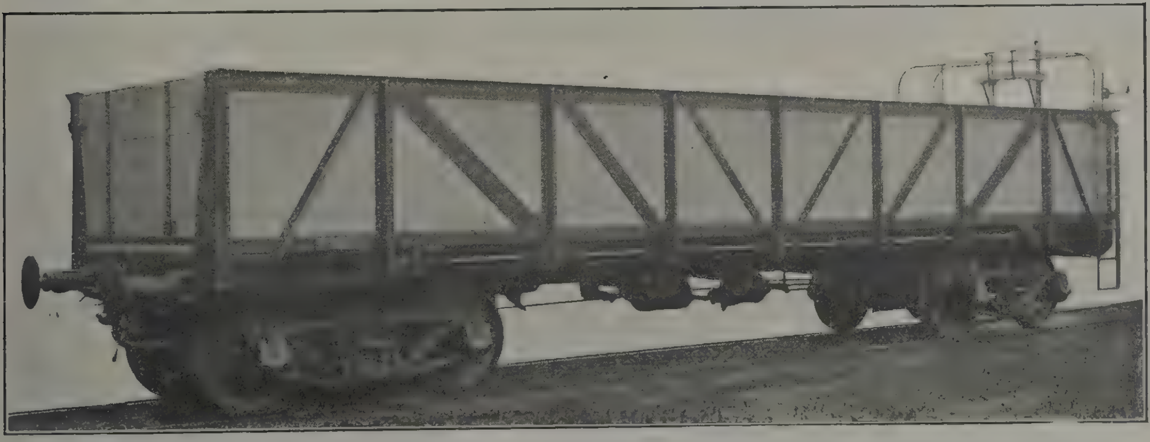


Fig. 2760—Steel Frame General Service Car for the Russian Government Railways. Inside Length, 39 ft 11 3/16 in.; Inside Width, 9 ft. 2¾ in.; Inside Height, 4 ft. 4½ in.; Capacity, 110,300 lb. Builder American Car & Foundry Company.

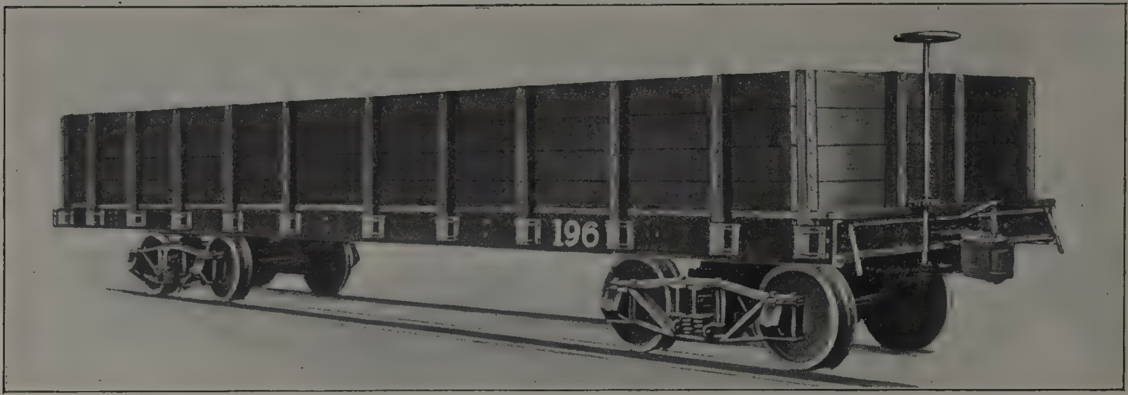


Fig. 2761—Steel Frame Gondola Car, 15 Tons Capacity; Inside Length, 30 ft. 7 in.; Gage, 36 in.; Automatic Couplers; Hand Wheel Brake Applying on One Truck. Builder, The Gregg Company, Ltd.

Fig. 2762—All-Steel, 35-Metric Ton Narrow Gage Gondola Car for Katanga Railway. Weight, 32,700 lb.; Inside Length, 37 ft.; Inside Width, 7 ft. 9 in.; Inside Height, 4 ft. 3 in.; Capacity, 1,218 cu. ft. Level Full. Builder, Pressed Steel Car Company.

Fig. 2763—All-Steel, 50-Metric Ton Drop Bottom Gondola Car for the Russian Government Railways. Weight, 47,000 lb.; Inside Length, 40 ft.; Inside Width, 9 ft. 6¾ in.; Inside Height, 4 ft. 4 in.; Capacity, Level Full, 1,624 cu. ft. Builder, Pressed Steel Car Company.

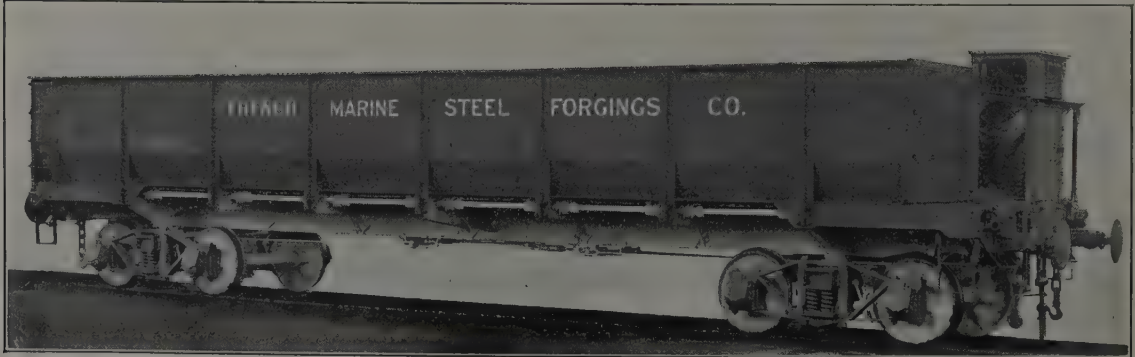


Fig. 2764—All-Steel, 50-Metric Ton Drop Bottom Gondola Car. Weight, 41,400 lb.; Inside Length, 38 ft. 2⅜ in.; Inside Width, 9 ft. 6¾ in.; Inside Height, 4 ft. 4 in.; Capacity, Level Full, 1,582 cu. ft. Builder, Pressed Steel Car Company.

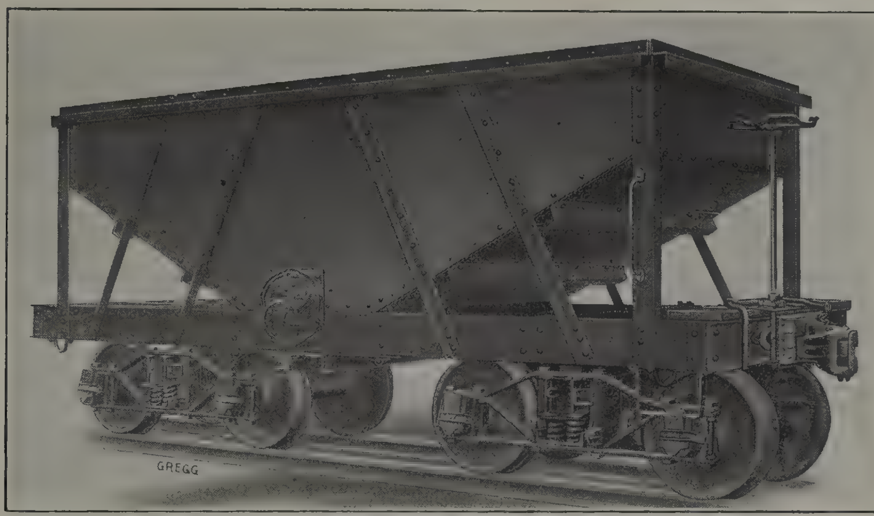


Fig. 2765—Steel Hopper Car, Capacity, 9 cu. yd.; Gage, 30 in.; Three-Quarter Size Automatic Couplers; Hand Wheel Brake Applying on One Truck; Single Door in Bottom, Dumping Over the Track. Used for Carrying Ashes, Crushed Rock or Sand for Ballast; Coal, Ore and Other Similar Materials. Builder, The Gregg Company, Ltd.

Fig. 2766—Steel Frame Gondola Car with Two Pockets and Discharge Doors in bottom. Inside Length, 20 ft.; Inside Width, 6 ft.; Capacity, 10 Tons; Gage, 30 in.; Link and Pin Self-Contained Spring Couplers; Used Principally for Carrying Track Ballast of Ashes, Sand, Rock, etc.; Also for Coal, Ore, etc. Builder, The Gregg Company, Ltd.

Fig. 2767—All-Steel, 35-Metric Ton Narrow Gage Triple Hopper Car for Katanga Railway. Weight, 34,300 lb.; Inside Length, 24 ft. 9¼ in.; Inside Width, 8 ft. 27/16 in. Builder, Pressed Steel Car Company.

Fig. 2768—Steel-Frame Flat Car. Capacity, 20 Tons; Length, 33 ft.; Width, 7 ft.; Gage One Meter; Automatic Couplers and Air Brakes; Used for General Freight Service, and when Fitted with Proper Superstructure, for Sugar Cane. Builder, The Gregg Company, Ltd., for the American Railroad of Porto Rico.

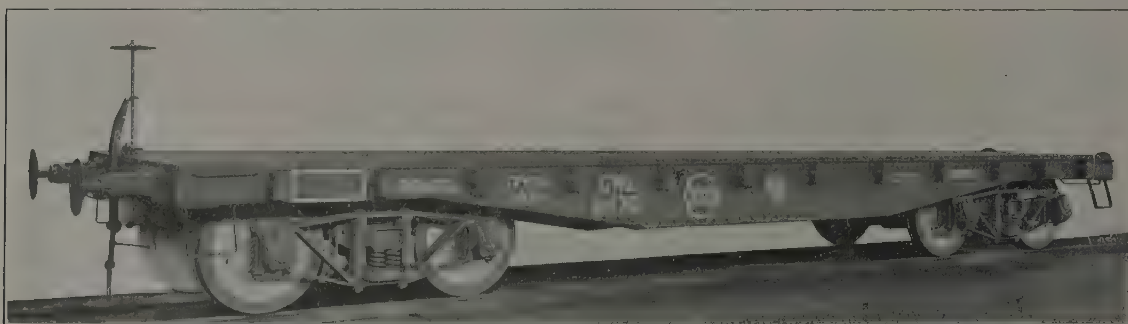


Fig. 2769—Steel Underframe 50-Metric Ton Flat Car for the Russian Government Railways. Weight, 40,800 lb.; Length Over Floor, 40 ft.; Width Over Floor, 8 ft. 11½ in. Builder, Pressed Steel Car Company.

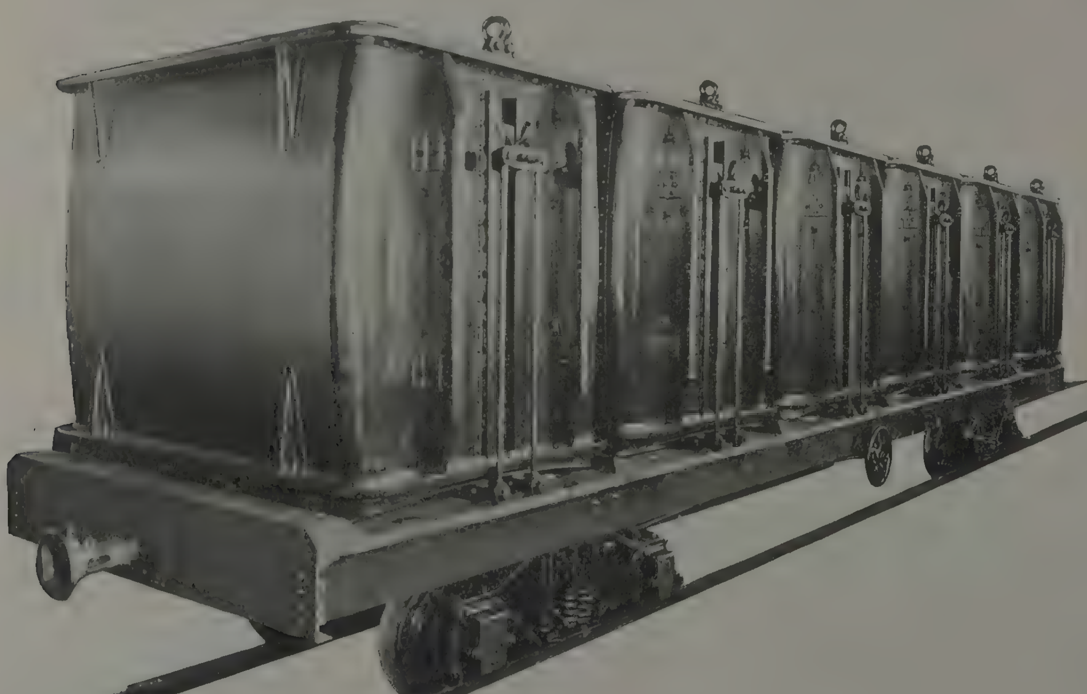


Fig. 2770—Steel Underframe 60-Ton Flat Car for Transporting Coal in Buckets as Shown. Gage, 3 ft. 6 in.; Screw Brakes Operated from Side of Car; Length Over Ends, 40 ft.; Width Over Floor, 8 ft. Built by the Canadian Car & Foundry Company, for the South African Railways for use at Durban Coal Station.

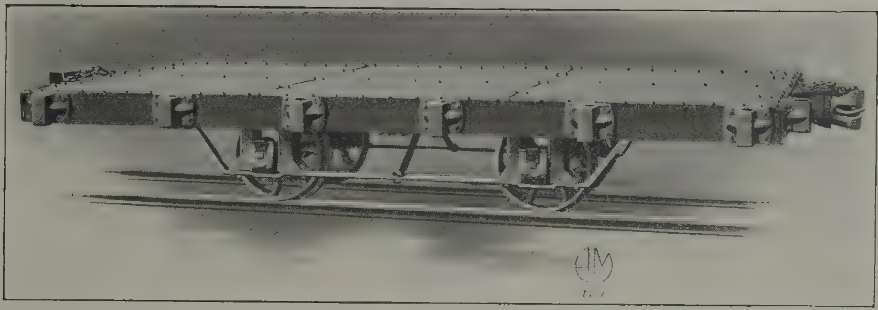


Fig. 2771—All-Steel Flat Car. Capacity, 4 Tons; Length, 12 ft.; Width, 5 ft. 6 in.; Link and Pin Self-Contained Spring Couplers; Pressed Steel Stake Pockets. For General Use on Small Railroads. Builder, The Gregg Company, Ltd.

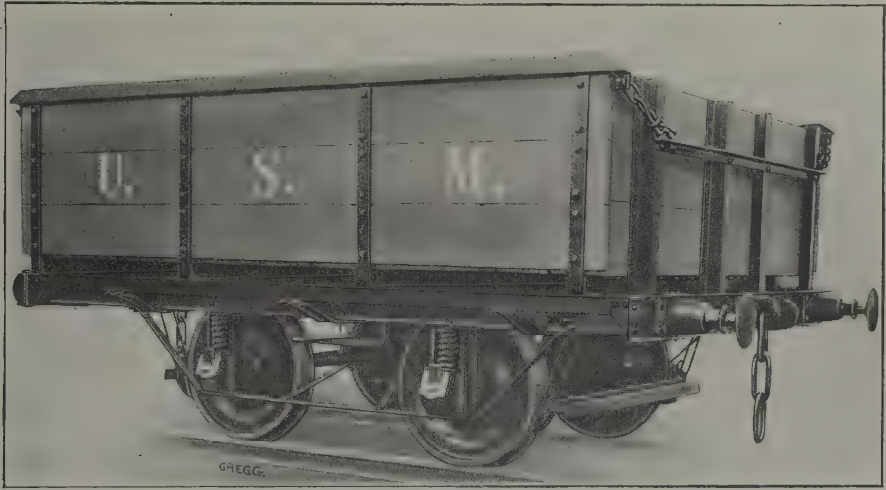


Fig. 2772—Steel-Frame Gondola Car. Capacity, 8 Tons; Length, 10 ft.; Width, 8 ft. 6 in.; Standard Gage; European Type Center Drawbar and Side Spring Buffers; Cane Is Loaded by Hand; Side Drop Doors Permit Unloading of Cane by Rake Type Feeder. Builder, The Gregg Company, Ltd.

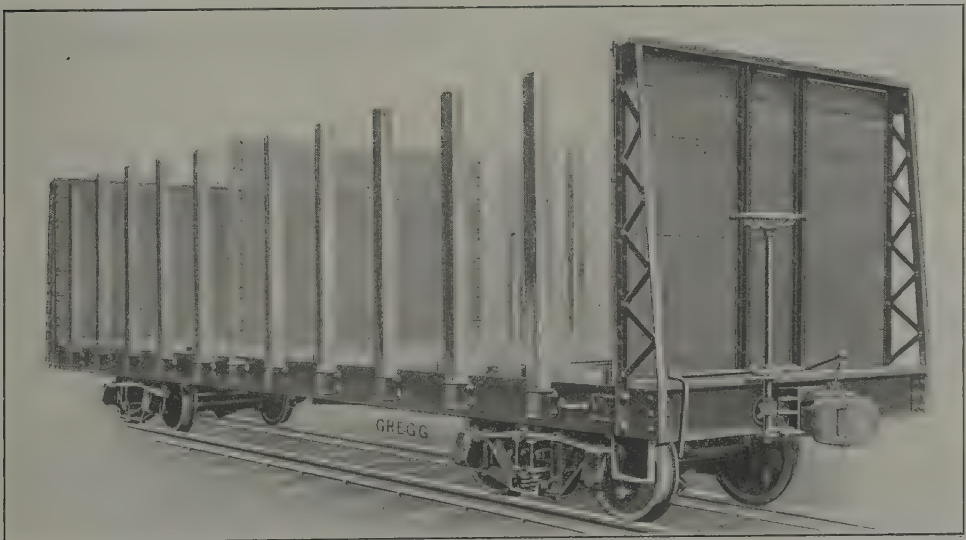


Fig. 2773—"Aguirre" Steel-Frame Car. Capacity, 15 Tons; Length, 30 ft.; Width, 7 ft.; Gage, One Meter; Automatic Couplers; Brake Applies to One Truck; Superstructure, 5 ft. 6 in. High with Wood Cleat Floor Suitable for Hoist Discharge, or for General Freight; by Removing the Stakes, the Cane May Be Unloaded with a Rake Type Feeder, Pulling the Cane Off Sidewise to the Conveyor. Used in Porto Rico, Brazil, Peru and Mexico. Builder, The Gregg Company, Ltd.

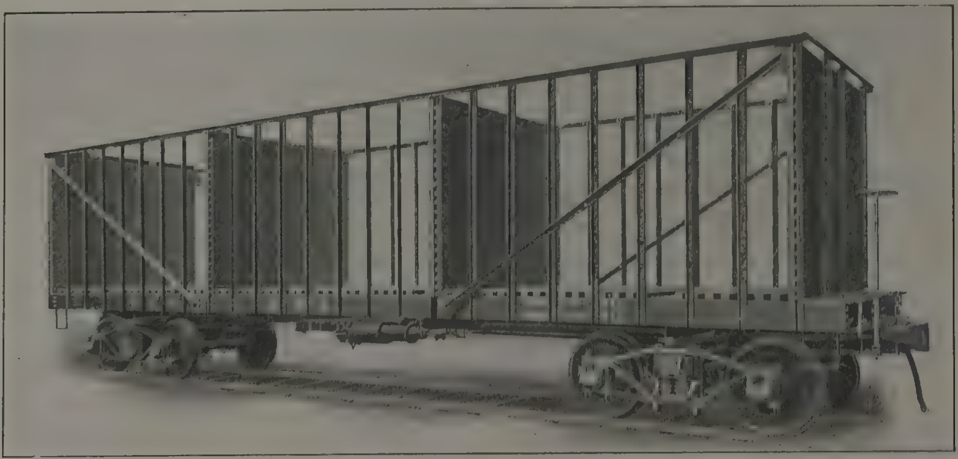


Fig. 2774—Steel-Frame Car. Capacity, 30 Tons; Length, 38 ft.; Width, 8 ft. 6 in.; Floor of Wood Cleats; Superstructure of Steel Frame Work and Wood Covered Partitions; Height, 6 ft.; Hoist Discharge, the Entire Contents of One Compartment, 10 Tons of Cane, being Lifted at One Hoist. Used on Large Plantations of Cuba. Builder, The Gregg Company, Ltd.

Fig. 2775—Steel-Frame Sugar Cane Car. Side Discharge. Builder, Magor Car Corporation.

Fig. 2776—"Confluente" All-Steel Car. Capacity, 12 Tons; Length, 25 ft.; Width, 6 ft.; Link and Pin Self-Contained Spring Couplers; Hand Wheel Brake on One Truck; Floor of Pressed Steel Cleats; Steel Superstructure, 5 ft. 6 in. high; Unloaded by Chain Lift. Cars of this Type Are Extensively Used in Cuba and Porto Rico. Builder, The Gregg Company, Ltd.

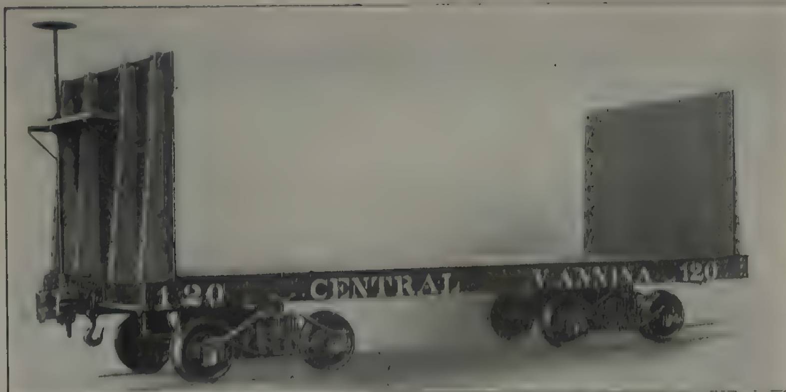


Fig. 2777—Steel Frame Car. Capacity 10 Tons; Length, 20 ft.; Width, 7 ft.; Gage One Meter; Automatic Couplers; Safety Coupling Chains and Hand Brake Applying on One Truck; Unloaded by Tipping the Car into a Pit, by a Derrick Fitted with a Grab, or by a Rake Type Unloader. Used in Porto Rico, Peru, Trinidad and Other Places. Builder, The Gregg Company, Ltd.

Fig. 2778—"Corchita" All-Steel Car. Capacity, 25 Tons; Length, 32 ft.; Width, 8 ft. 6 in.; Standard Gage; One Compartment, Opening at End. Discharged on Tipping Table, Which Slides the Cane Out at the End, into the Feeder Pit. This Type Is Used on Some Cuban Estates. Builders, The Gregg Company, Ltd.

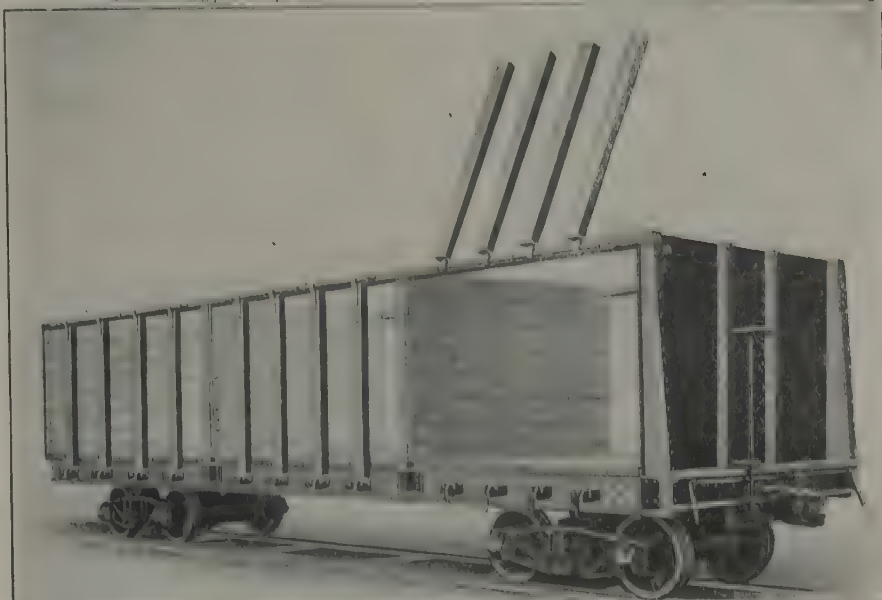


Fig. 2779—Steel Frame Car. Capacity 15 Tons; Gage, 36 in.; Length, 30 ft.; Width, 7 ft.; Automatic Couplers, Hand Brake on One Truck, Wood Superstructure, 5 ft. High; Individual Release Top Hinged Stakes; Unloaded by Tipping Sidewise. Discharge Regulated by Number of Stakes Released, or by Angle of Car. Style of Superstructure Originated in Cuba. Builder, The Gregg Company, Ltd.

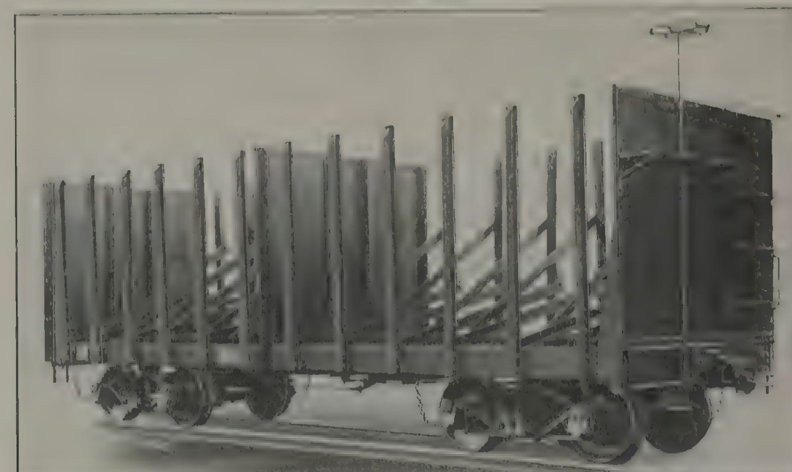


Fig. 2780—All-Steel Car. Capacity 12,000 Kilos; Length, 24 ft.; Width, 6 ft. 6 in.; Height, 5 ft. 6 in.; Gage One Meter. Slings Are of the Type Which Tie the Cane in Bundles, After Which It Is Stored for Future Grinding. Horizontal Division Bars Divide the Load into Three Layers. Developed for Brazilian Plantations Requiring a Large Capacity Car, with a Light Capacity Derrick. Builder, The Gregg Company, Ltd.

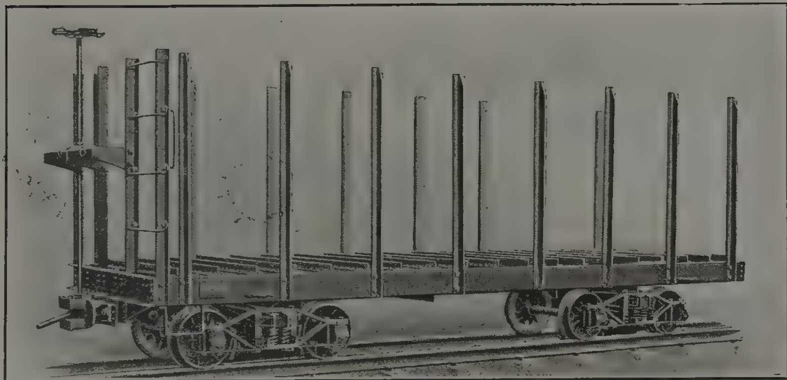


Fig. 2781—"Estrelliana" All-Steel Car. Capacity 10 Tons; Length, 20 ft.; Width, 6 ft.; Gage, 75 Centimeters; Link and Pin Self-Contained Spring Coupler; Brake on One Truck; Floor of Angle Cleats; Rigid Stakes at Sides and Ends, 5 ft. 6 in. High, with Top Side Rail Facilitating the Loading of the Cane by Hand. Cane Discharged by Hoist or Hand. Used Extensively in South America, Especially Brazil. Builder, The Gregg Company, Ltd.

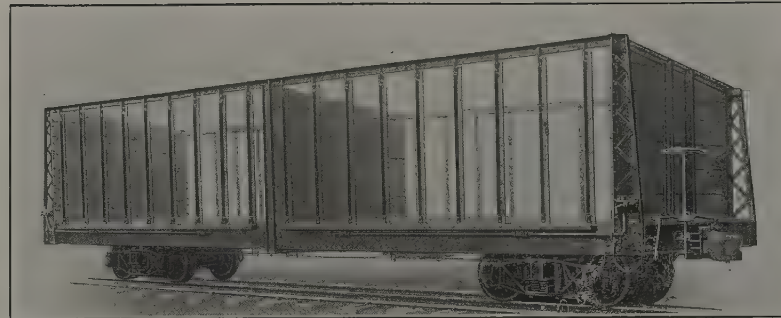


Fig. 2782—"Providencia" Steel-Frame Car. Capacity 15 Tons; Gage, 30 in.; Length, 31 ft. 6 in.; Width, 7 ft. 6 in.; Automatic Couplers; Hand Wheel Brake on One Truck; Two Compartment Superstructure, Plank Floor and Partition Sheathing; Top Hinged Stakes; Side of Each Compartment Opens as a Unit (Height of Fixed Side 4 ft. 6 in. and Releasing Side 5 ft. 6 in.). Turnbar Release Unlocks Doors from Ends of Car; Car Inclines Sidewise, Dumping Cane to Pit or Auxiliary Carrier. Cars with This Type of Unloading Are Standard in Most New Cuban Factories. Builder, The Gregg Company, Ltd.

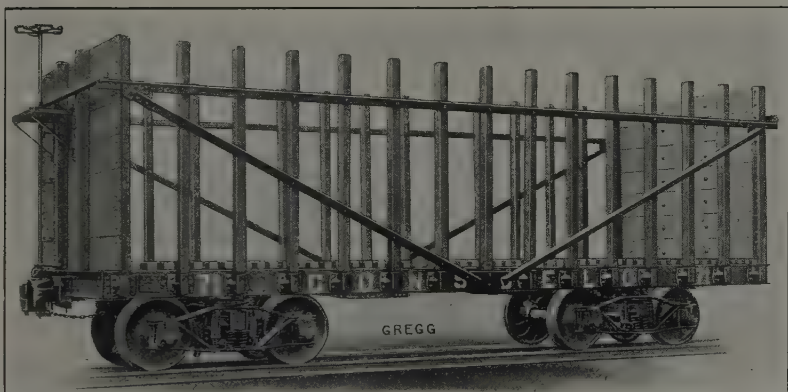


Fig. 2783—"Consuelo" Steel-Frame Car. Capacity 10 Tons; Length, 21 ft.; Width, 7 ft.; Three Quarter Size Automatic Couplers; Brake on One Truck; Superstructure of Wood, 5 ft. 9 in. High and Floor of Wood Cleats; Used with Hoist Discharge Apparatus, the Whole Load Being Listed in One Hoist. Built for Plantation in Santo Domingo by The Gregg Company, Ltd.

Fig. 2784—"Portugalete." All-Steel Car. Plate Floor; Capacity 20 Tons; Length, 33 ft.; Width, 8 ft.; Standard Gage; Automatic Couplers; Air Brakes; Height of Release Side 6 ft., of Solid Side 5 ft. 6 in.; Top Hinged Doors for Side Dump Unloading; All Compartments Unlock from Ends of Car; Latest Type of Superstructure for Side Dump Unloaders, as Developed in Cuba. Builder, The Gregg Company, Ltd.

Fig. 2785—Steel-Frame Car. Capacity 4 Tons; Length, 10 ft.; Width, 6 ft.; Link and Pin Self-Contained; Spring Couplers; Superstructure, 4 ft. High. Adapted to Use on Portable Track in Place of Bull Carts in Cuba, Transferring the Load from Small to Large Cars, by Means of a Derrick. Builder, The Gregg Company, Ltd.

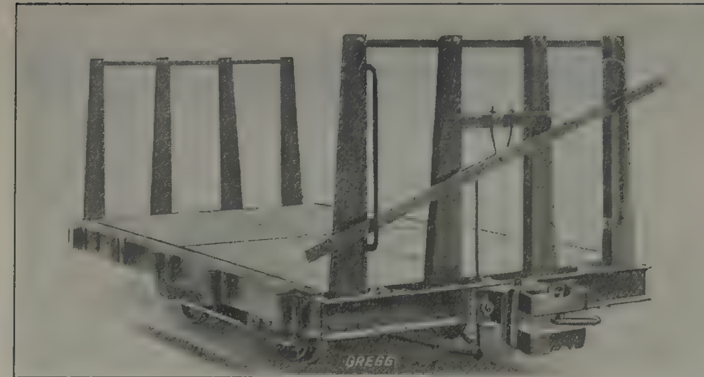


Fig. 2786—Steel-Frame Car. Capacity 5 Tons; Length, 12 ft.; Width, 6 ft.; Gage, 75 Centimeters; Link and Pin Self-Contained Spring Coupler; Cane Loaded Crosswise by Omitting the Side Stakes, or Lengthwise by Using Side Stakes. Often loaded on portable Track and Hauled to the Mill, without Transferring to Larger Cars. Adapted to Unloading by Rake Type Cane Carrier Feeders. Used Extensively in Porto Rico, Mexico, Brazil and Peru. Builder, The Gregg Company, Ltd.

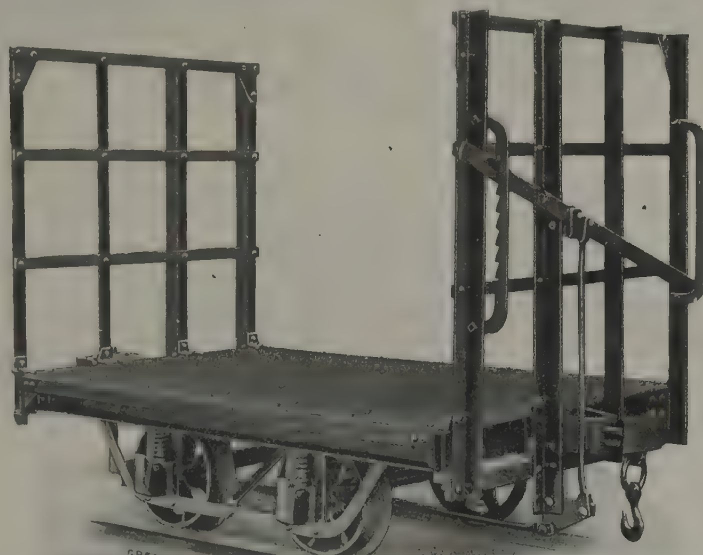


Fig. 2787—All-Steel Car. Capacities 1½ to 2 Tons; Gages 50-30-24 Centimeter; Used in Cane Fields on Portable Track and the Load Transferred to Larger Cars at Loading Stations. Cane loaded Crosswise. On Small Plantations These Cars Are Hauled to the Mill by Animal Power or Light Locomotives. Car Is Adapted to almost Any System of Unloading. Used in Porto Rico, Peru, Central America and Other Sugar Producing Countries. Builder, The Gregg Company, Ltd.

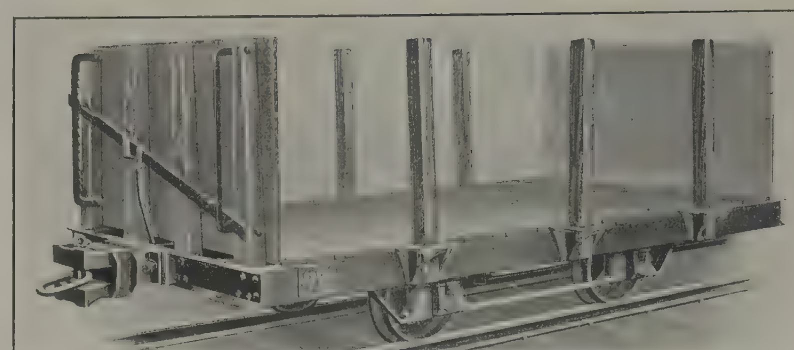


Fig. 2788—"Hawaiian" Steel-Frame Car. Capacity 5 Tons; Length, 12 ft.; Width, 6 ft.; Gage, 36 in.; Link and Pin Self-Contained Spring Coupler; Quick Releasing Stake Pockets. Used Exclusively in the Hawaiian Islands, on Portable or Permanent Track. Designed Especially for Use with Cane Carrier Feeders of the Rake Type. Builder, The Gregg Company, Ltd.

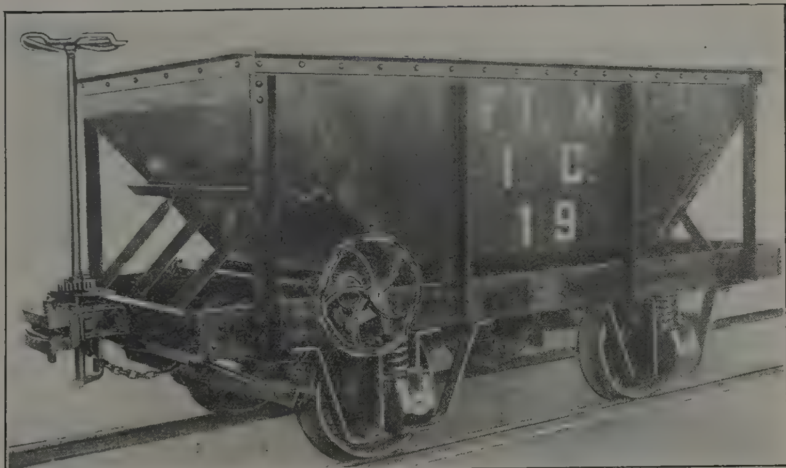


Fig. 2789.—Steel Hopper Car. Capacity 3 cu. yds. Gage 36 in.; Single Bottom Door; Link and Pin Couplers; Hand Wheel Brake. Used for Transporting Ashes, Crushed Rock, Earth, Coal, Ore, etc. Builder, The Gregg Company, Ltd.

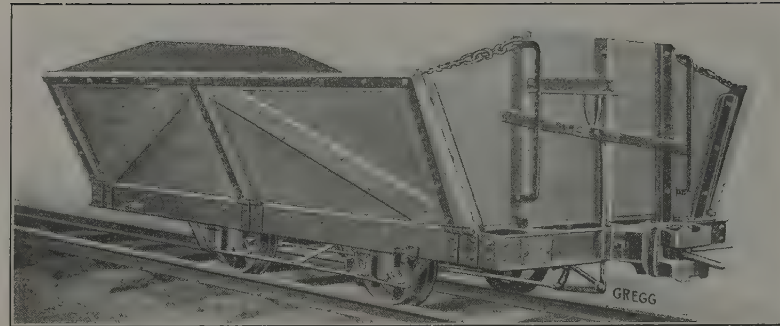


Fig. 2790.—Steel Underframe Wood Floor, Sloping Side Door Car. Length, 12 ft.; Width, 6 ft.; Capacity, 5 Tons; Gage, 36 in. Principally used in Hawaiian Islands and Philippines with Rake Type Feeders. Builder, The Gregg Company, Ltd.

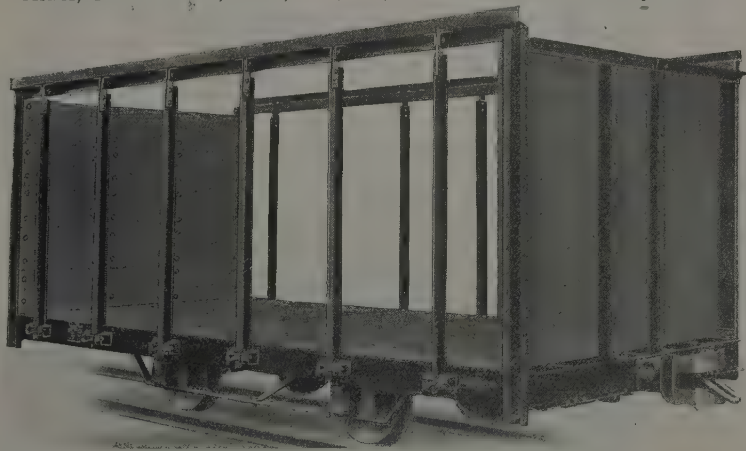


Fig. 2791—Steel-Frame Car, Capacity, 6 Tons; Length, 14 ft.; Width, 6 ft.; Gage, 36 in.; Link and Pin Self-contained Spring Couplers; Superstructure, 5 ft. 6 in. high; Top Hinge, Individual Bottom Release, Side Stakes; Unloaded by Inclining towards Carrier or Pit. Discharge Regulated by Number of Stakes Released or Inclination of Car. This Style of Superstructure is used in South America, notably in Colombia. Builder, The Gregg Company, Ltd.

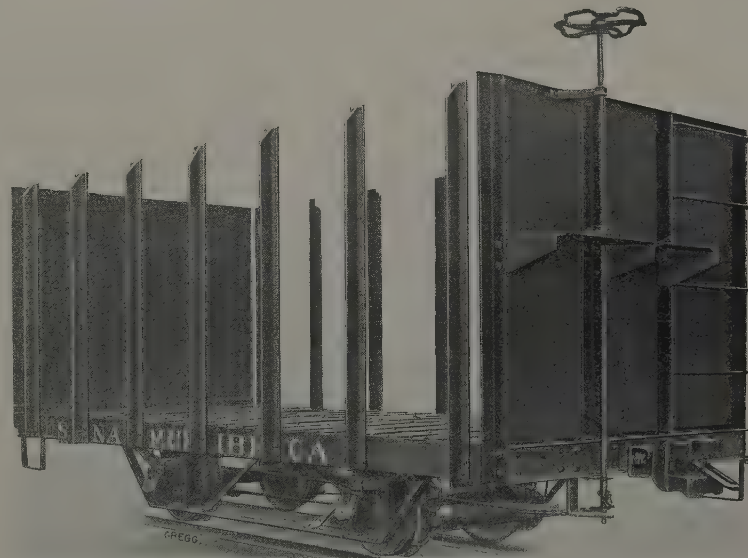


Fig. 2792—All-Steel Car, Capacity, 6 Tons; Length, 15 ft.; Width, 6 ft.; Gage, 75 Centimeters; Semi-Elliptic Springs; Link and Pin Self-Contained Spring Coupler; Stakes, 5 ft. 6 in. high; Car Designed for Use in Very Rough Hilly Countries, the Sheathed Ends Keeping the Cane from Sliding Forward. Hand Unloading. For Brazilian plantations. Builder, The Gregg Company, Ltd.

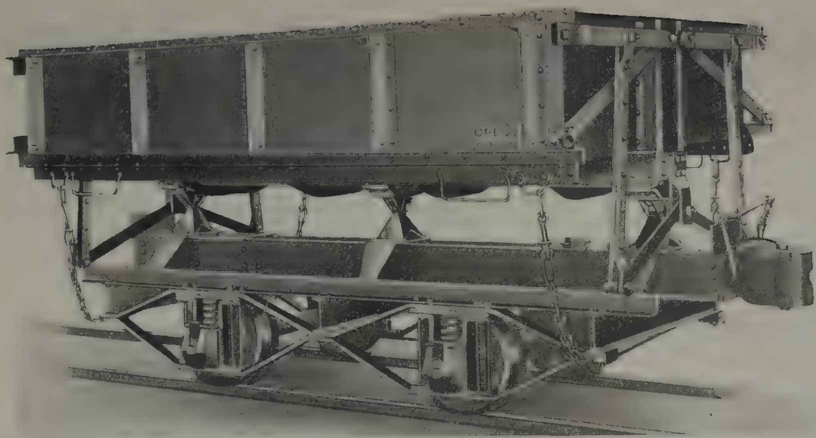


Fig. 2793.—All-Steel Two-Way Box-Body Dump Car. Capacity 4 cu. yd.; Gage, 1 Meter; For Regular Locomotive Traction, and Steam Shovel Work. Builder, The Gregg Company, Ltd.

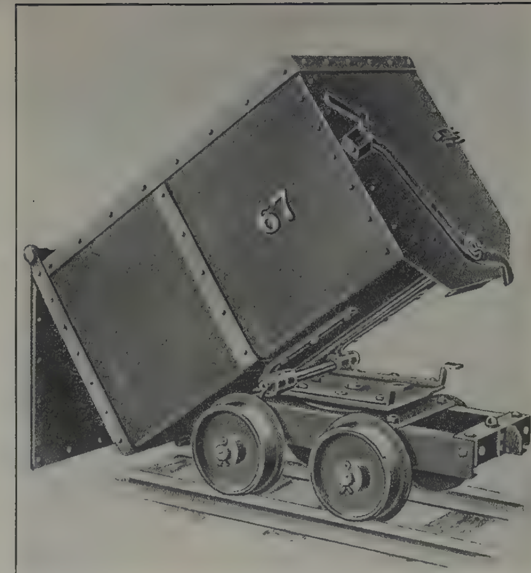


Fig. 2794.—Steel Rotary Dump Car. Capacity 1 cu. yd.; Gage, 24 in.; Dumps in Any Direction, the Body Turning on the Base. Adapted to Mines, Gravel Pits, Grading, Etc. Builder, The Gregg Company, Ltd.

Fig. 2795.—Steel Frame Dump Car. Builder, Western Wheeled Scraper Company.

Fig. 2796.—Two-Way V-Body Dump Car. Gages, from 20 in. to 42 in.; For Transporting Loose Material, such as Earth, Concrete, Coal, Press Cake, Etc., and for Light Locomotive Traction or Steam Shovel Work. Builder, The Gregg Company, Ltd.

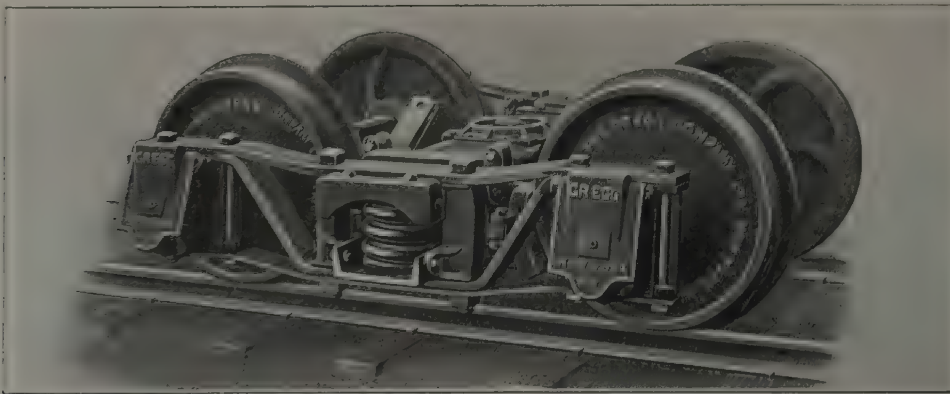


Fig. 2797.—Special Diamond-Frame Arch-Bar Truck. Designed to Lower Center of Gravity of Load to a Minimum Height, for Use on Very Narrow Gages, or where the Permissible Height is Limited, as in Tunnels.

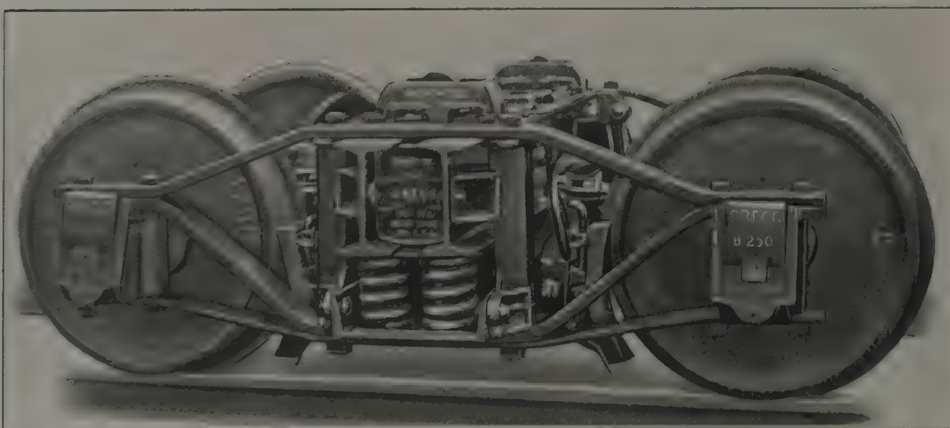


Fig. 2798—Diamond-Frame Arch-Bar Truck of Conventional Design, with Roller Side Bearings. Used Generally on Narrow Gage Equipment. Builder, The Gregg Company, Ltd.

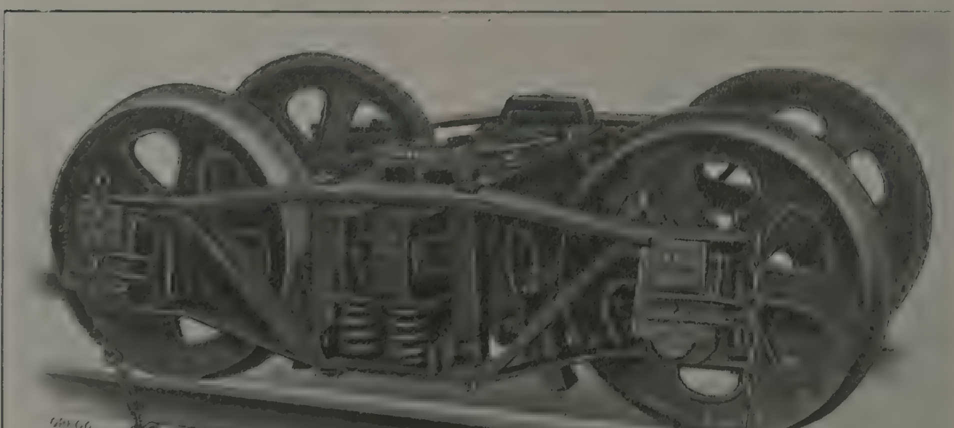


Fig. 2799.—Diamond-Frame Arch-Bar Truck, with Special Cast Steel Wheels, Safety Chains, Lock Lid Journal Boxes, Roller Side Bearings. Used on South American Narrow Gage Railroads. Builder, The Gregg Company, Ltd.

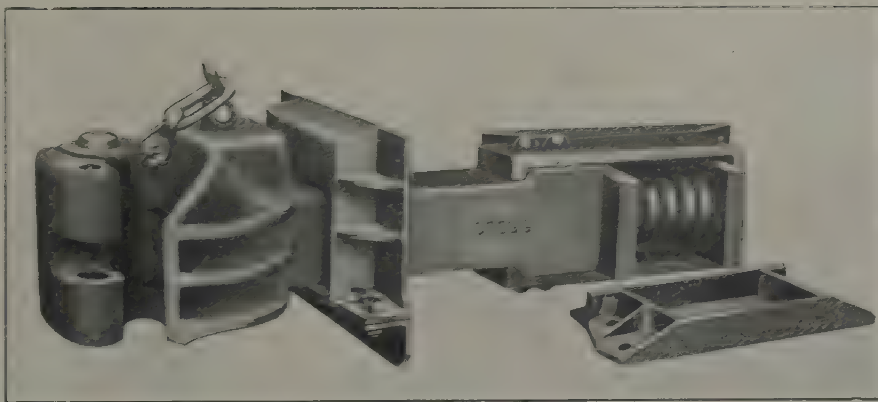


Fig. 2800.—Automatic Coupler showing Cast Steel Striking Plate and Follower Stops, Forged Steel Follower Plates and Yoke, with Double Draft Springs as applied to Narrow and Standard Gage Cars of 10 to 30 Tons Capacity.

Fig. 2801.—Heavy Forged Steel Hook and Ring Drawhead with Spring Buffer and Draft Gear for Narrow Gage Cars of 5 to 10 Tons Capacity for Locomotive Traction.

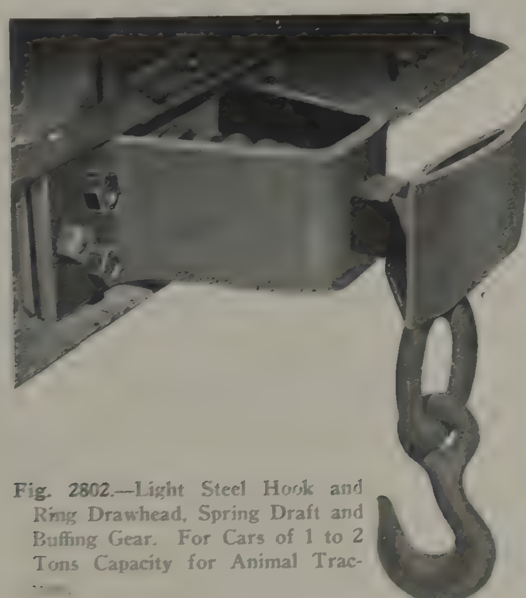


Fig. 2802.—Light Steel Hook and Ring Drawhead, Spring Draft and Buffing Gear. For Cars of 1 to 2 Tons Capacity for Animal Traction.

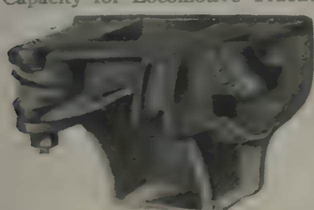


Fig. 2803.—Quick Releasing Stake Pocket. Permits Door to Open and Stake to be Easily Removed Even When Under Heavy Pressure of Load Against It.

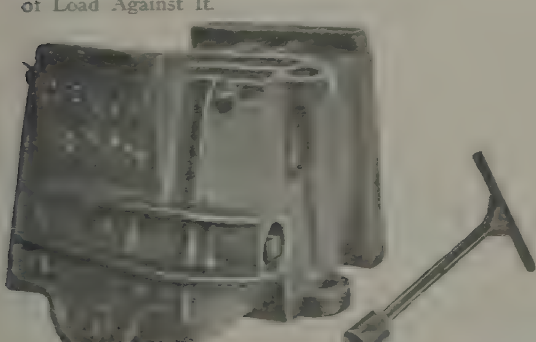


Fig. 2804.—Journal Box Lock Lid, Locked by a Set Screw Bearing Against Side of Box, Behind Lip Around the Front Opening. Operated by a Special Socket Wrench, in Possession of Train Crew.

Builder, The Gregg Company, Ltd.

War Equipment

In this section will be found illustrations of equipment used by the United States Government forces, both in America and Overseas. It includes cars built for transporting supplies and artillery, such as box, refrigerator, gondola, flat, tank and dump cars; artillery trucks; gun transport cars; armored cars and guns; examples of camouflage; hospital cars and trains.

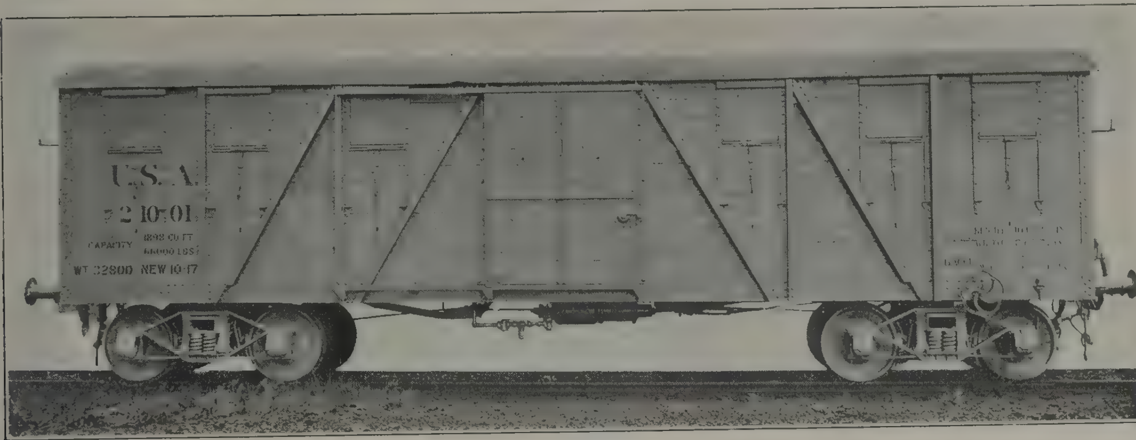


Fig. 2805—Steel Frame 33-Ton Box Car. Standard Gage; Sliding Doors; Air and Hand Brakes; Length over End Sills, 36 ft. 2¾ in.; Width over Side Sills, 8 ft. 3 5/16 in.; Weight, 32,800 lb. Built for American Expeditionary Forces.

Fig. 2806—Steel Frame 33-Ton Box Car with Cab. Standard Gage; Sliding Doors; Air and Hand Brakes; Length over End Sills, 36 ft. 2¾ in.; Width over Side Sills, 8 ft. 8 5/16 in.; Weight, 33,200 lb. Built for American Expeditionary Forces.

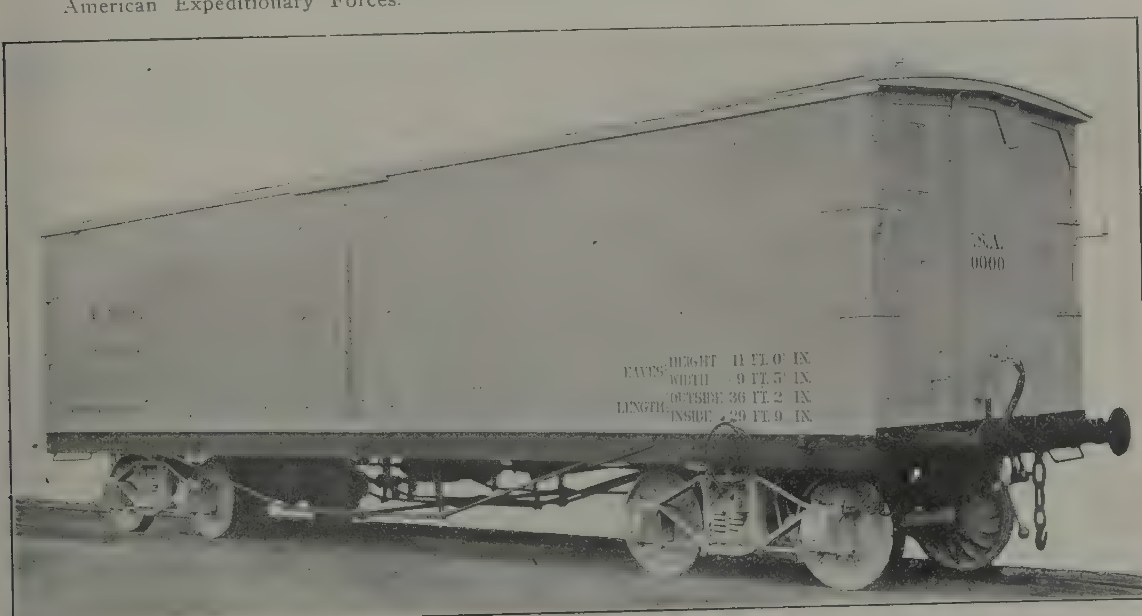


Fig. 2807—Refrigerator for American Expeditionary Forces. Built by Haskell & Barker Car Company.

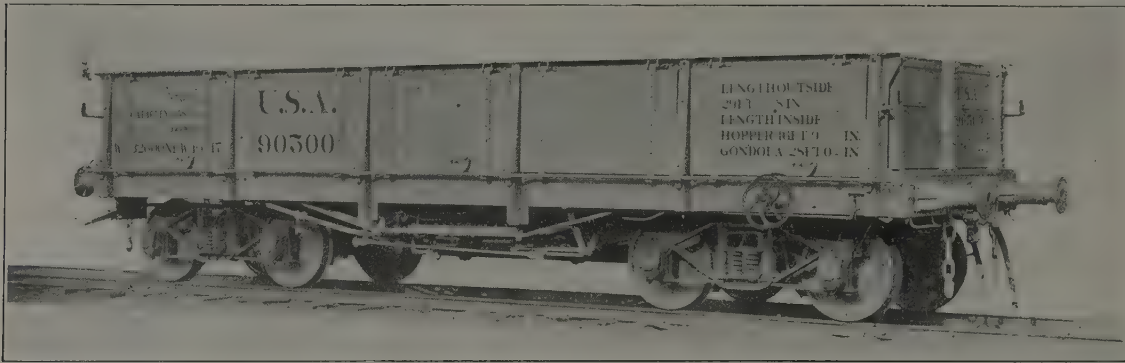


Fig. 2808—Rodger Ballast Car. Standard Gage; Capacity when Adjusted as Hopper, 676 cu. ft.; Gondola, 458 cu. ft.; Length over End Sills, 29 ft. 8 in.; Width over Side Sills, 9 ft. 4 in.; Weight, 32,600 lb.; Air and Hand Brakes. Built for American Expeditionary Forces.

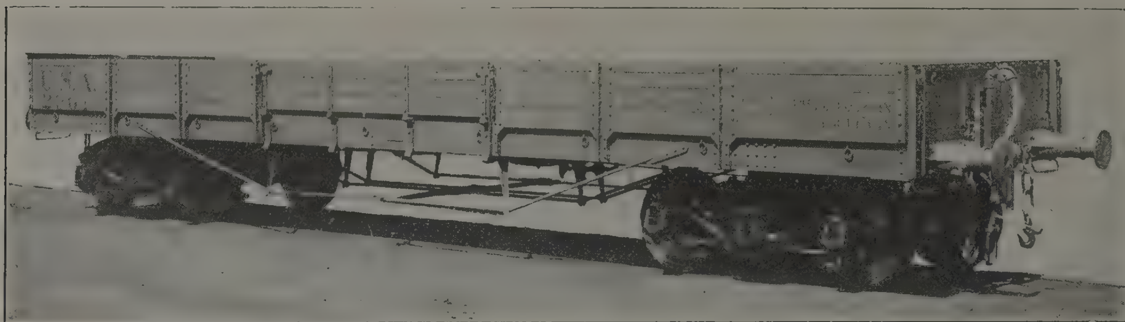


Fig. 2809—Low Side, 33-Ton Gondola. Standard Gage; One Drop Door on Each Side; Steel Drop End Doors; Air and Hand Brakes; Length over End Sills, 36 ft. 2¾ in.; Width over Side Sills, 8 ft., 5¼ in.; Weight, 29,000 lb. (See also Fig. 2812.) Built for American Expeditionary Forces.

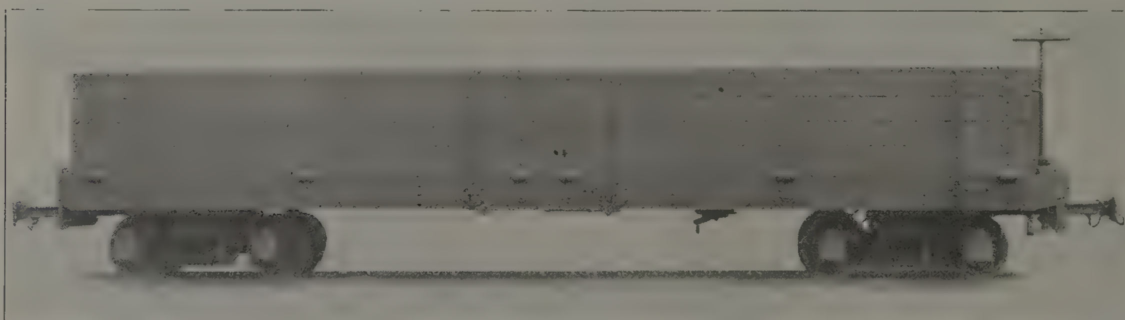


Fig. 2810—Drop Side Door 11-Ton Gondola. 60-Centimeter Gage; Length over End Sills, 22 ft. 1¼ in.; Width over Side Sills, 5 ft. 7 in.; Weight, 9,200 lb. Built for American Expeditionary Forces.

Fig. 2811—Standard Gage, 33-Ton High Side Gondola Car; Vertical Side Doors; Air and Hand Brakes; Length over End Sills, 36 ft. 2¾ in.; Wide over Side Sills, 8 ft. 5¼ in.; Weight, 32,800 lb. Built for American Expeditionary Forces.

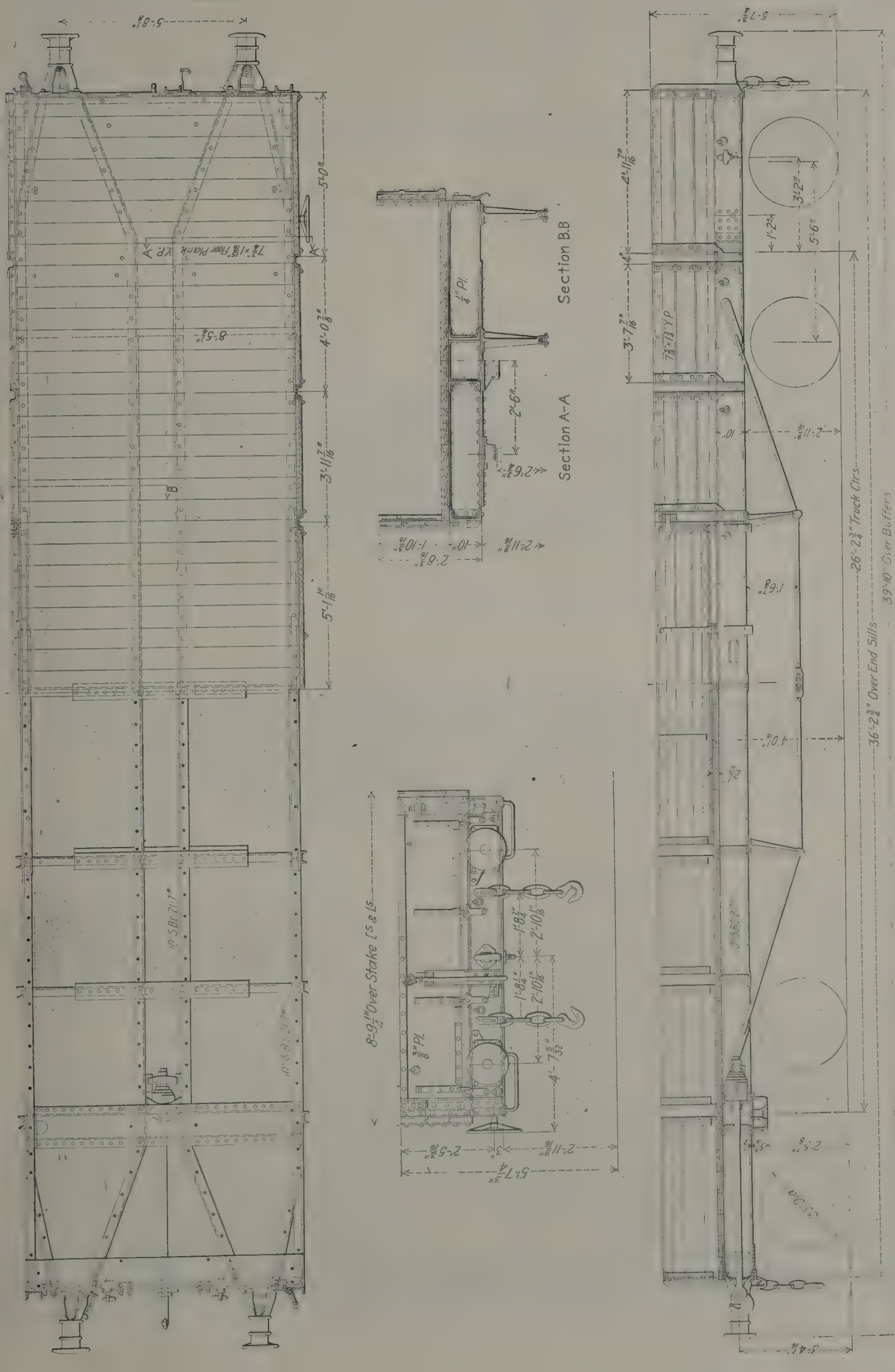


Fig. 2812—General Arrangement of 33-Ton Low Side Steel Frame Gondola Car for U. S. Government Overseas Service. Builder, Haskell & Barker Car Company.

(*See also Fig. 2809.*)

Fig. 2813—Steel Frame 11-Ton Flat Car. 60-Centimeter Gage; Hand Brakes; Removable Steel Stakes; Length, 22 ft. 1¼ in.; Width, 5 ft. 7 in.; Weight, 8,700 lb. Built for American Expeditionary Forces.

Fig. 2814—Steel and Wood Frame 15-Ton Flat Car. Length, 25 ft.; Width, 7 ft.; Gage, 36 in.; Air and Hand Brakes; Automatic Coupler. Built for the U. S. Army Engineer Corps by the Gregg Company, Limited.

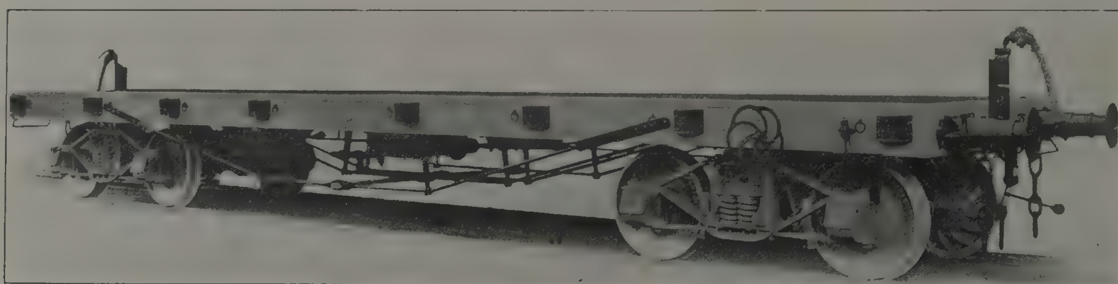


Fig. 2815—Standard Gage, 33-Ton Flat Car. Air and Hand Brakes; Length over End Sills, 36 ft. 2¾ in.; Width over Side Sills, 8 ft. 5¼ in.; Weight, 25,500 lb. Built for American Expeditionary Forces.

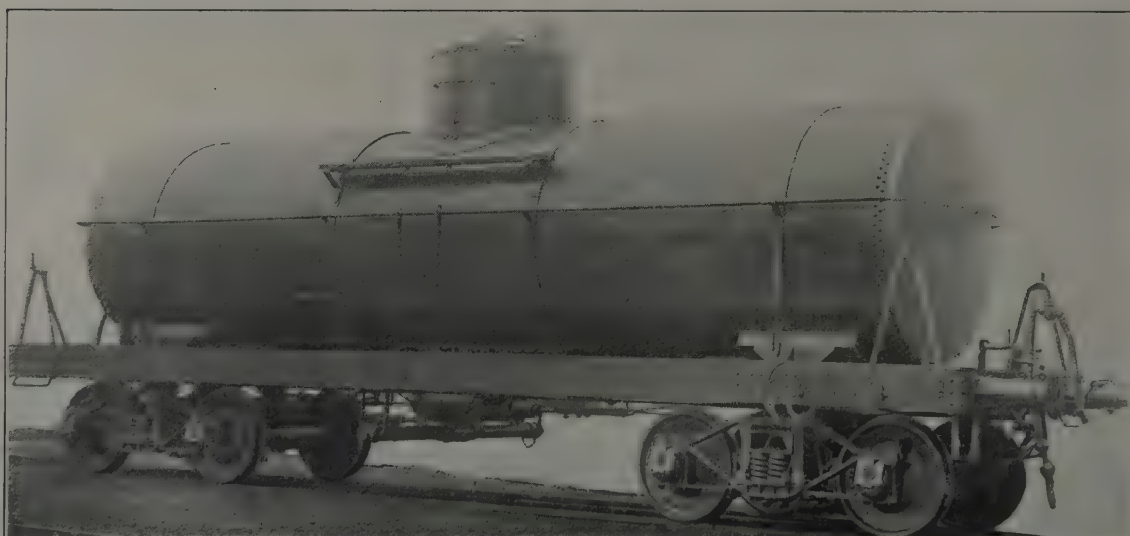


Fig. 2816—Standard Gage, 6,500-Gal. Steel Tank Car. Air and Hand Brakes; Length over End Sills, 36 ft. 2¾ in.; Width over Side Sills, 8 ft. 3 5/16 in.; Weight, 35,300 lb. Built for American Expeditionary Forces.

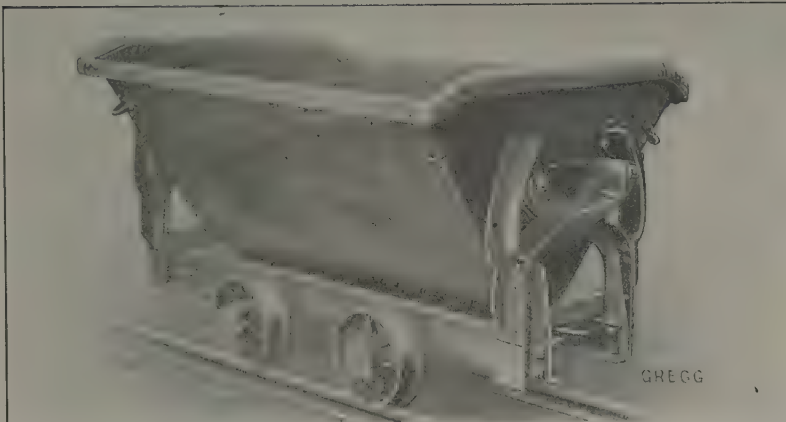


Fig. 2817—Two-Way V-Body Dump Car, Capacity 13½ cu. ft.; Gage, 40 Centimeters; Equipped with Rings for Tying Tarpaulins over Perishable Freight; Mine Type Wheels with Dust and Oil Proof Hubs and Roller Bearings. Built for the U. S. Army Engineer Corps by The Gregg Company, Limited.

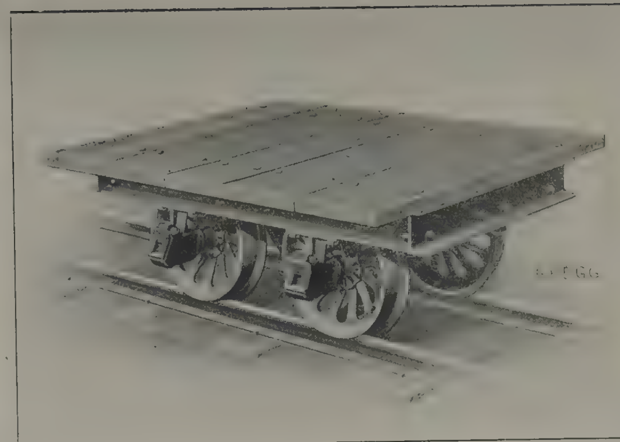


Fig. 2818—Push Car for Camp and Depot Use. Capacity 1-Ton; Gage, 40 Centimeters. Built for the U. S. Army Engineers Corps by The Gregg Company, Limited.

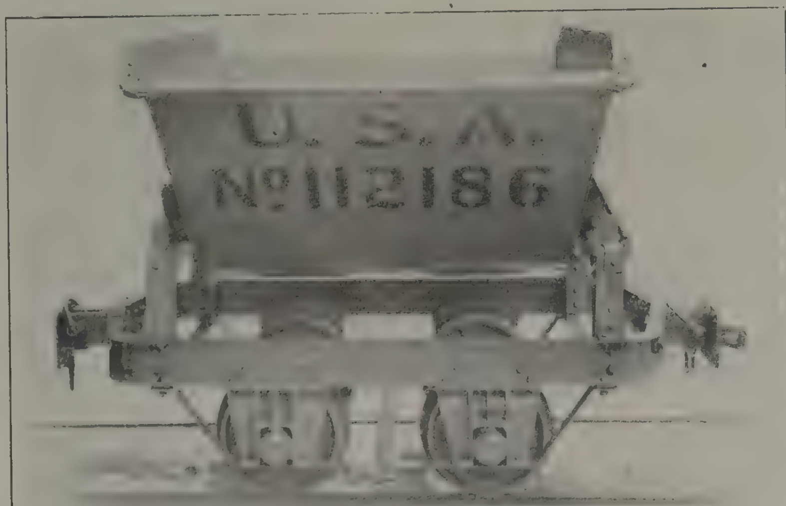


Fig. 2819—Two-Way V-Body Dump Car. Capacity 27 cu. ft.; Length over Coupler, 6 ft. 9 in.; Width of Body, 4 ft. 8⅝ in.; Weight, 1,000 lb. Built for American Expeditionary Forces.

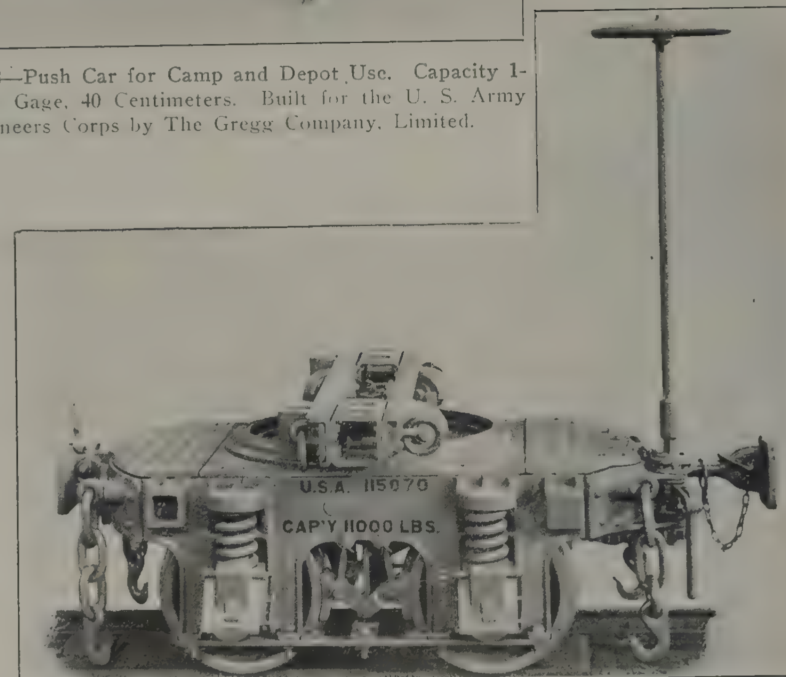


Fig. 2820—Artillery Truck. Capacity 5 Metric Tons; Gage, 60 Centimeter; Wheel Base, 23⅝ in. Built for American Expeditionary Forces.

Fig. 2821—Special Car for Transporting 16-Inch and Other Heavy Naval Guns. Complete Unit is 56 ft. long; Will Traverse Curves of 100 ft. Radius; Carries 286,000 lb. Built by the Pullman Company.

(*See Figs.* 2822-2824.)

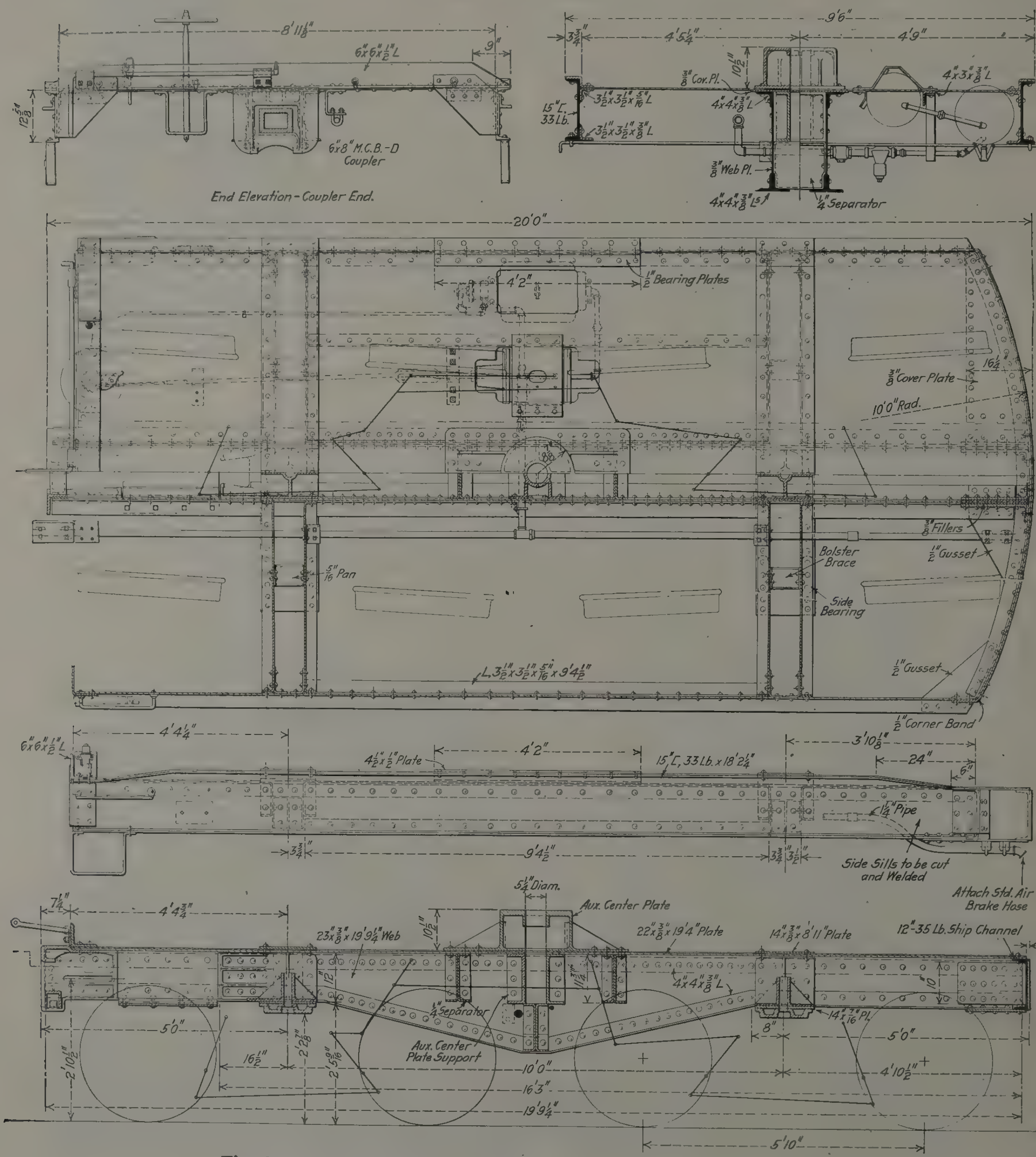


Fig. 2822—Details of Carrier Units of Naval Gun Car Shown Above.

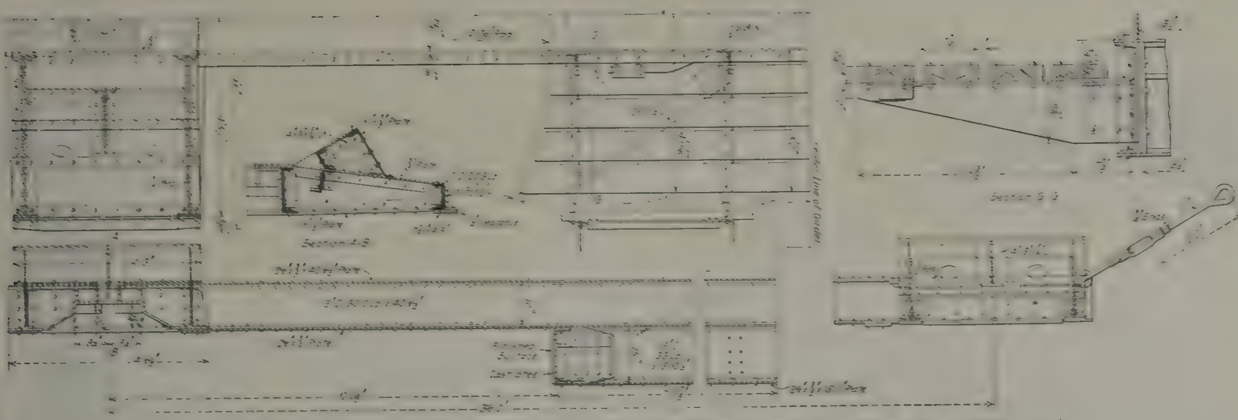


Fig. 2823—Girder and Buffer Members of the 140-Ton Gun Car. (See Figs. 2221, etc.)

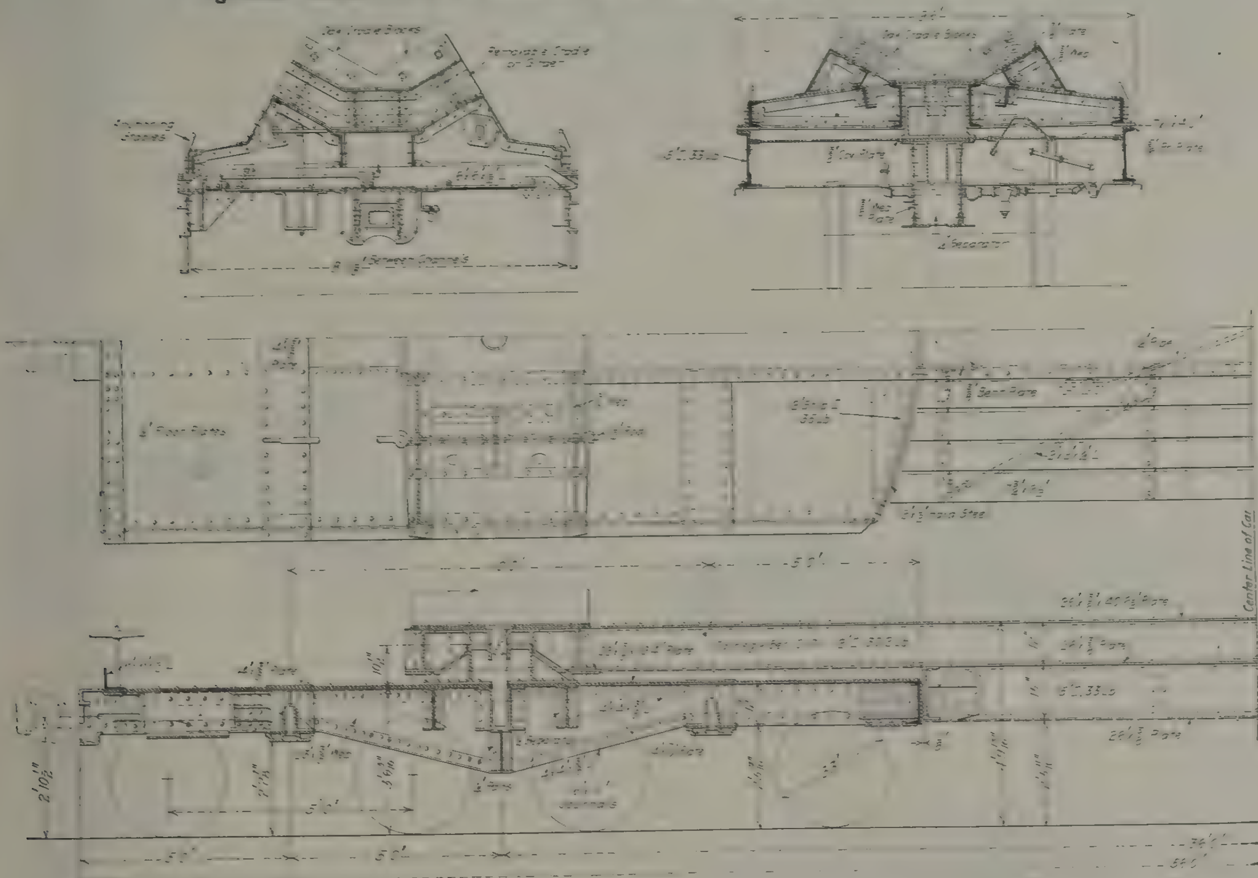


Fig. 2824—Plan and Elevation of Naval Gun Car. (See Figs. 2821-2823.)

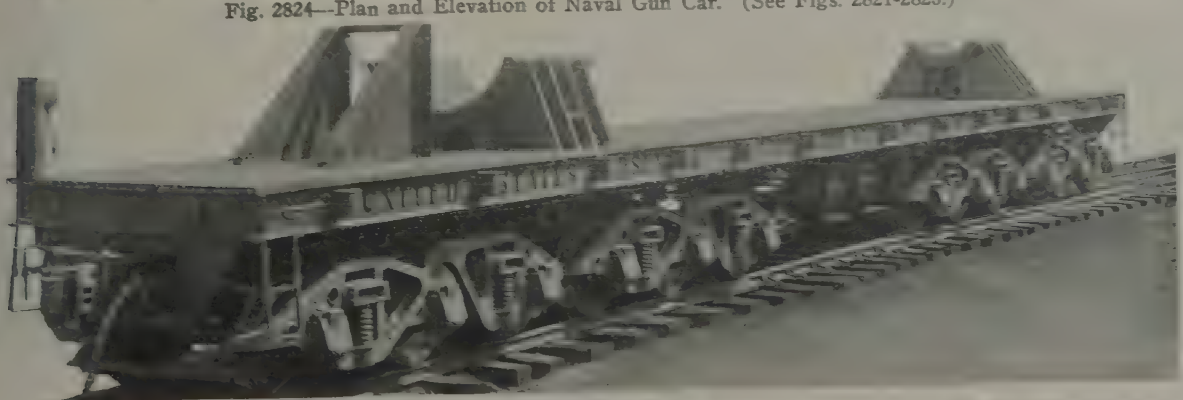


Fig. 2825—Gun Transport Car. 240-Ton Capacity. Built by the Magor Car Corporation for the United States Arsenal at Watervliet, N. Y.

Fig. 2826—Twelve-Inch 50-Caliber Long Range Gun on Sliding Railway Mount at the Instant of Firing. Used by American Forces in France.

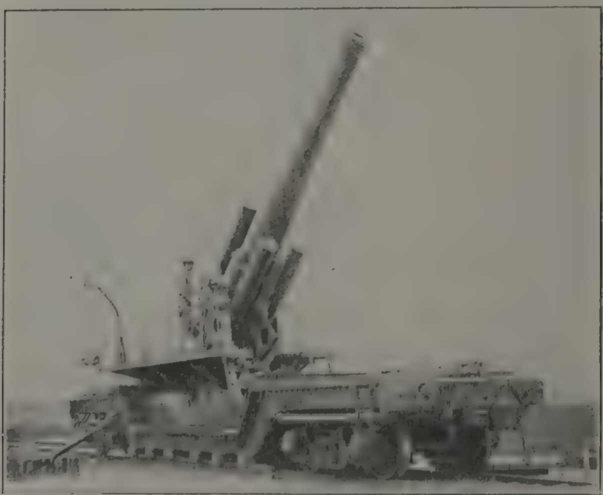


Fig. 2827—Eight-Inch Railway Mount.

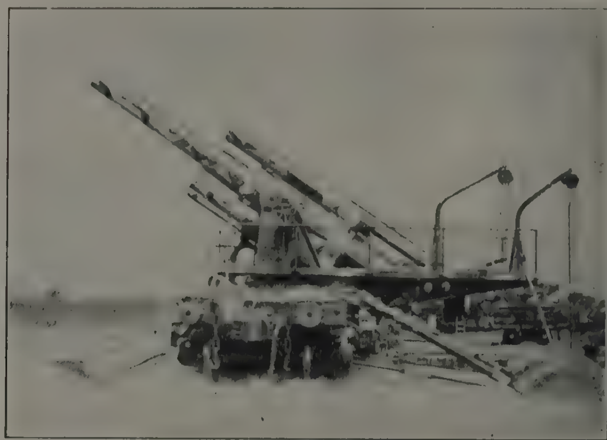


Fig. 2828—Eight-Inch Railway Mount at Instant of Firing.

Fig. 2829—Railway Mount for, and Method of Placing 8-Inch Gun on Narrow Gage Car for Movement to Front. Used by American Forces in France.

(*See Figs.* 2827-2828.)

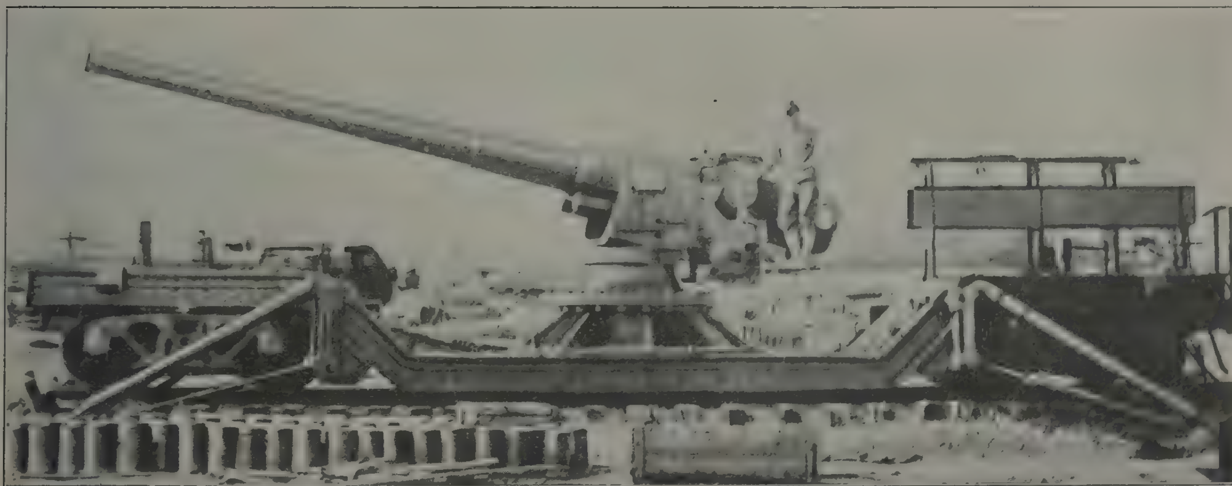


Fig. 2830—Railway Gun Mount for 7-Inch Field Piece for United States Military Forces. Range 2200 Metres.
Photo by International Film Service.

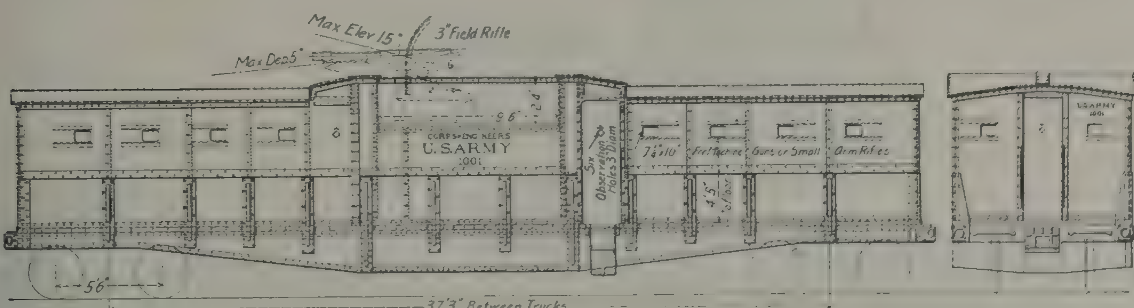


Fig. 2831—Side and End Elevations of the Armored Car for the United States Army.
Used on the Mexican Border.

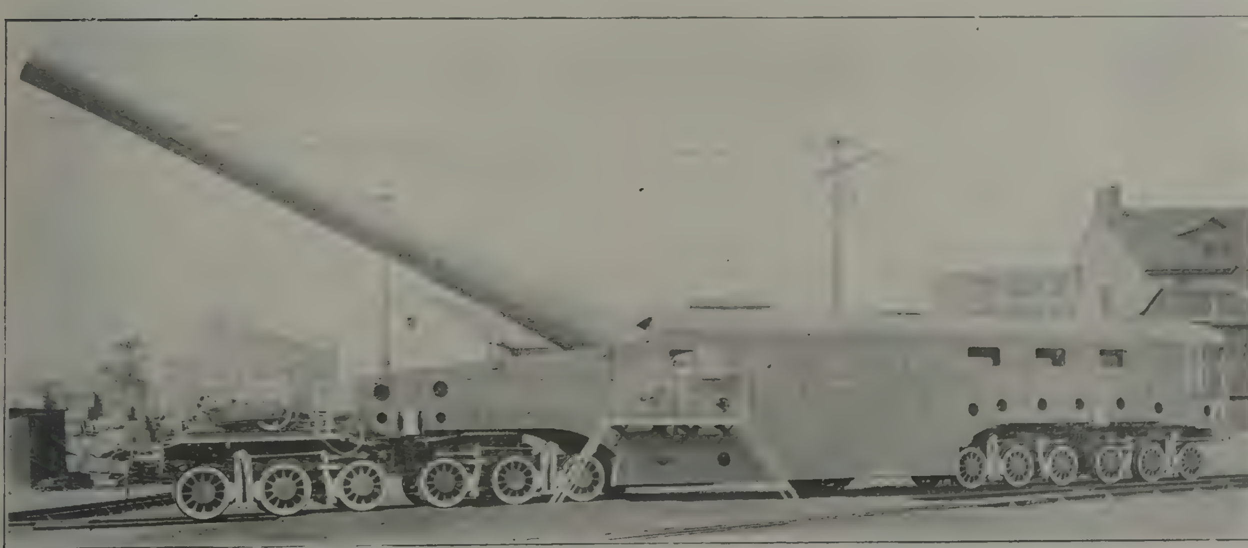


Fig. 2832—Armored Railway Mount for 14-Inch 50-Calibre Naval Gun. Designed by the Navy Bureau of Ordnance; Built by the Baldwin Locomotive Works; for Operation in France. Throws a 1450-lb. Projectile with an Effective Range of 30 Miles at High Elevations.

Fig. 2833—Twelve-Inch 50-Calibre Long Range Gun on Sliding Railway Mount. Throws 700 lb. Projectile at a Muzzle Velocity of 3200 ft. per second. Built by the Ordnance Department of U. S. Army.
Photo by International Film Service.

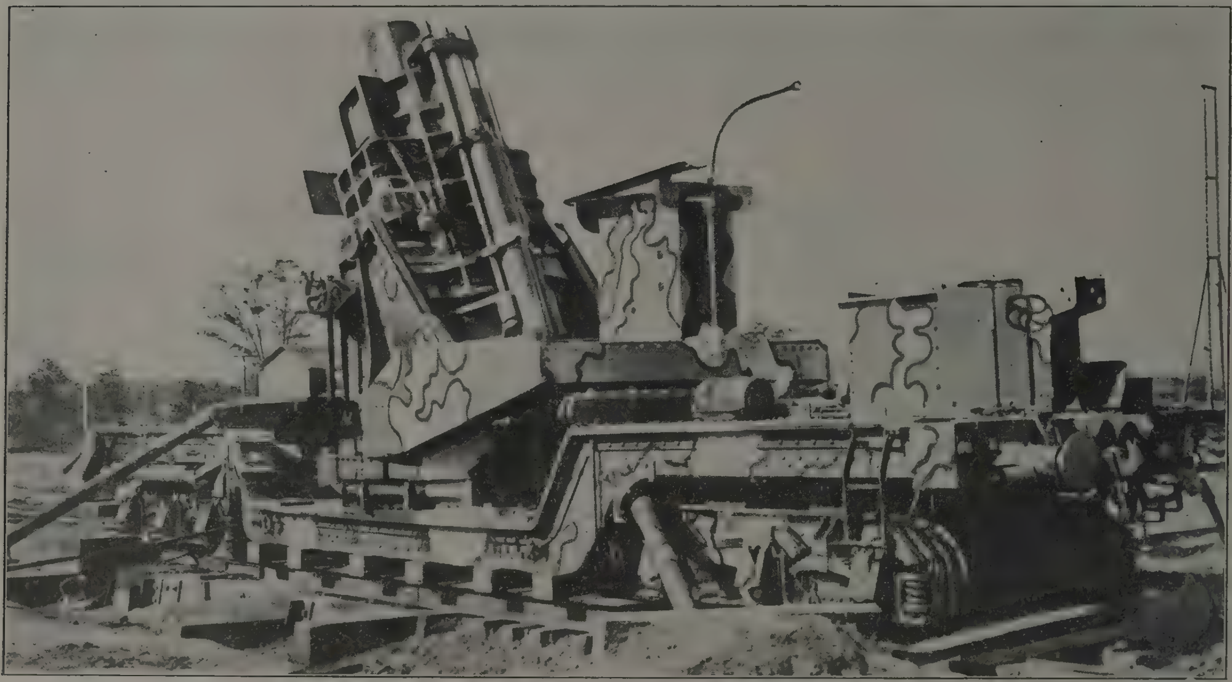


Fig. 2834—Twelve-Inch Mortar for United States Military Forces. Throws a 700 lb. Projectile 10 Miles.
Photo by International Film Service.

Fig. 2835—Camouflaged U. S. Standard Ammunition Supply and Fire Control Car for Railway Artillery, for Use with American Expeditionary Forces in France.

Fig. 2836—Side Door Patient Car for the U. S. Army Hospital Train. Built by the Pullman Company.
See Figs. 2837-2839.)

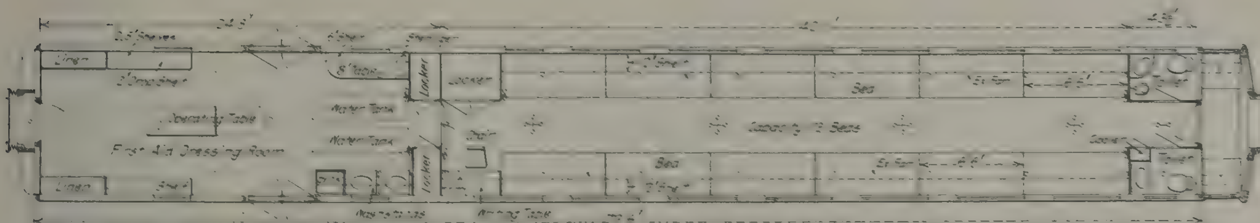


Fig. 2837—Floor Plan of First Aid Car for U. S. Army Hospital Train. Built by the Pullman Company.

Fig. 2838—Interior of First Aid Car Showing Dressing Room and Hospital Beds.
(See Fig. 2837.)

Fig. 2839—Interior of Patient Car with Hospital Beds and Upper Berths.
(See Fig. 2836.)

Fig. 2840—Erie Hospital Car for Use of U. S. Government.

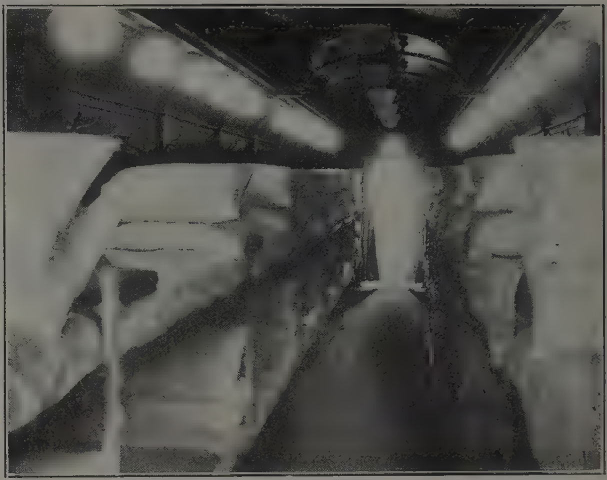


Fig. 2841—Interior of Erie Hospital Car Shown in Figs. 2840 and 2842.

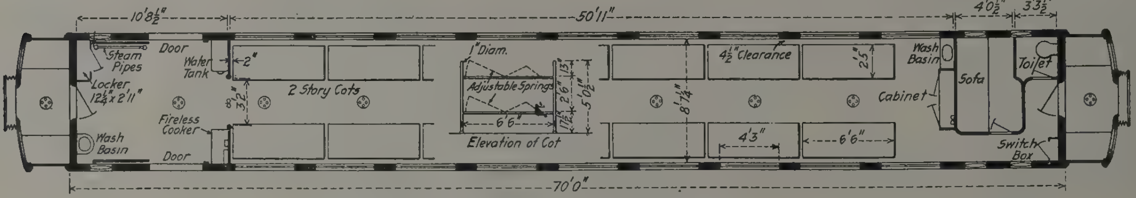


Fig. 2842—Floor Plan of Erie Hospital Car.
(See Figs. 2840-2841.)

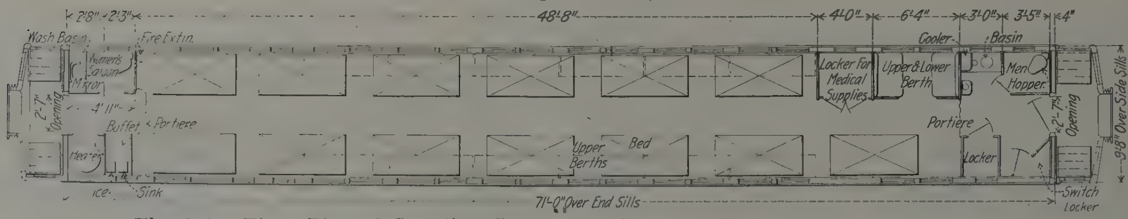


Fig. 2843—Floor Plan of Canadian Government Railways 71-ft.-Military Hospital Car.

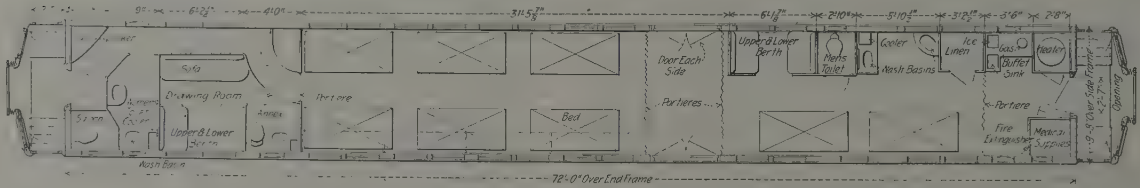


Fig. 2843A—Floor Plan of Canadian Government Railways 72-ft.-Military Hospital Car.

Fig. 2844—One of the Ward Cars for 16-Car Ambulance Train No. 55. Built by the Great Western Railway of England and Operated in France for the American Expeditionary Forces.

Sick Officers' Day Saloon.

Staff Car, Sleeping Compartments.

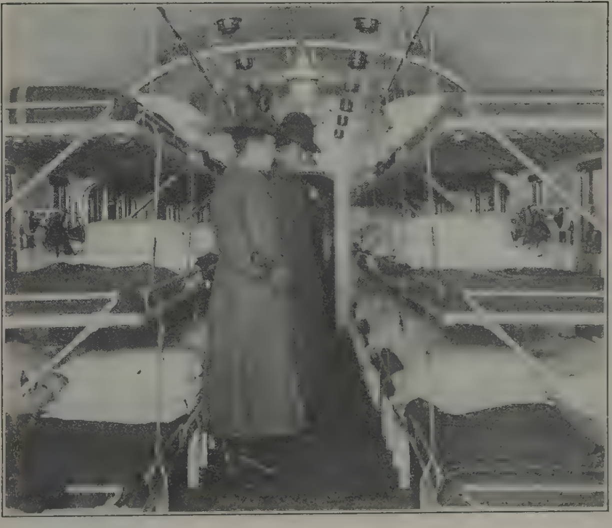
Kitchen Car.

Copyright by Underwood & Underwood, N. Y.

War Car Arranged for Sitting Cases.

Central News Photo.

One of the Nine War Cars.



Central News Photo.

American Officers Inspecting the Accommodations.

Fig. 2845—British 16-Car Ambulance Train for American Expeditionary Forces. Midland Railway of England.

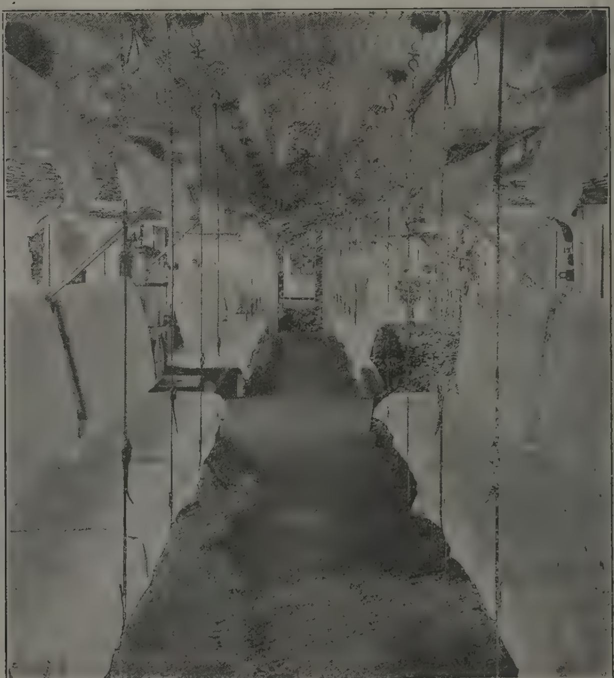
Interior of the Pharmacy Car.

Kitchen Car—Looking Towards the Range and Soyer's Stove.

Ward Car, with Cots Arranged for Lying-down Cases.

Kitchen Car—Sitting and Dining Room for Sick Officers.

Nurses' Dining Room in the Staff Car.



Ward Car, with Bottom Cots Arranged for Sitting-up Cases.

Fig. 2846—British 16-Car Ambulance Train for the United States Army. Built by Lancashire & Yorkshire Railway.

United States Railroad Administration Standard Cars

Photographs and drawings of the standard cars designed and built under the direction of the Railroad Administration, including: box, gondola, hopper, tank, flat, general service, refrigerator and baggage cars.

This section also includes drawings of floor plans and fittings as required by United States Government specifications for postal cars.

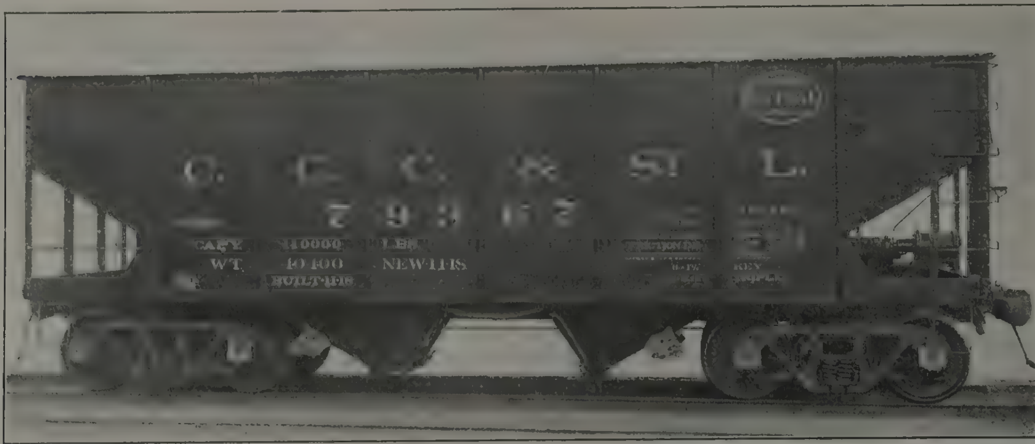


Fig. 2847—U. S. R. A. Standard All-Steel 55-Ton Hopper Car. Assigned to New York Central Lines. Builder, American Car & Foundry Co.
(See Fig. 2860.)

Fig. 2848—U. S. R. A. Standard Composite 50-Ton Gondola Car. Assigned to the Chicago & North Western. Builder, American Car & Foundry Co.
(See Figs. 2868-2869.)

Fig. 2849—U. S. R. A. Standard Steel-Frame Double Sheathed 40-Ton Box Car. Assigned to the Chicago and North Western. Builder, American Car & Foundry Co.
(See Figs. 2852-2854.)

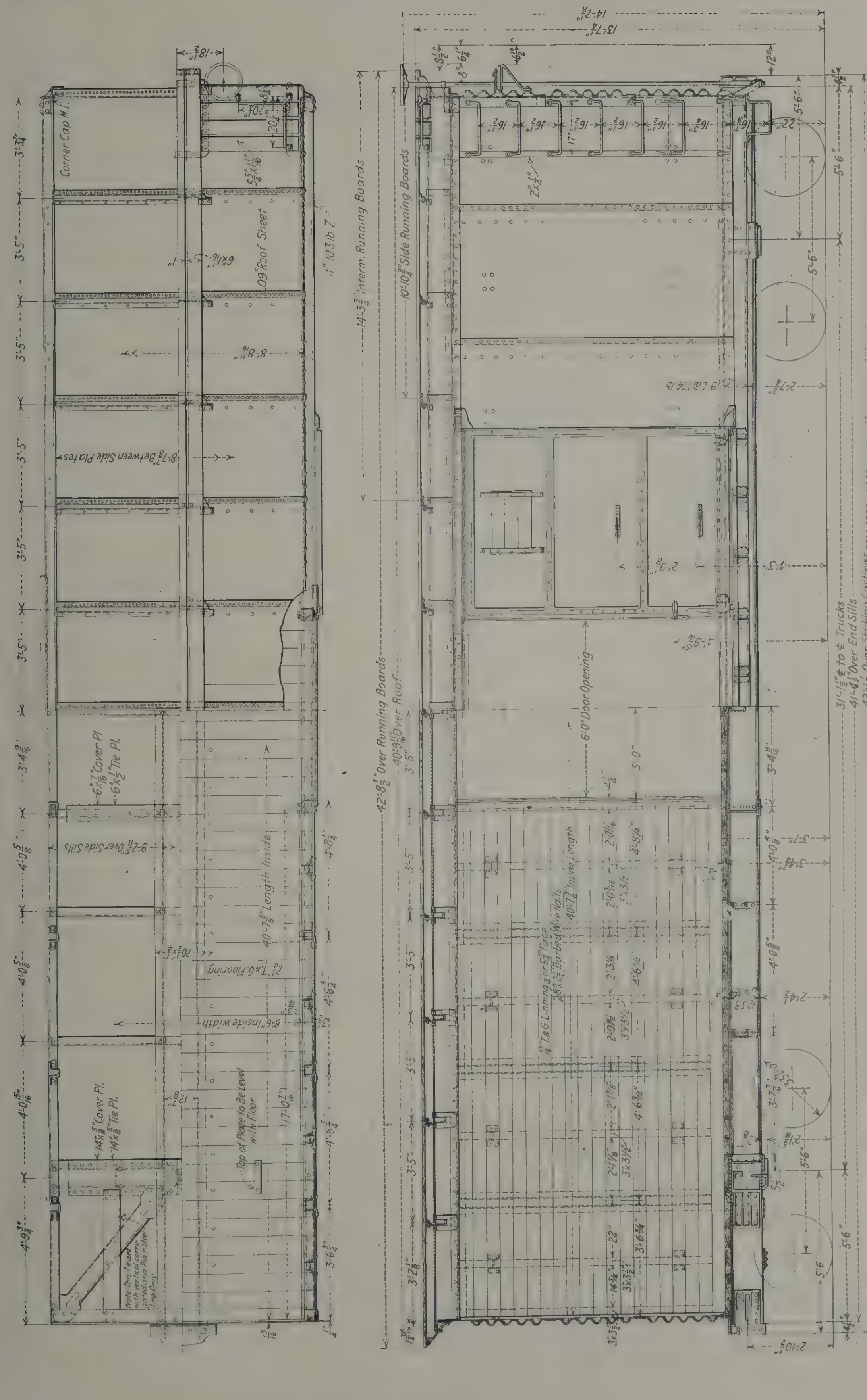


Fig. 2850—U. S. R. A. Standard All-Steel 50-Ton Box Car.
(See Cross Section and End in Fig. 2851.)

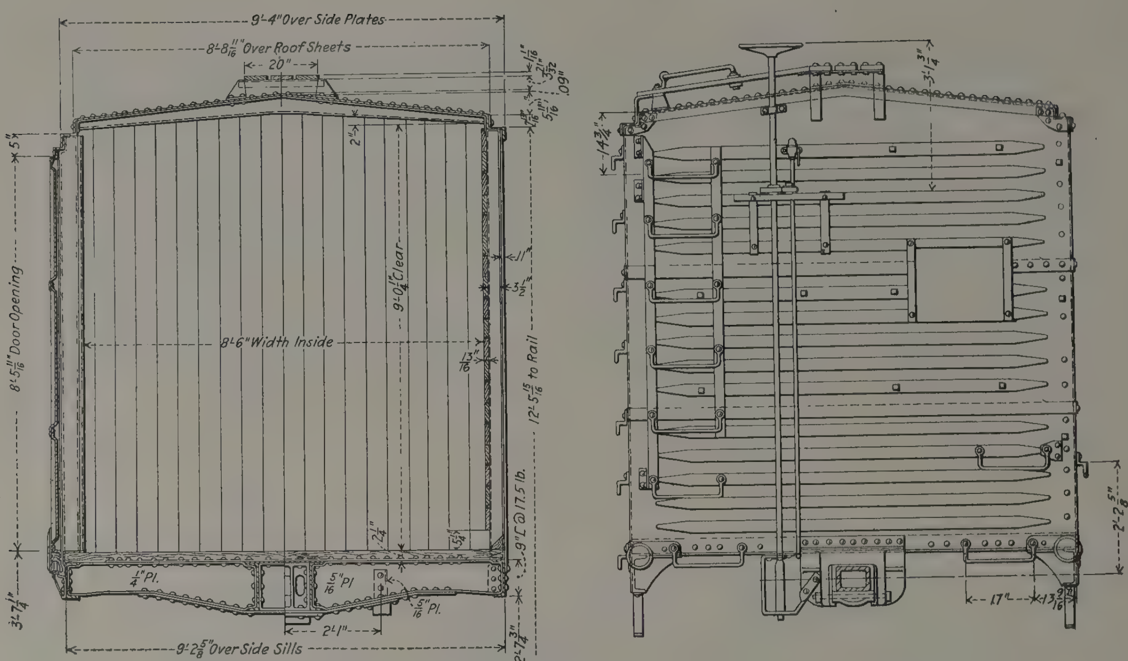


Fig. 2851—Cross-Section and End of All-Steel 50-Ton Box Car Shown in Fig. 2850.

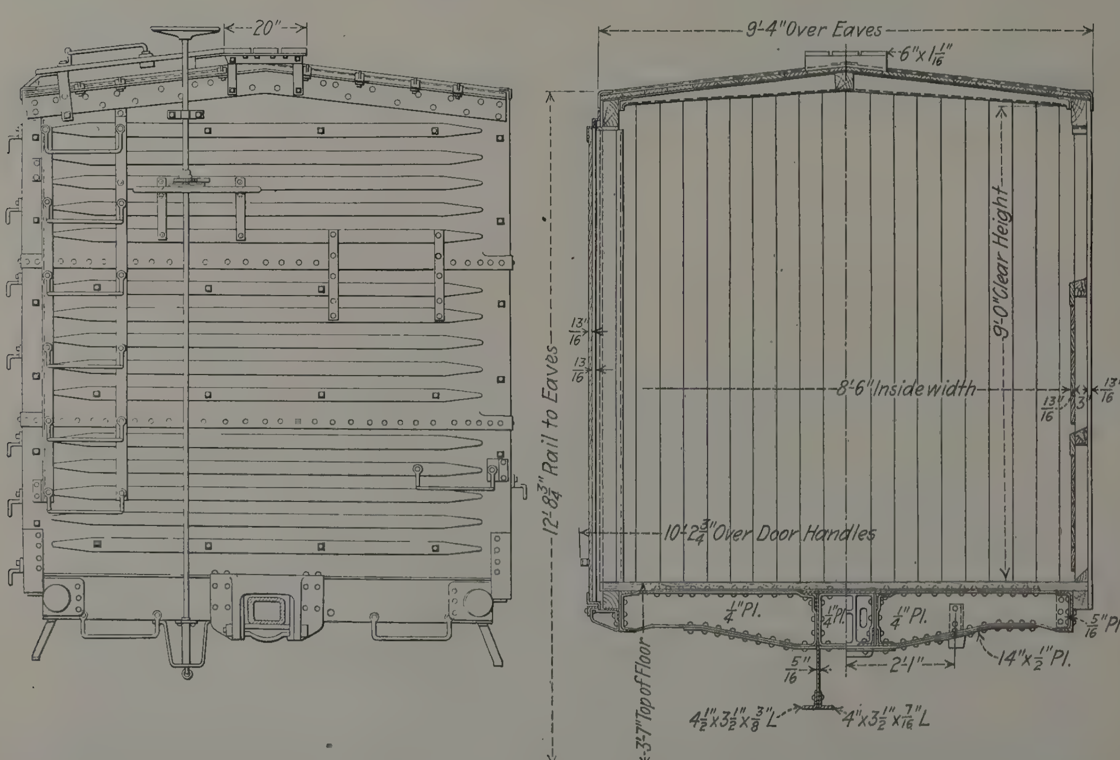


Fig. 2852—Cross-Section and End of 40-Ton Box Car Shown in Figs. 2849, 2853 and 2854.

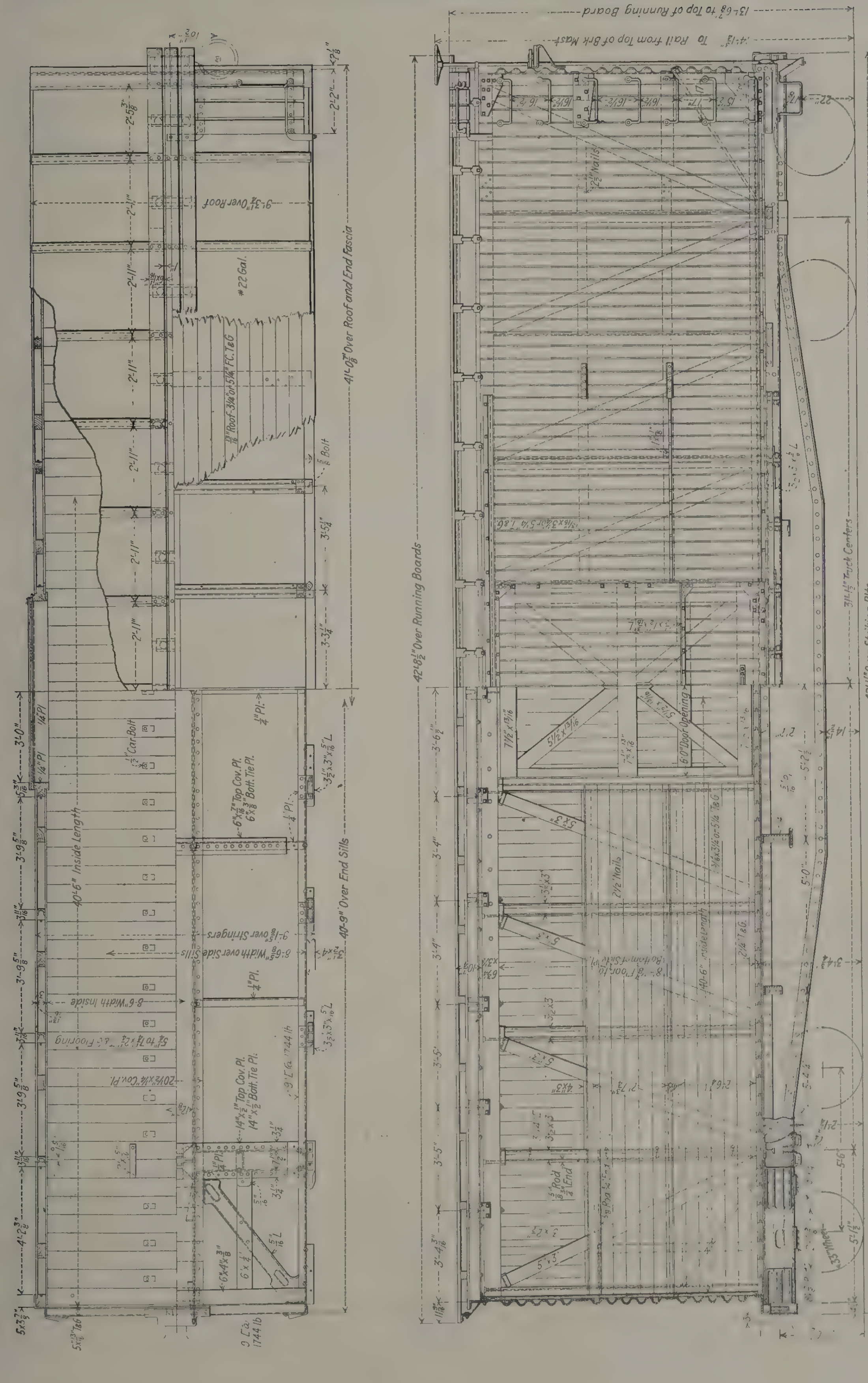


Fig. 2853—U. S. R. A. Standard Steel Frame 40-Ton Double Sheathed Box Car.
(*See Figs. 2849, 2852 and 2854.*)

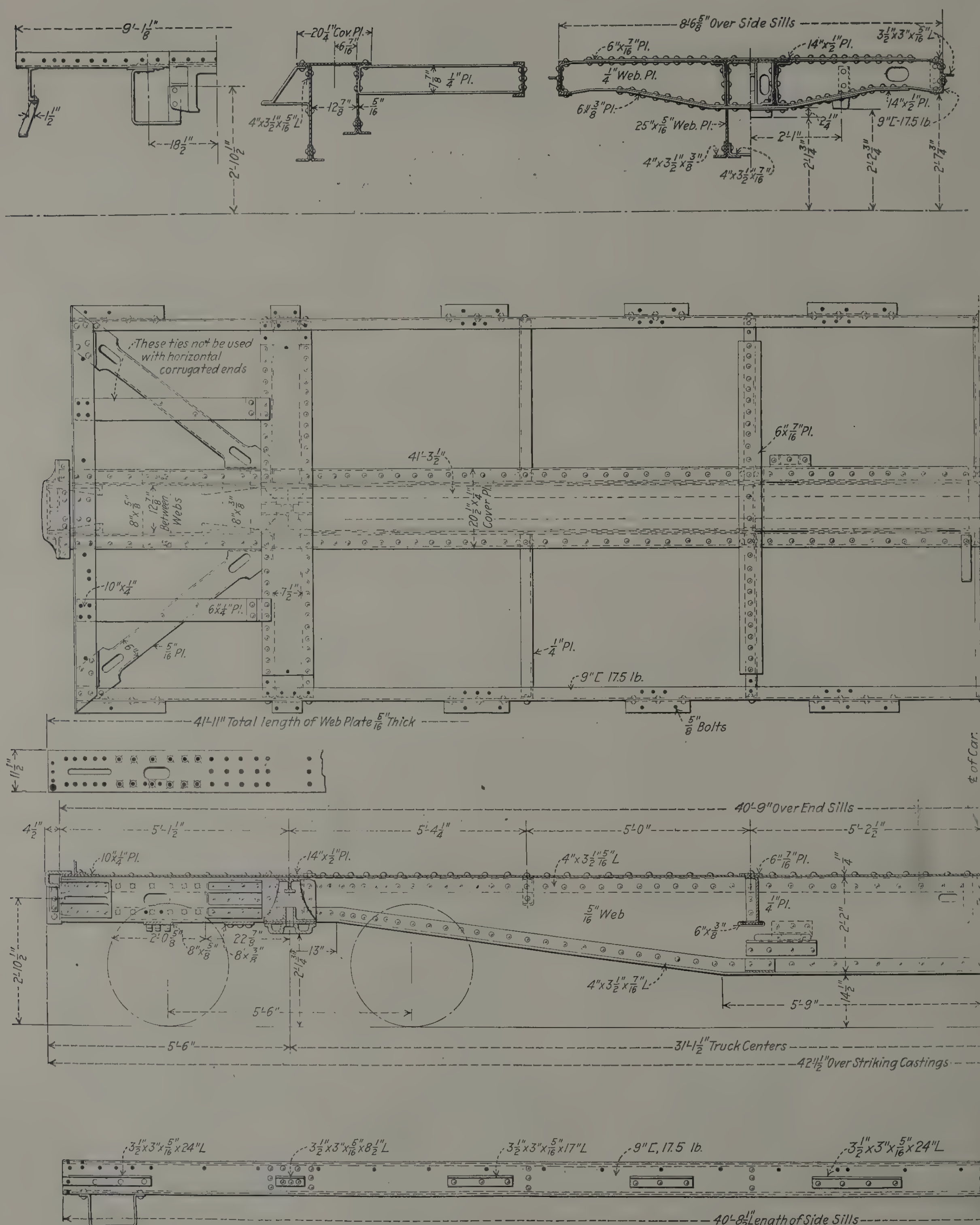


Fig. 2854—Steel Underframe for 40-Ton Double Sheathed Box Car Shown in Figs. 2849, 2852 and 2853.

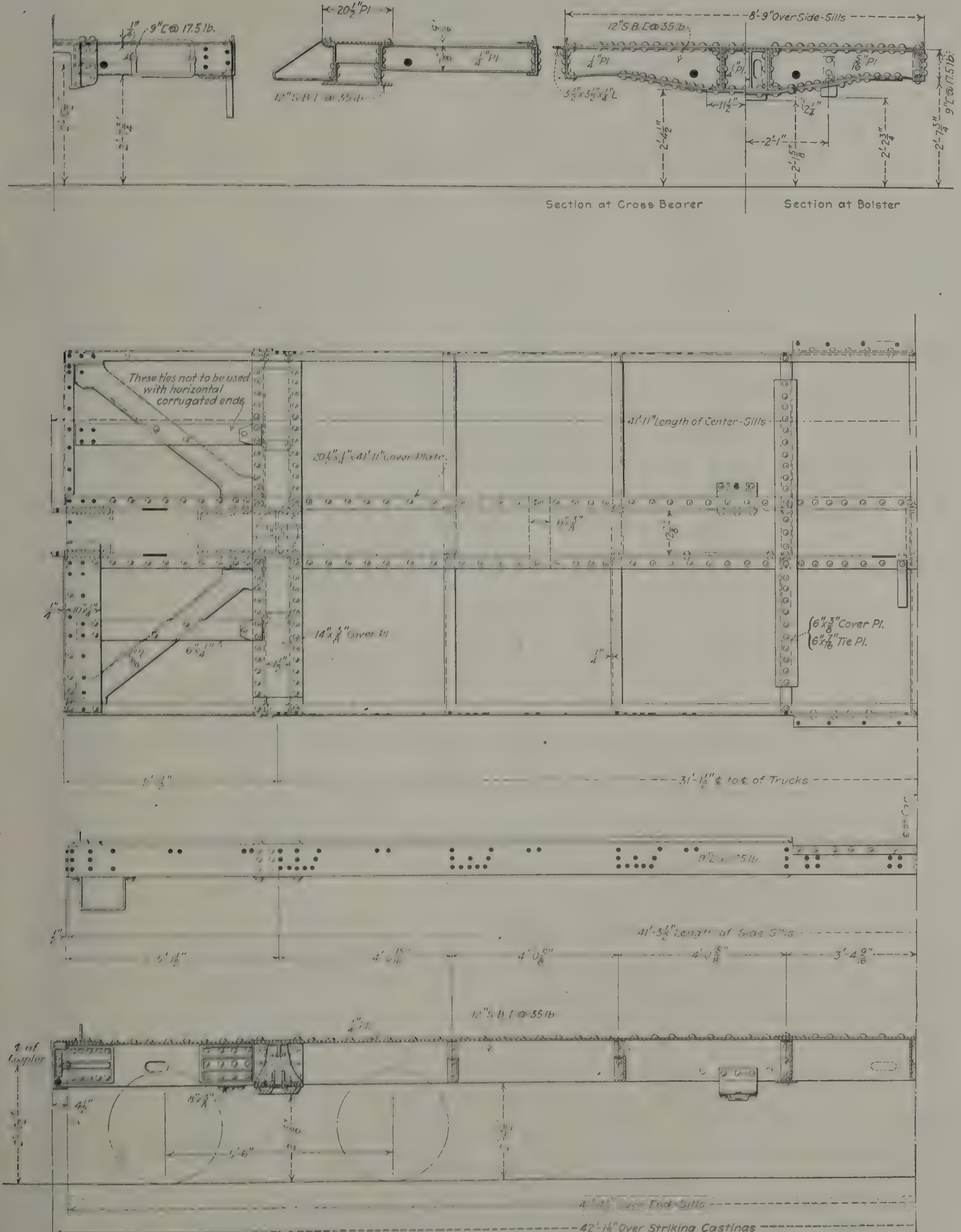


Fig. 2855—Steel Underframe for 40-Ton Single Sheathed Box Car Shown in Figs. 2856-2857.

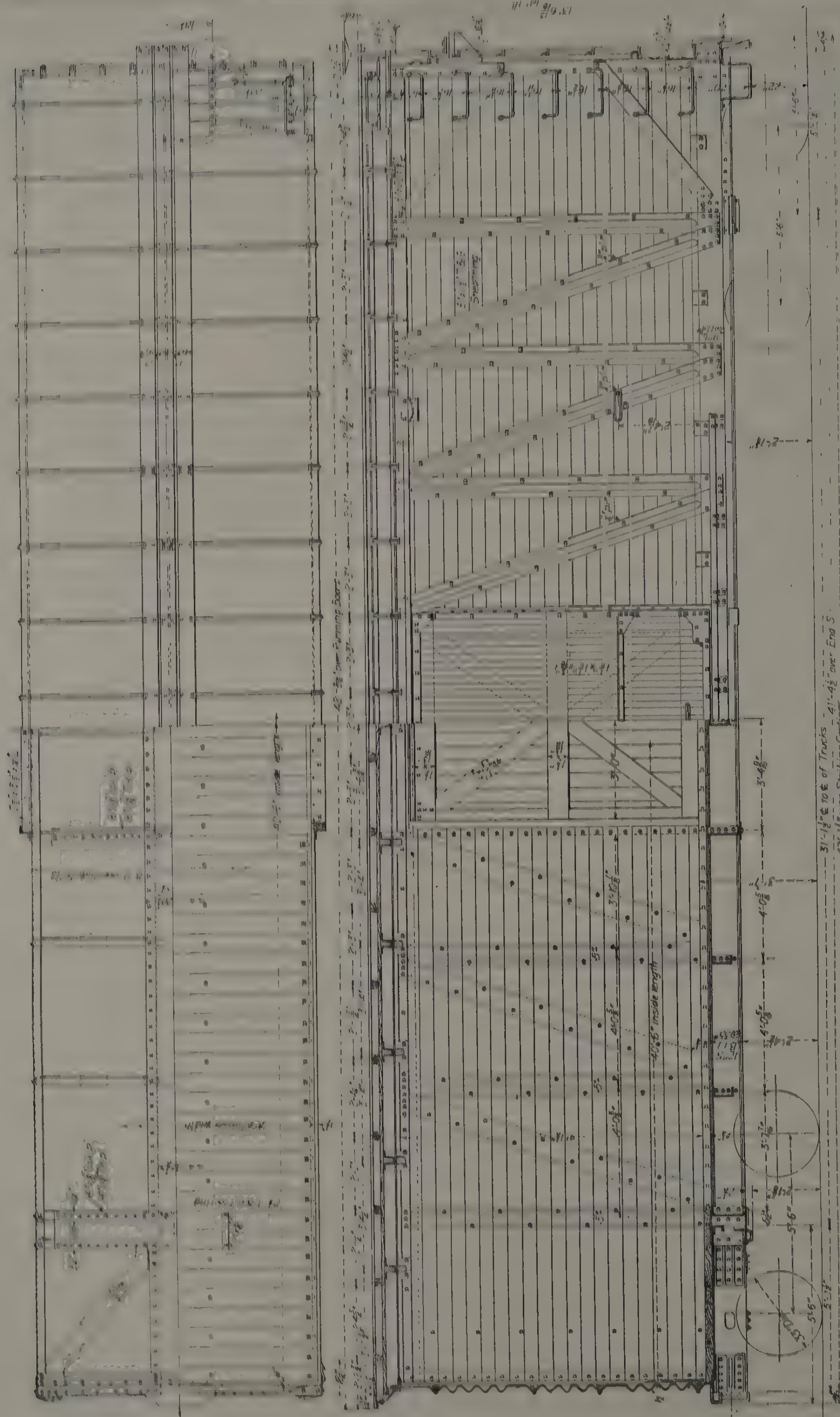


Fig. 2856—U. S. R. A. Standard Steel Underframe 40 and 50-Ton Single Sheathed Box Car.

(*See Figs. 2855 and 2857.*)

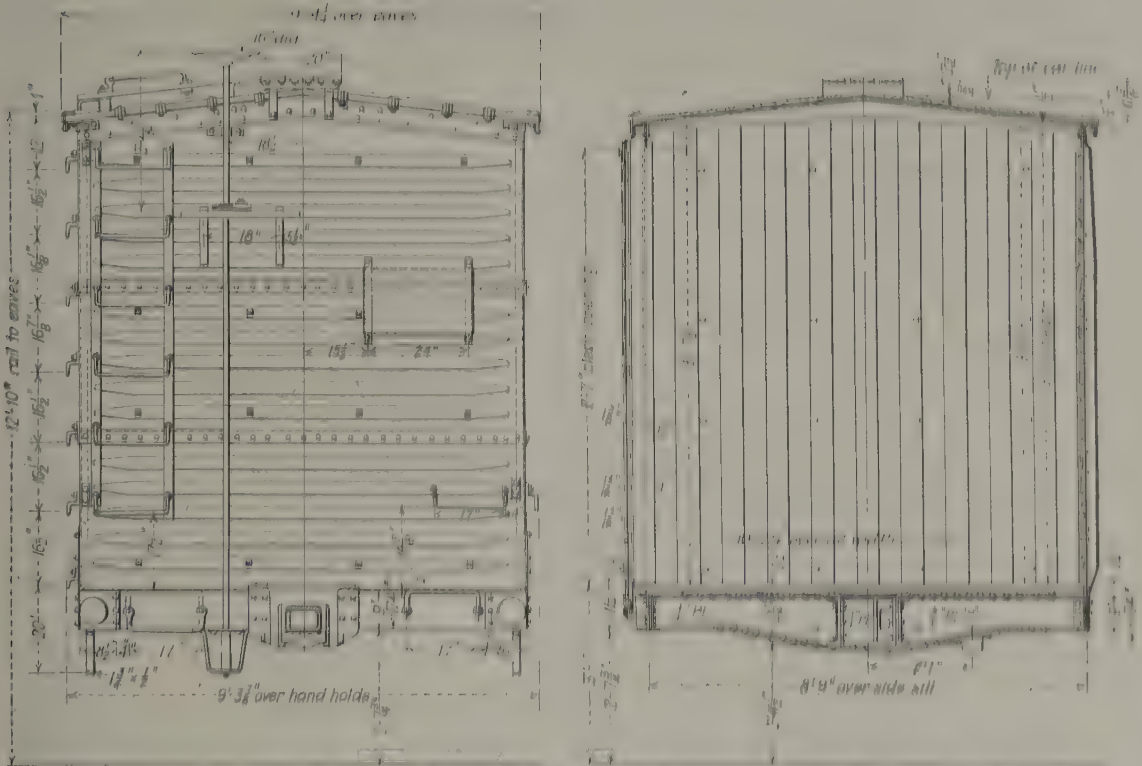


Fig. 2857—Cross-Section and End of 40 and 50 Ton Single Sheathed Box Car Shown in Figs. 2855-2856.

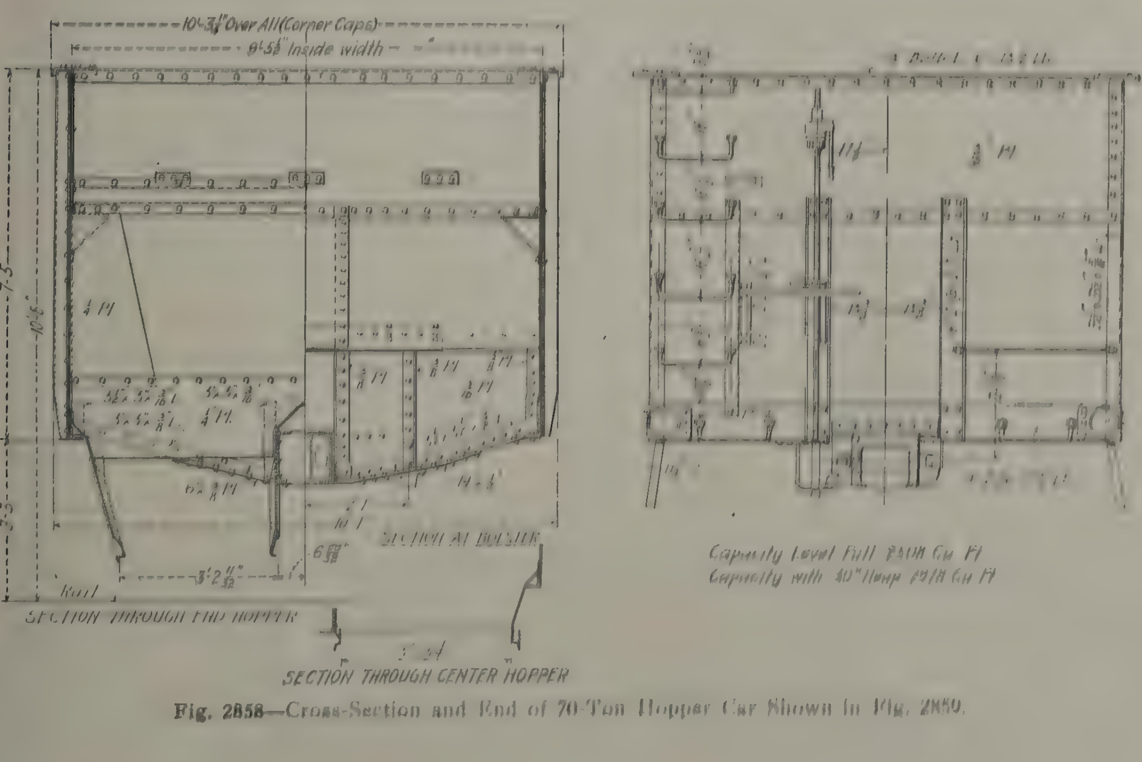


Fig. 2858—Cross-Section and End of 70-Ton Hopper Car Shown in Fig. 2859.

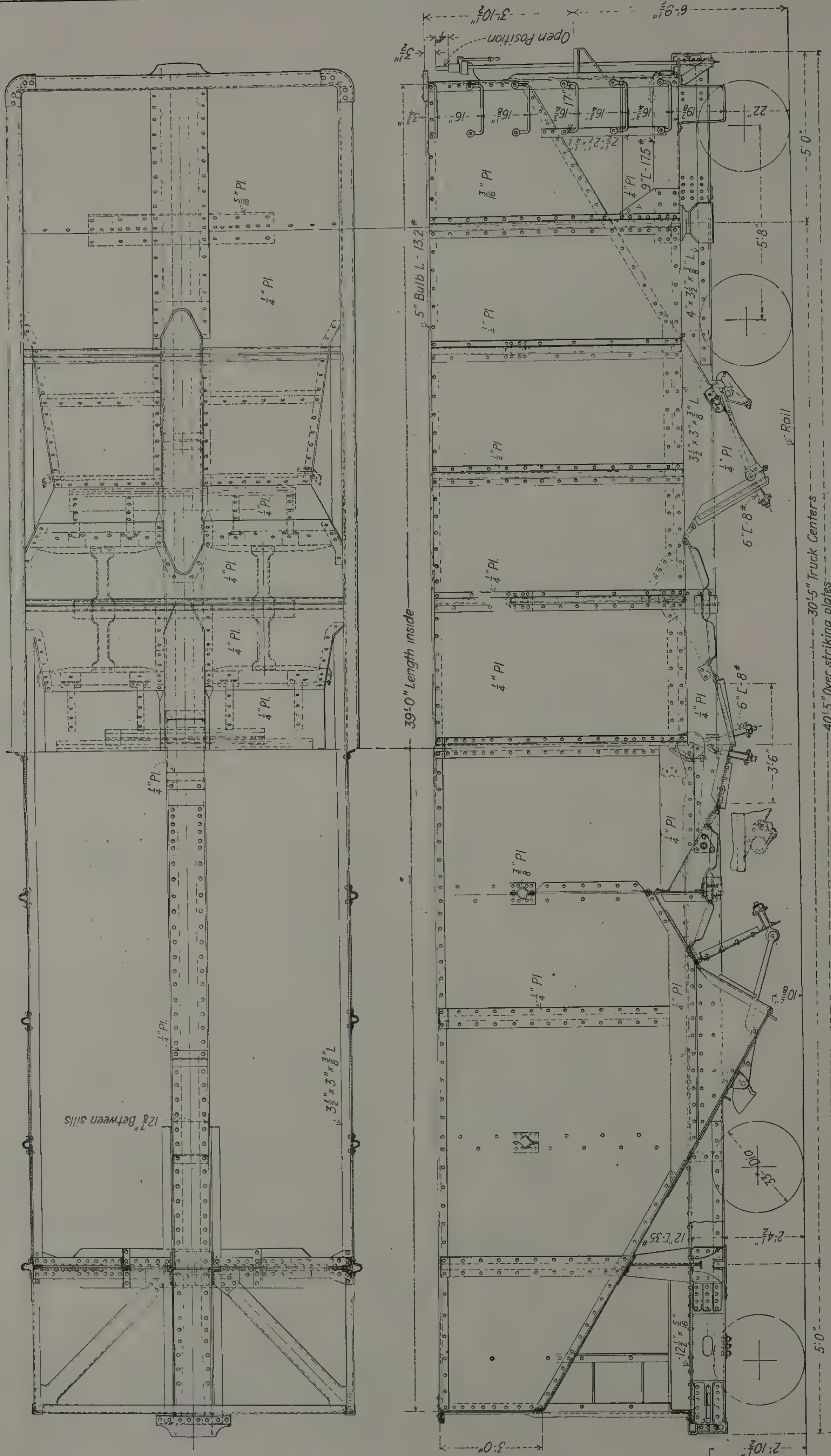


Fig. 2859—U. S. R. A. Standard All-Steel 70-Ton Hopper Car.
(See Cross-Section and End in Fig. 2858.)

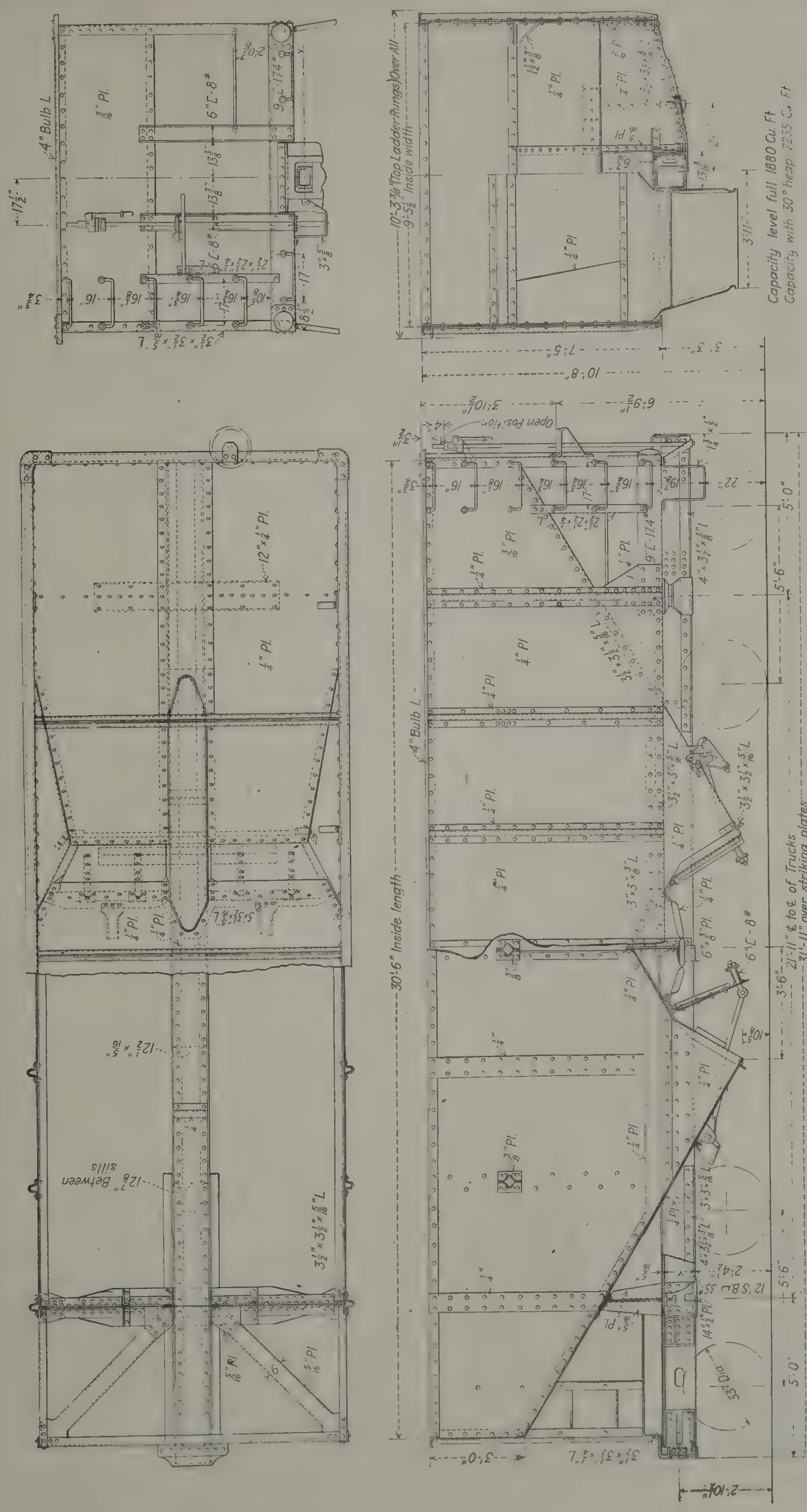


Fig. 2860—U. S. R. A. Standard All-Steel 55-Ton Hopper Car.
(See Fig. 2847.)

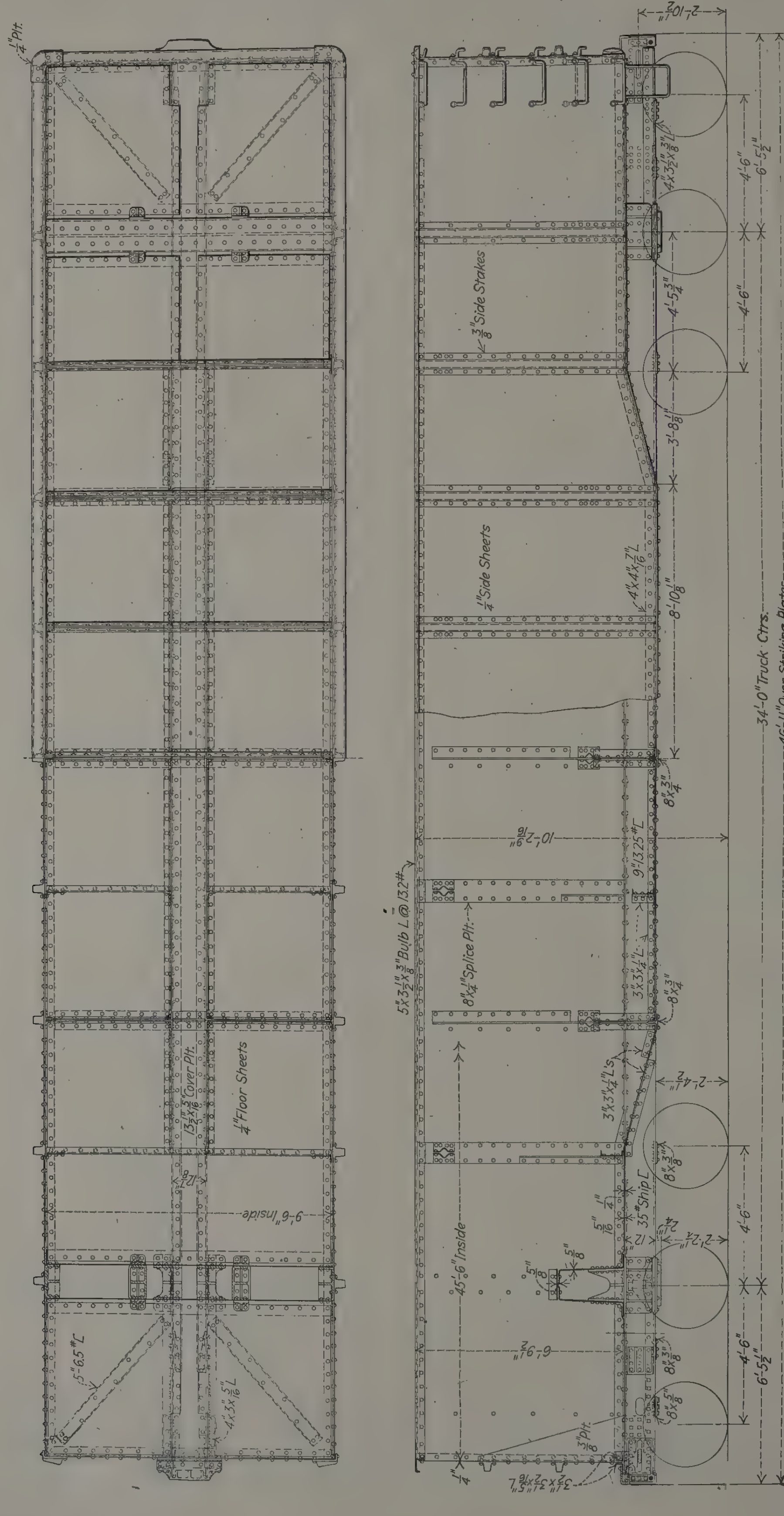


Fig. 2861—U. S. R. A. Standard All-Steel 100-Ton Gondola Car.
(See Cross-Section and End in Fig. 2862.)

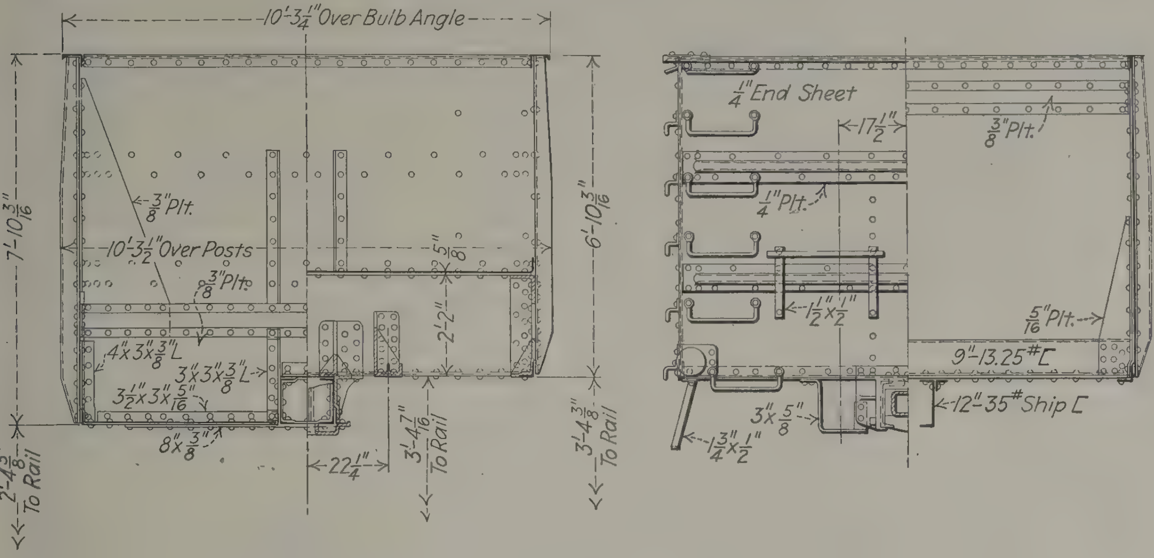


Fig. 2862—Cross-Section and End of 100-Ton Gondola Car Shown in Fig. 2861.

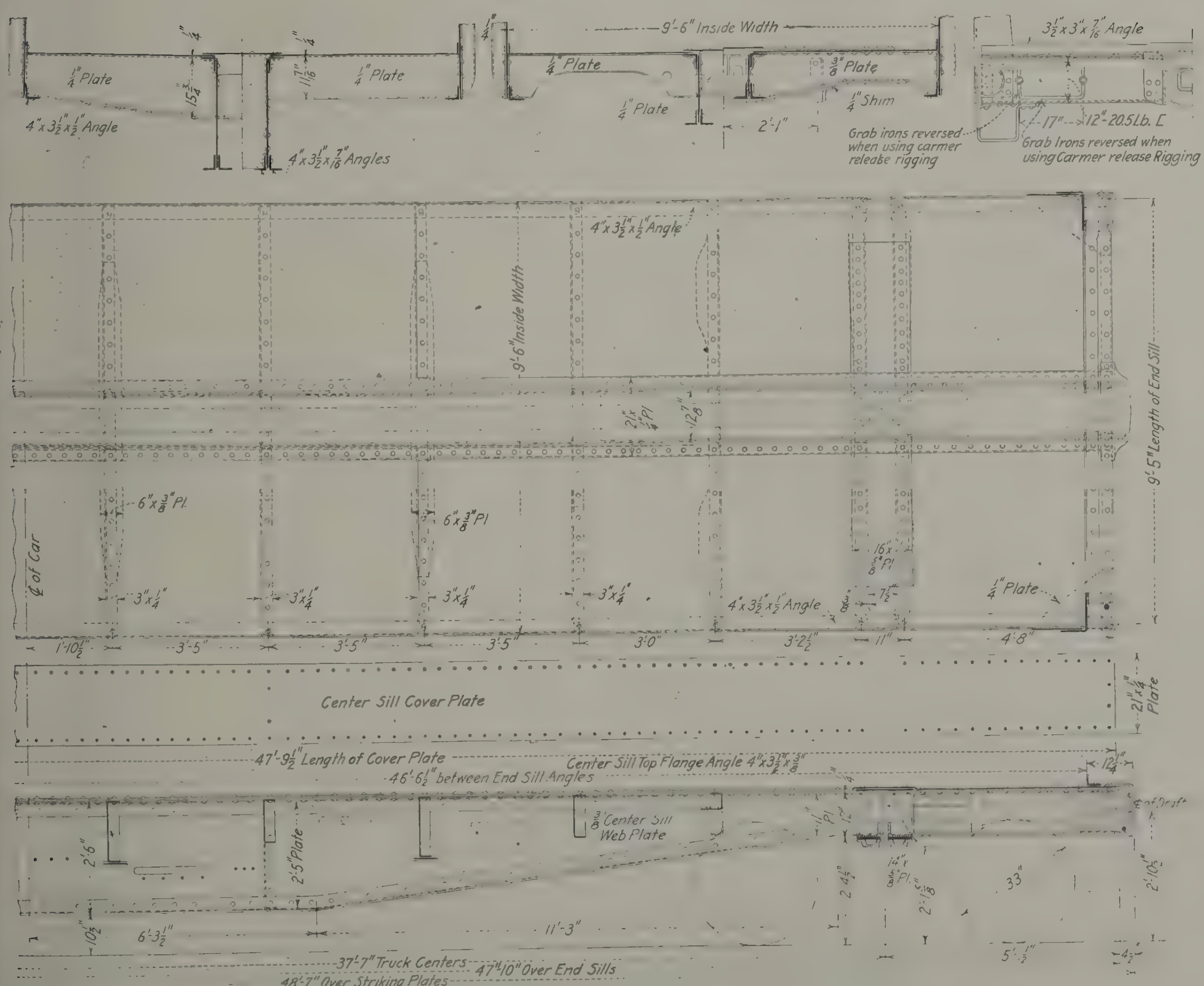


Fig. 2863—Steel Underframe for 70-Ton Low Side Gondola Car Shown in Fig. 2864.

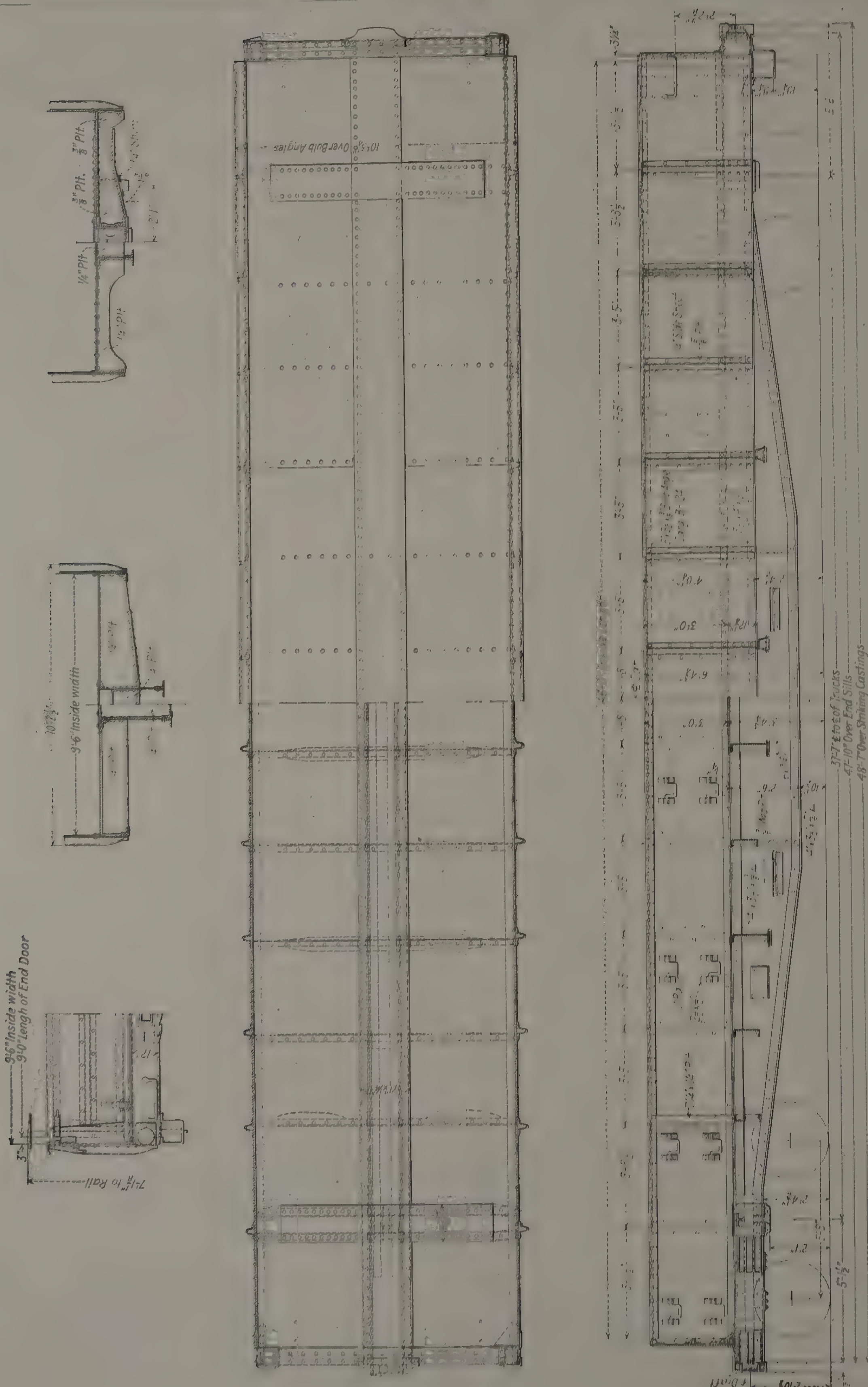


Fig. 2864—U. S. R. A. Standard All-Steel 70-Ton Low Side Gondola Car.
(See Underframe in Fig. 2863.)

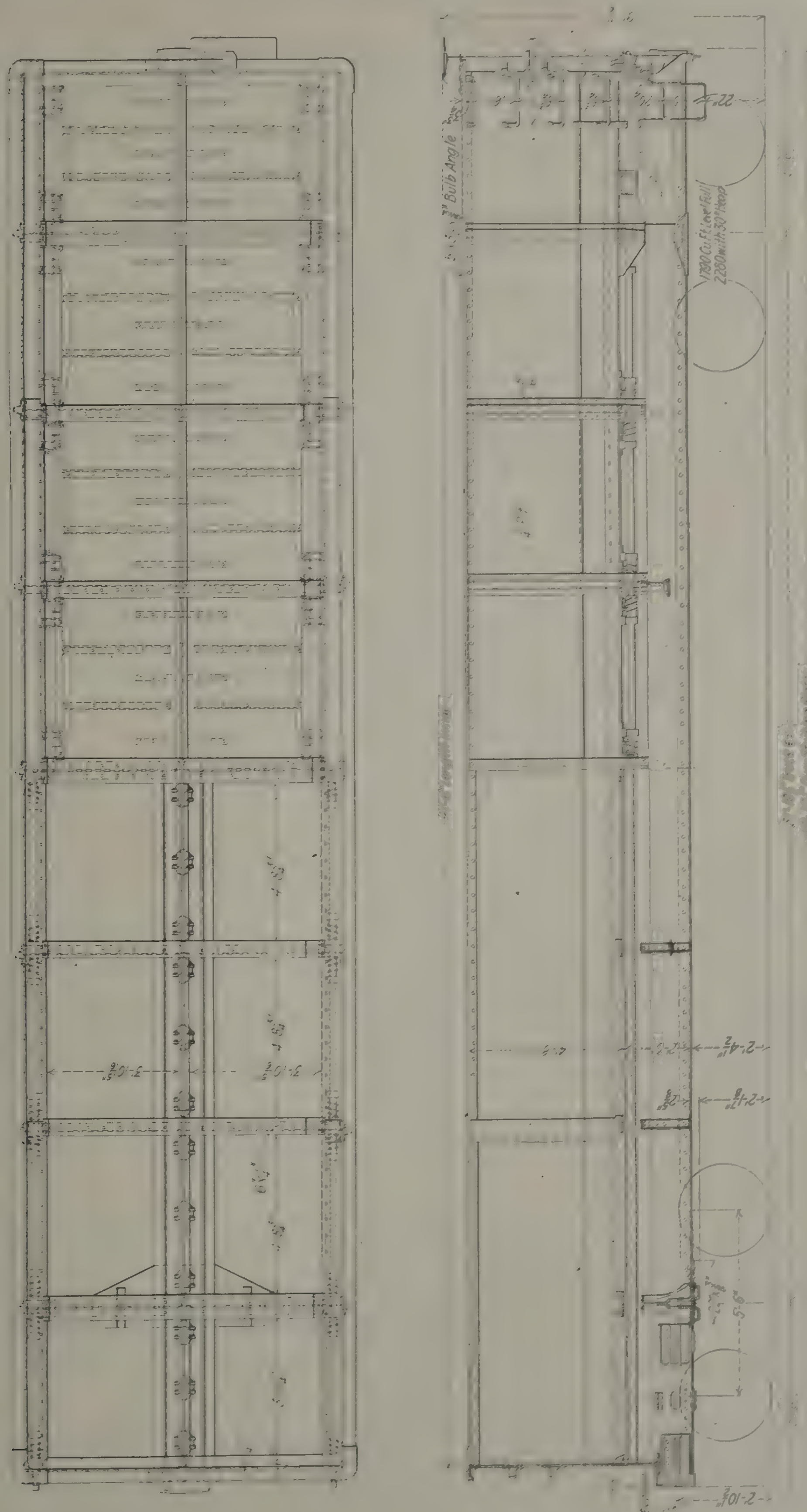


Fig. 2865—U. S. R. A. Standard All-Steel 50-Ton General Service Car.

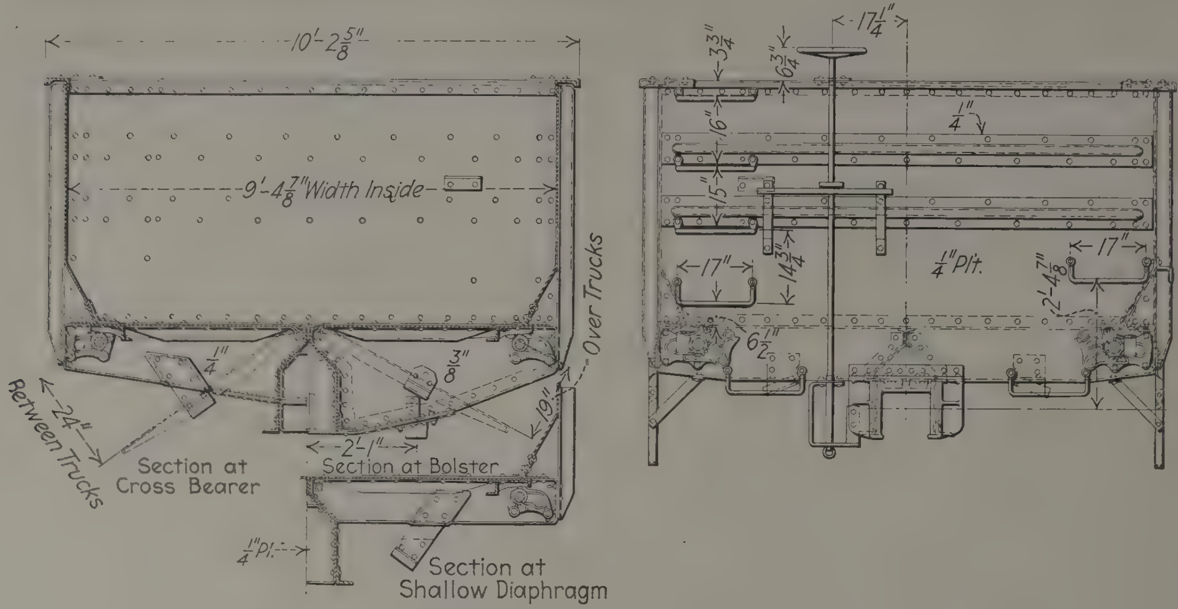


Fig. 2866—Cross-Section and End of 50-Ton General Service Car Shown in Figs. 2865 and 2867.

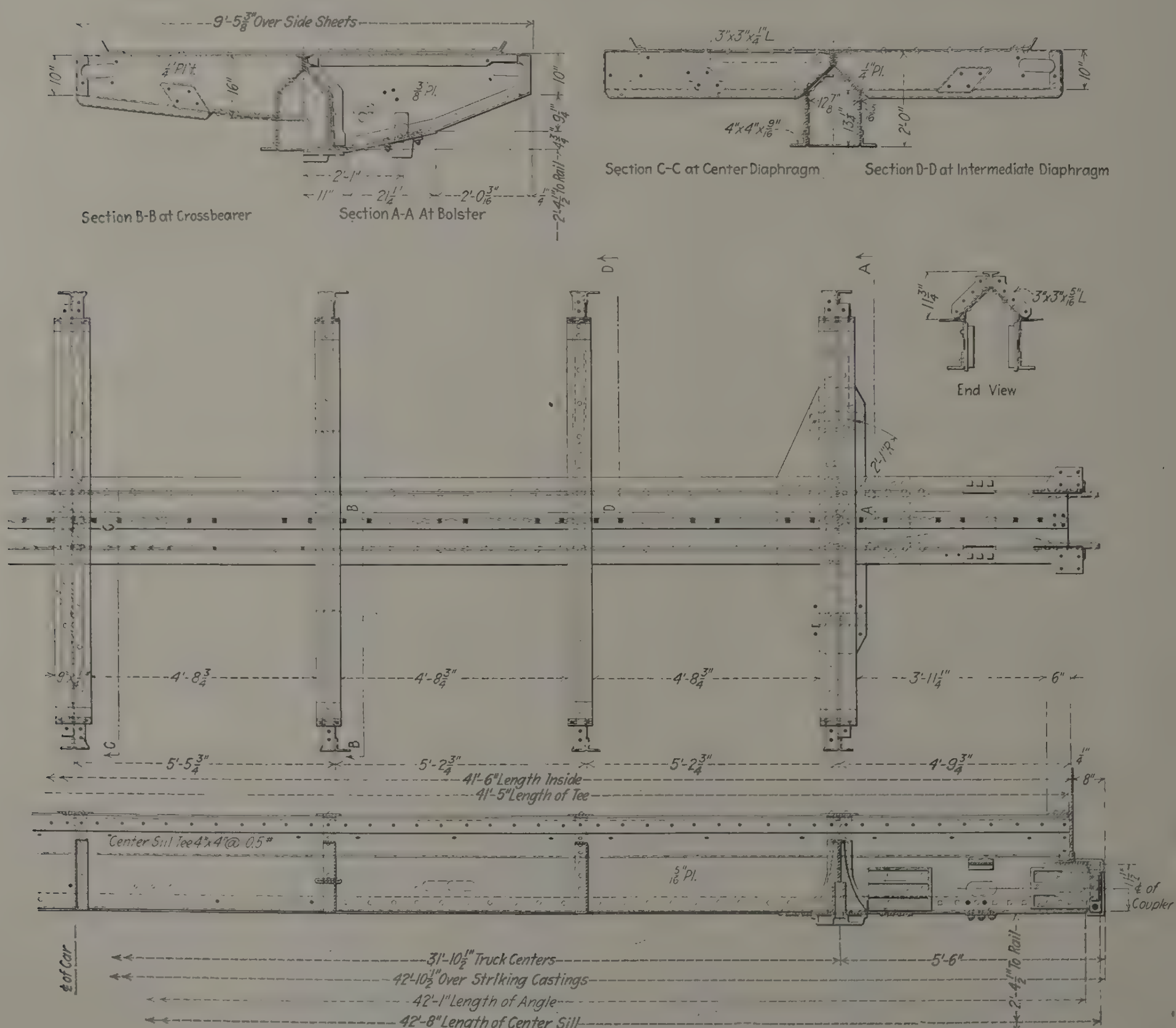


Fig. 2867—Steel Underframe for 50-Ton General Service Car Shown in Figs. 2865-2866.

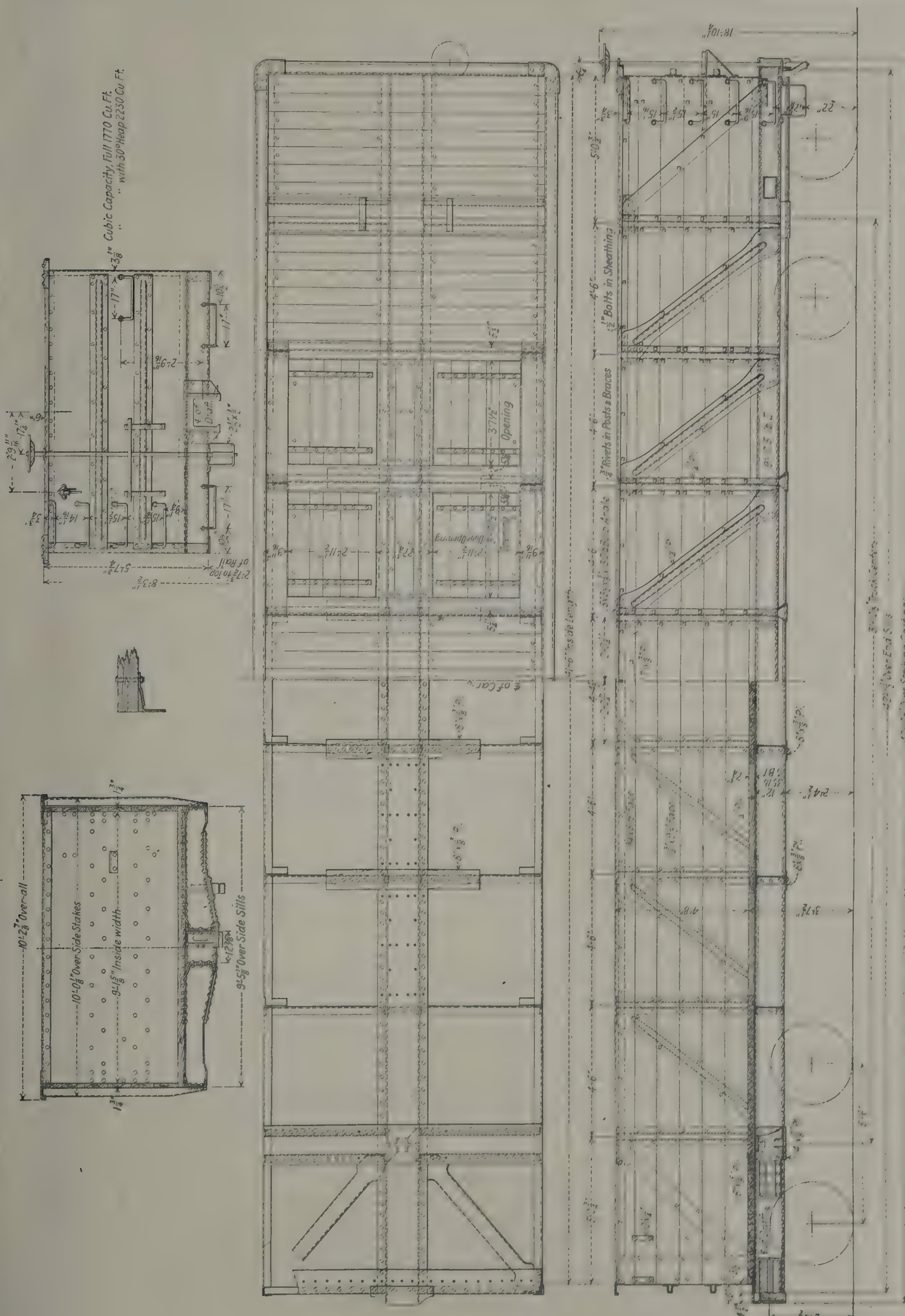


Fig. 2868—U. S. R. A. Standard, Composite 50-Ton Gondola Car.
(See Figs. 2848 and 2869.)

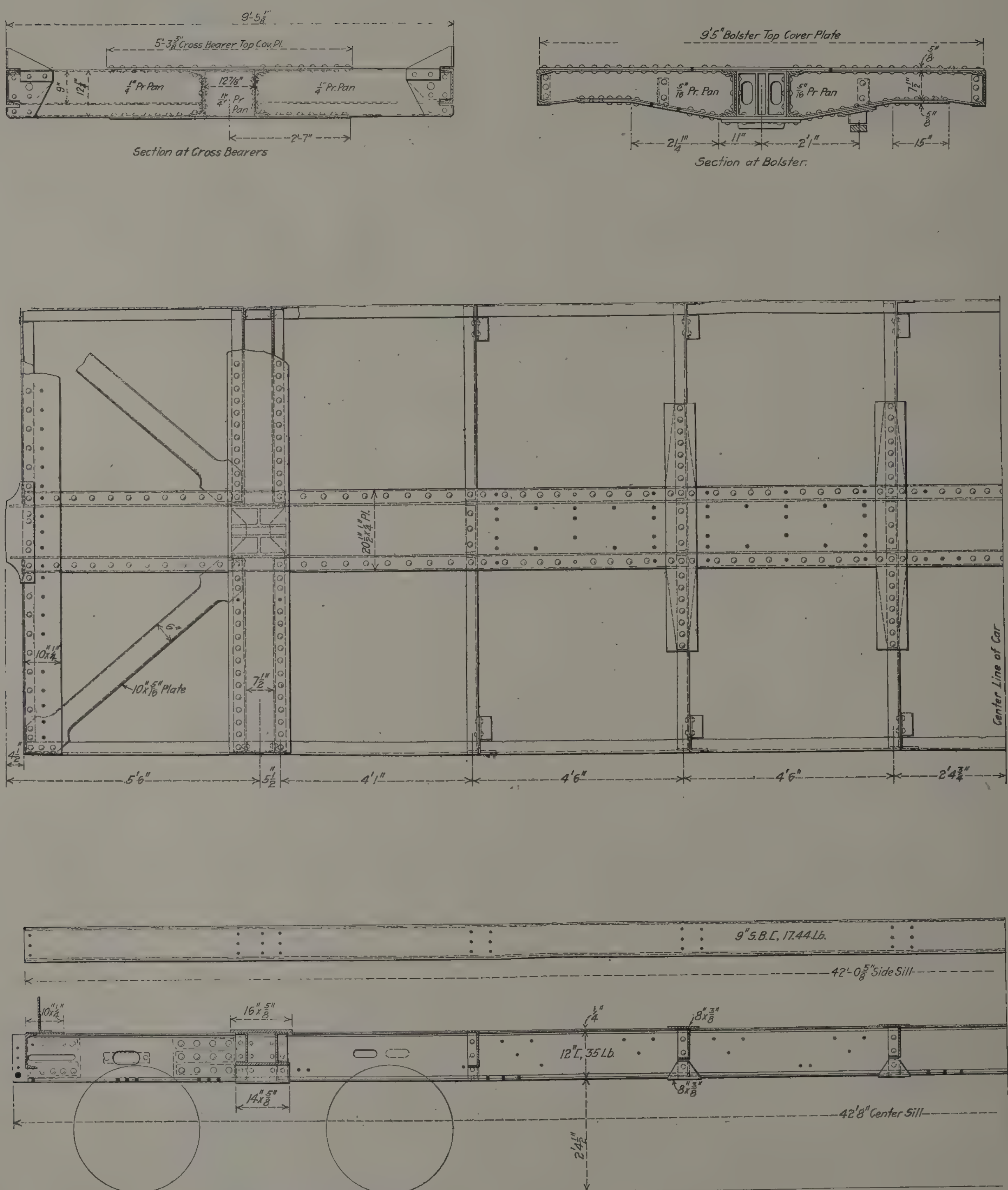


Fig. 2869—Steel Underframe for 50-Ton Gondola Car Shown in Fig. 2868.

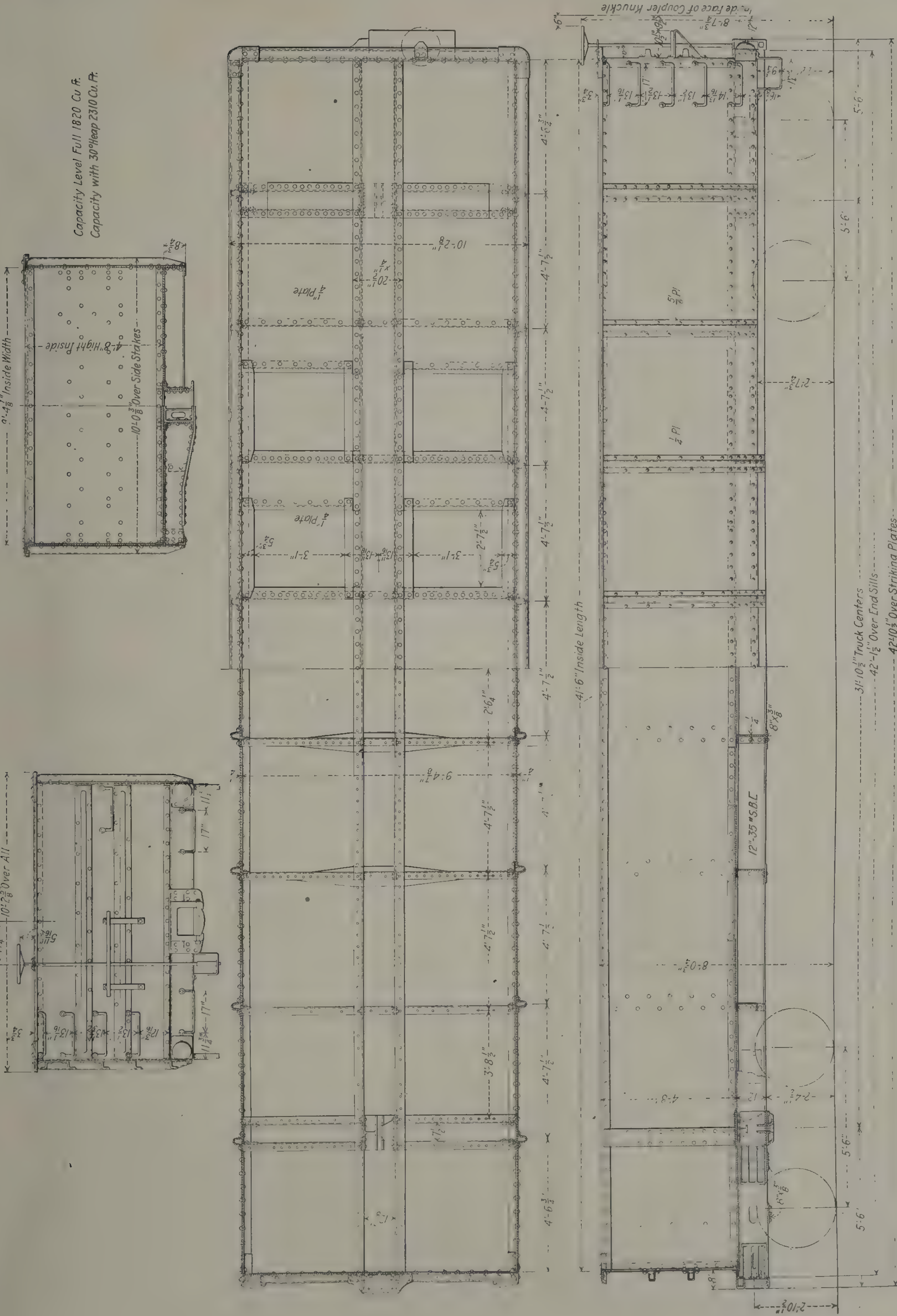


Fig. 2870—U. S. R. A. Standard All-Steel 50-Ton High Side Gondola Car.

(See U. S. R. A. Standard Underframe in Fig. 2871.)

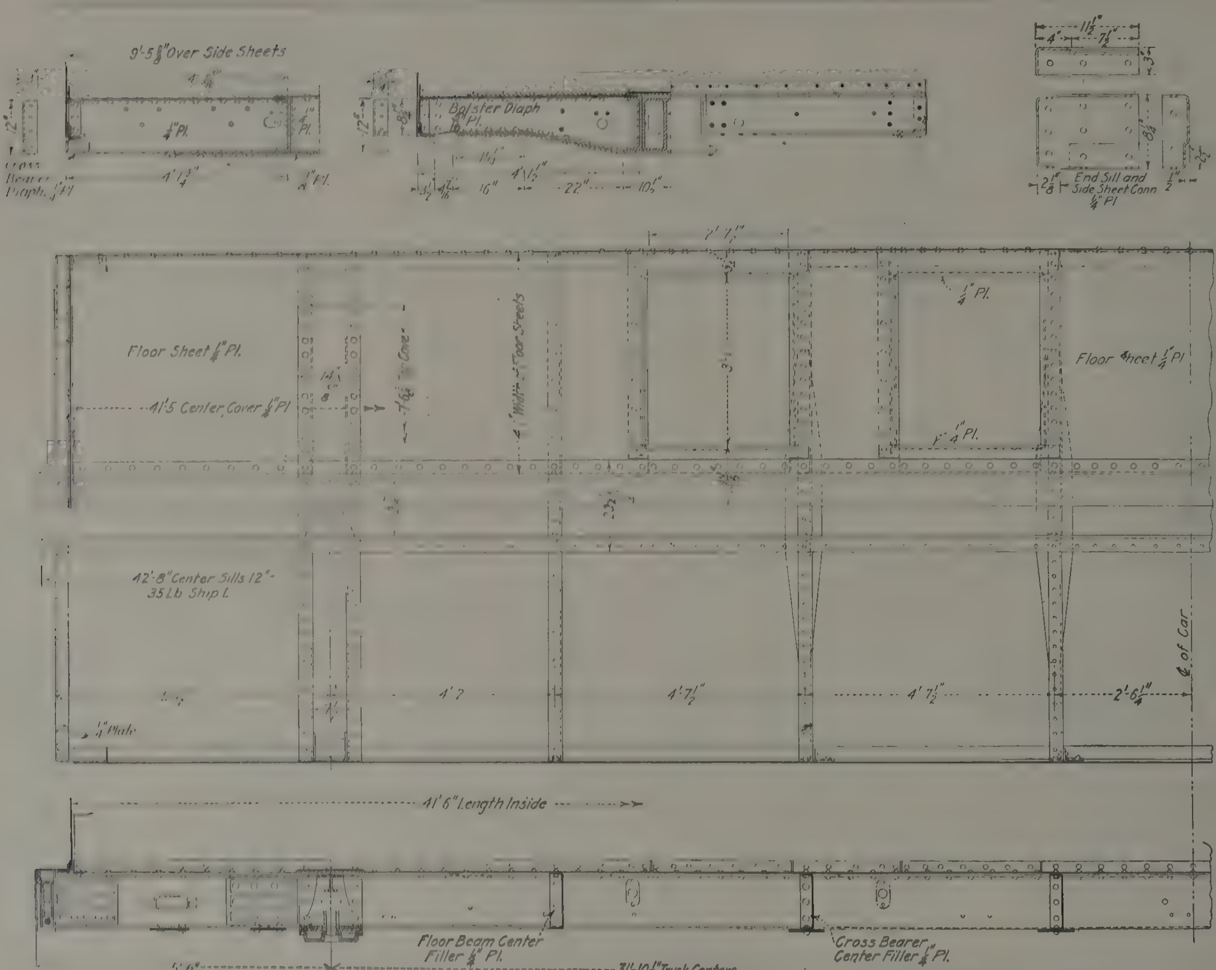


Fig. 2871—Steel Underframe for 50-Ton Gondola Car Shown in Fig. 2870.

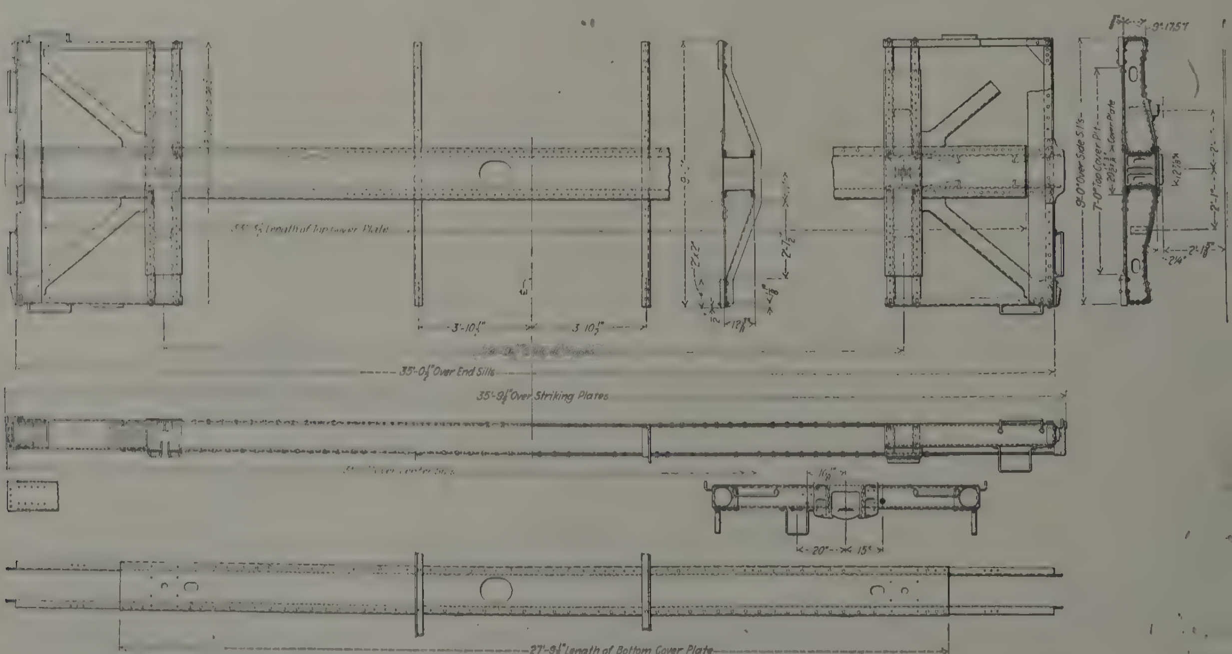


Fig. 2872—Steel Underframe for Tank Cars Shown in Figs. 2873-2875.

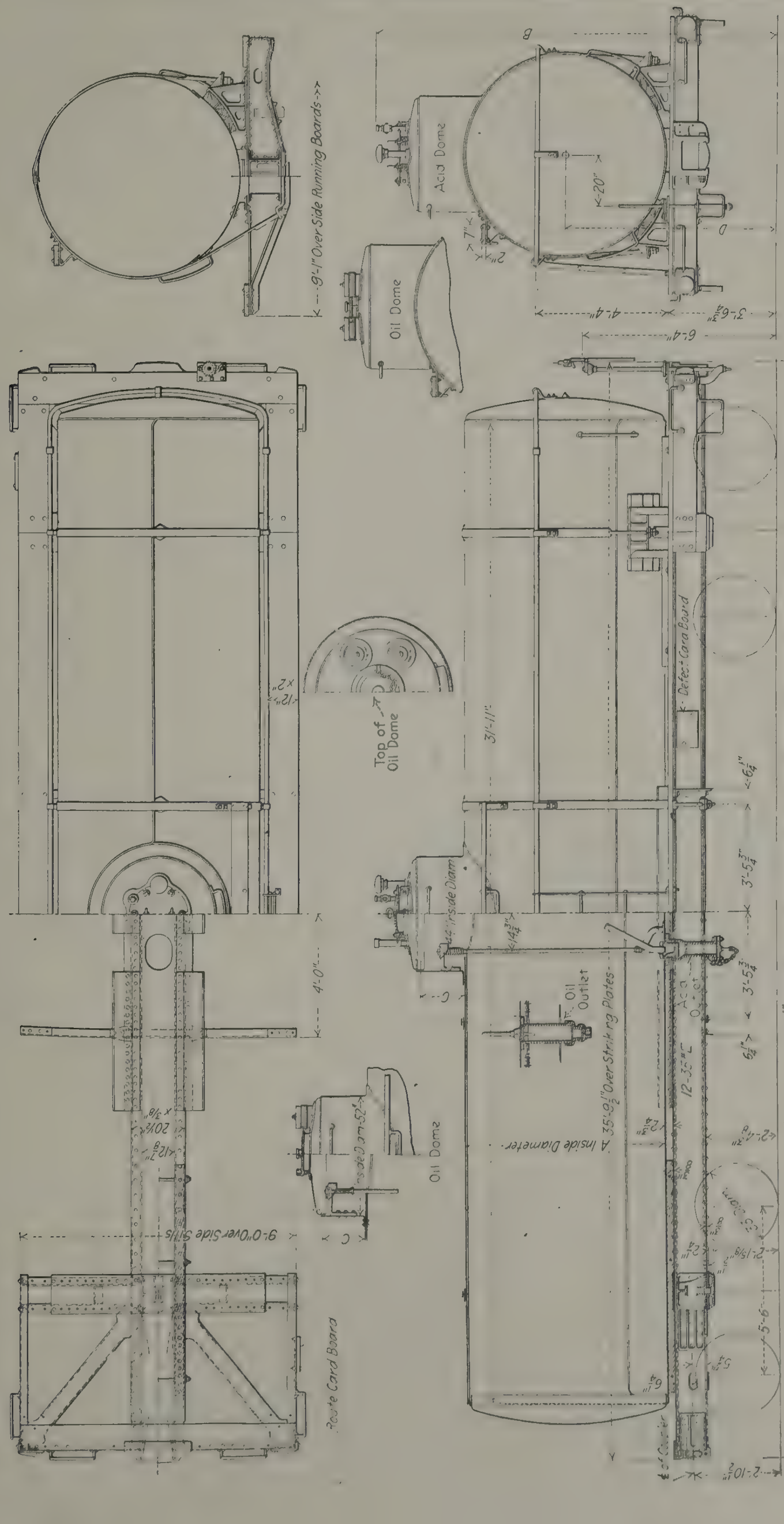


Fig. 2873—U. S. R. A. Standard, Steel Tank Cars of 7000, 8000 and 10000 gal. Capacity.
(*See Figs.* 2872 *and* 2874-2875.)

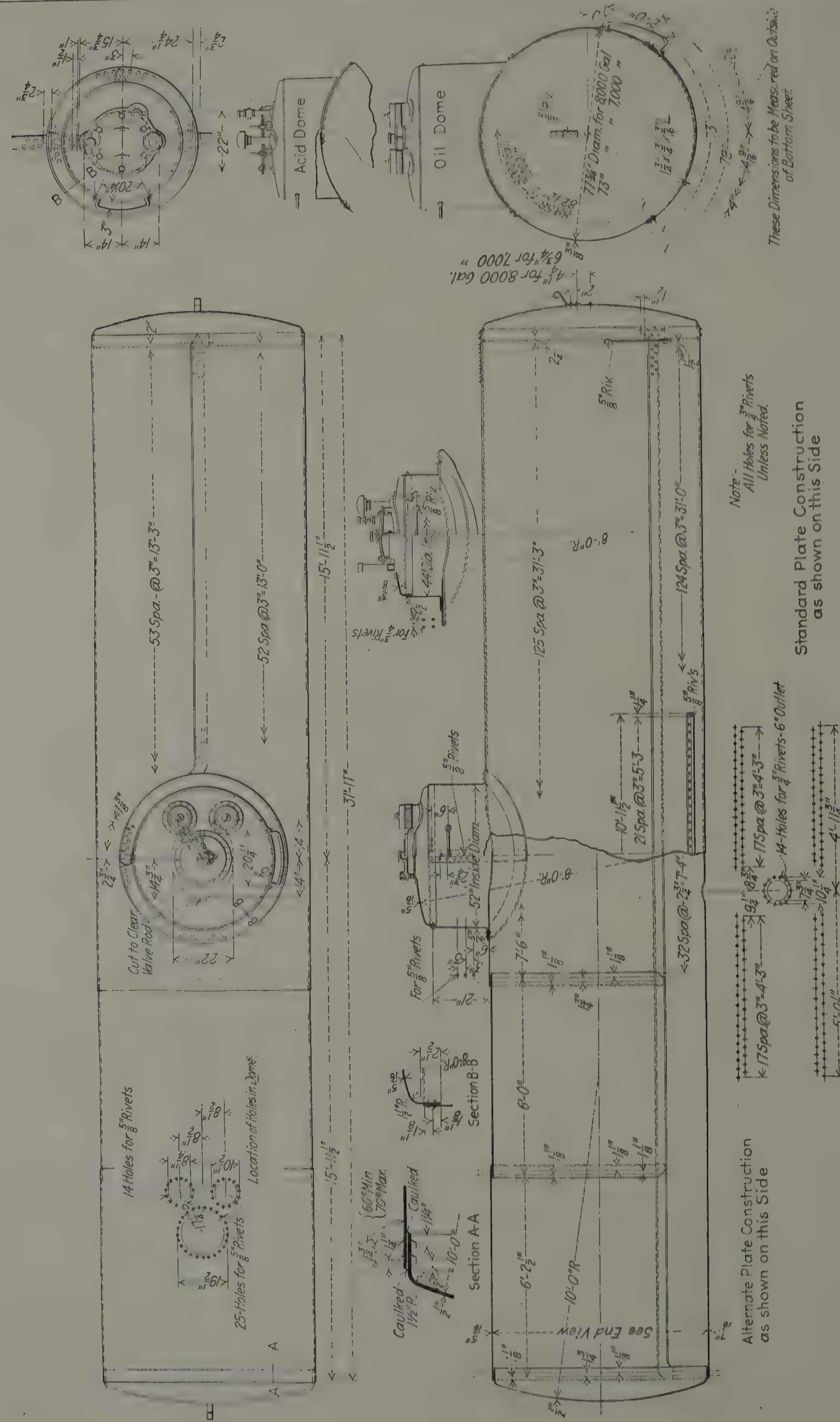


Fig. 2874—Details of 7000 and 8000 gal. Steel Tank for U. S. R. A. Standard Tank Cars.

(See Figs. 2872-2873 and 2875.)

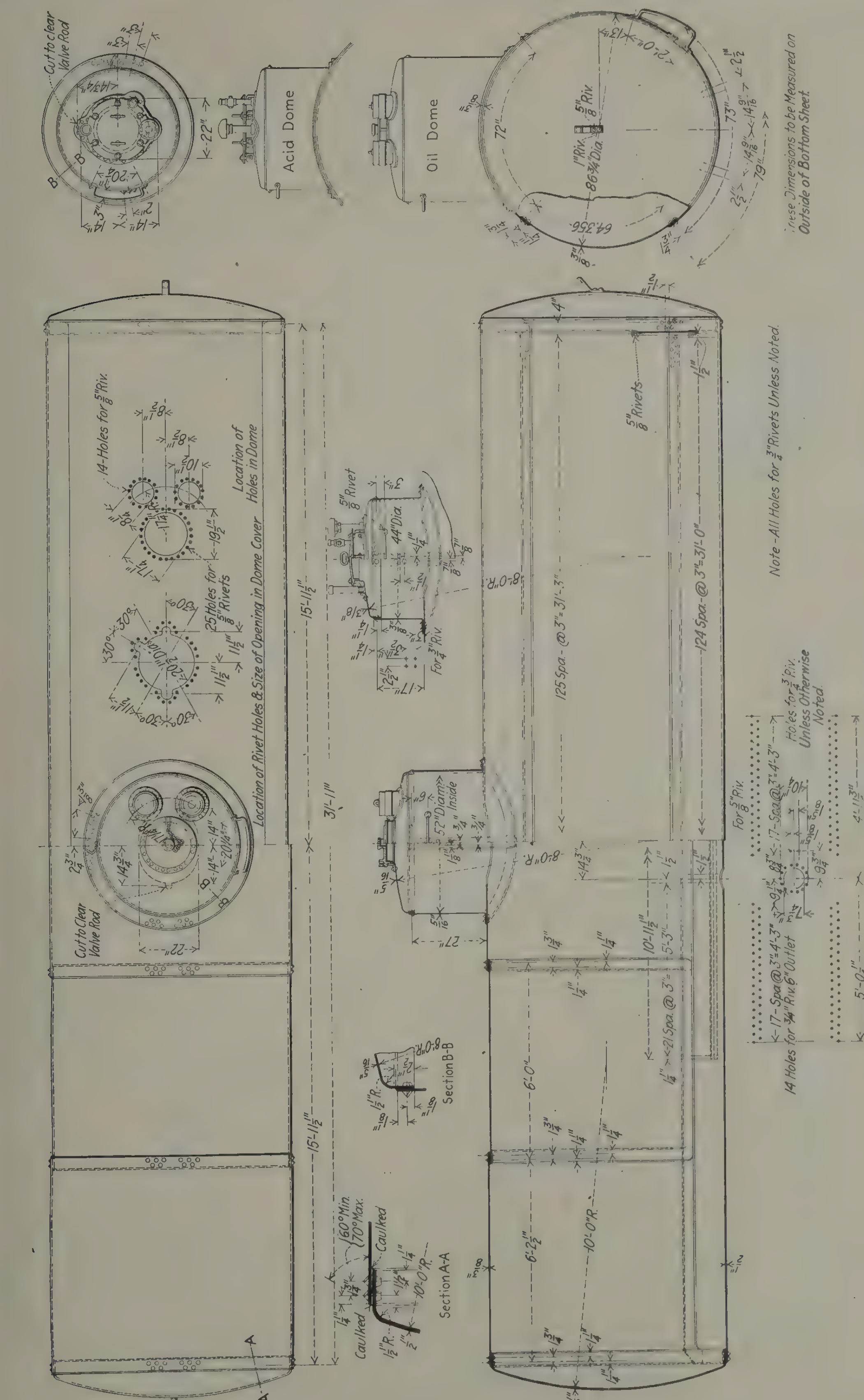


Fig. 2875—Details of 10,000 gal. Steel Tank for U. S. R. A. Standard Tank Car.

(See Figs. 2872-2874.)

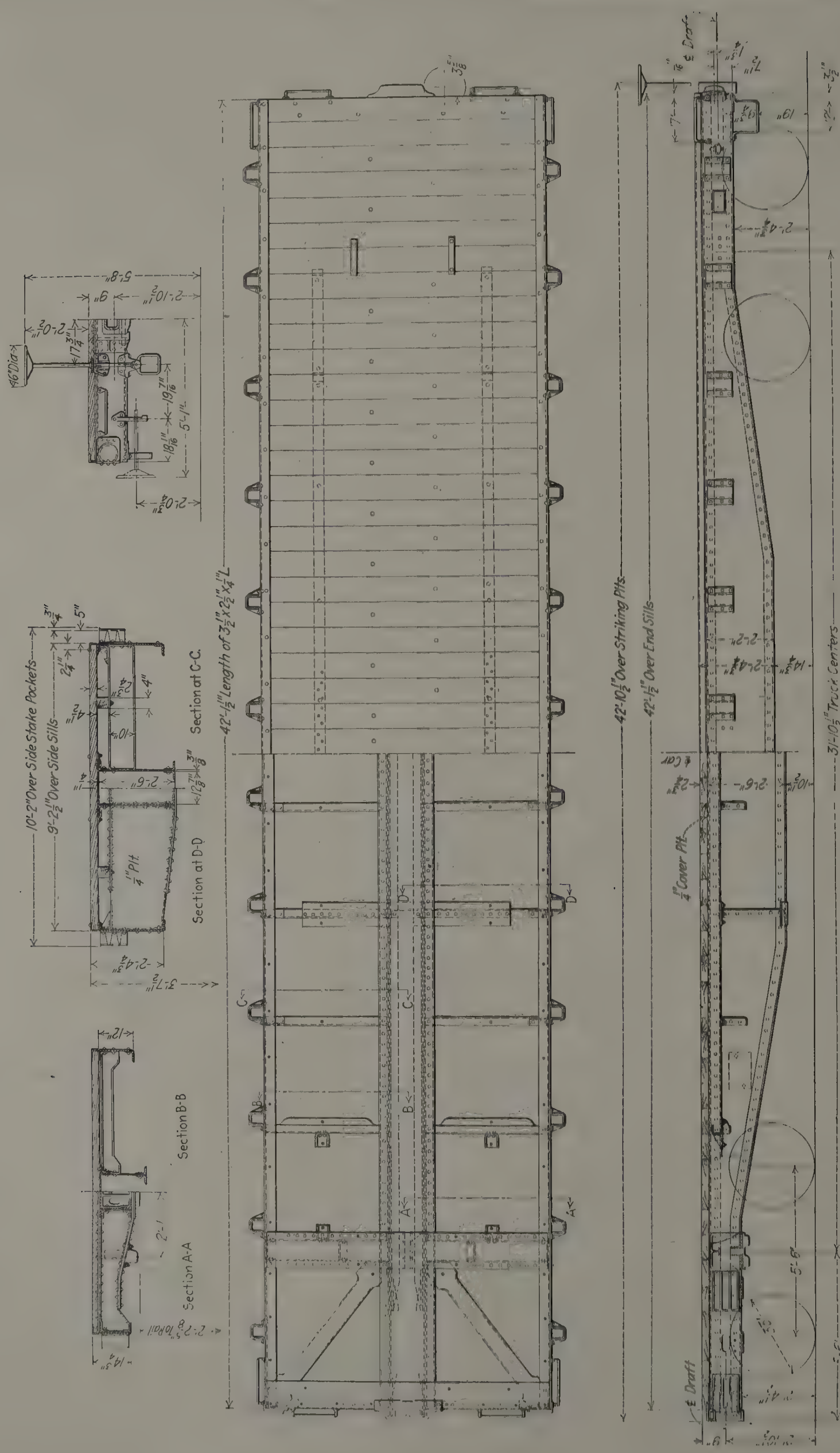


Fig. 2876—U. S. R. A. Standard, Steel Underframe 55-Ton Flat Car.

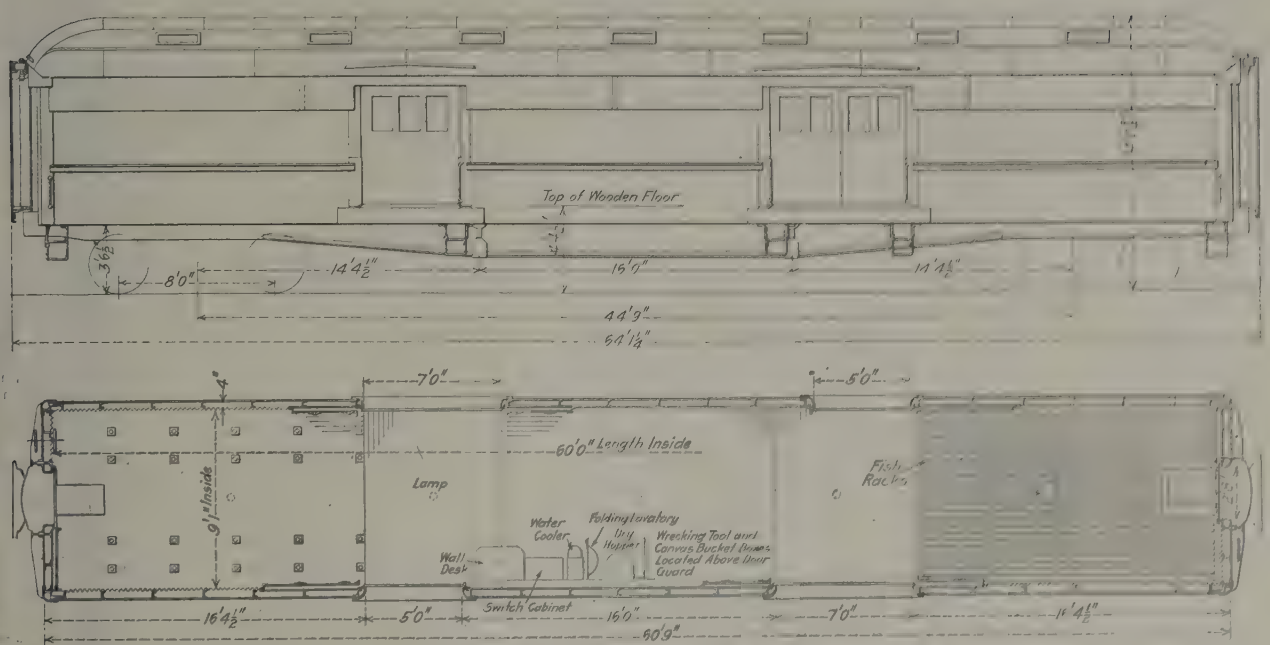


Fig. 2877—Floor Plan and Elevation of the U. S. R. A. Standard Baggage Car.

(See Figs. 2878-2879.)

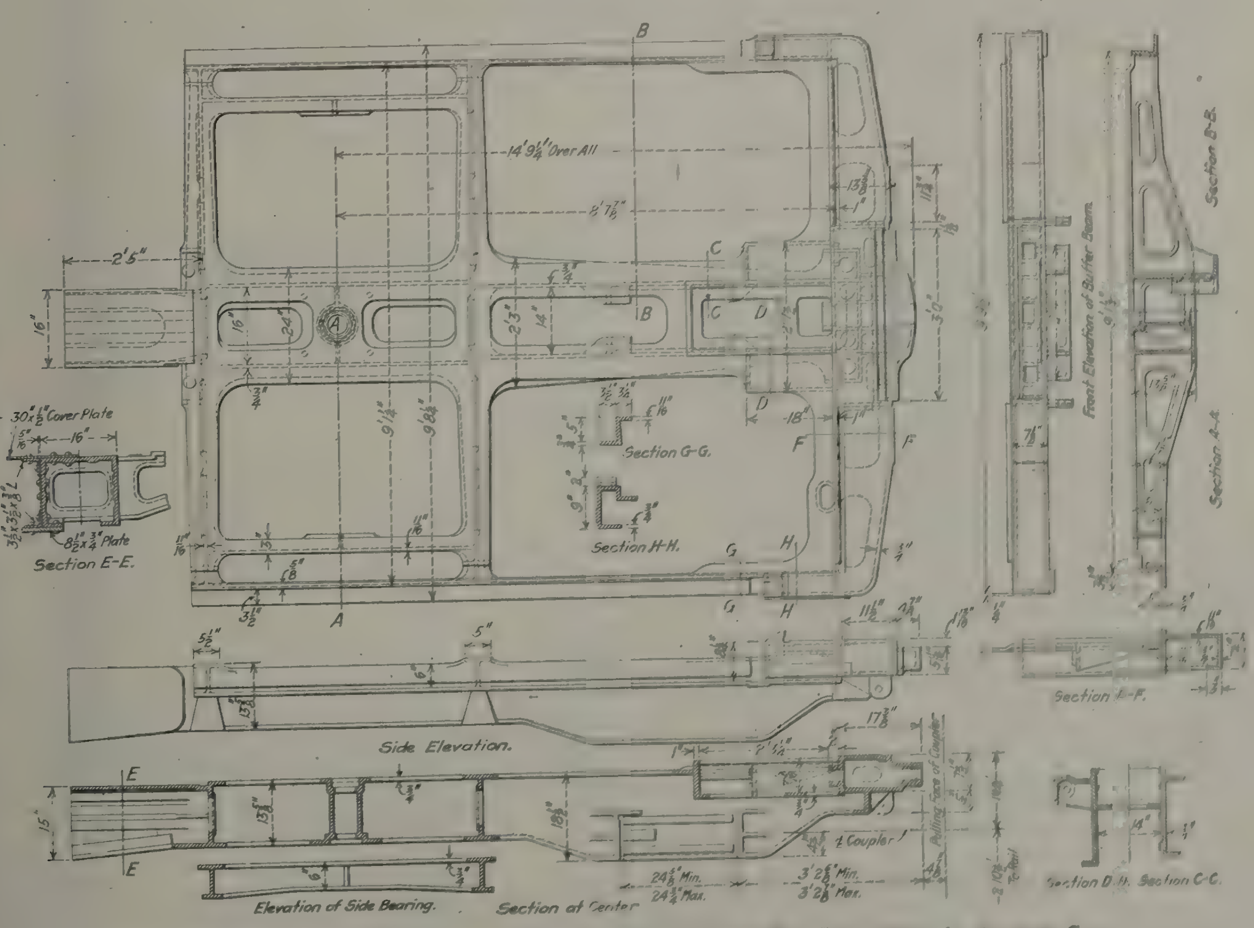


Fig. 2878—Unit Cast Steel Double Body Bolster and Underframe End Construction for Baggage Cars.

(See Figs. 2877 and 2879.)

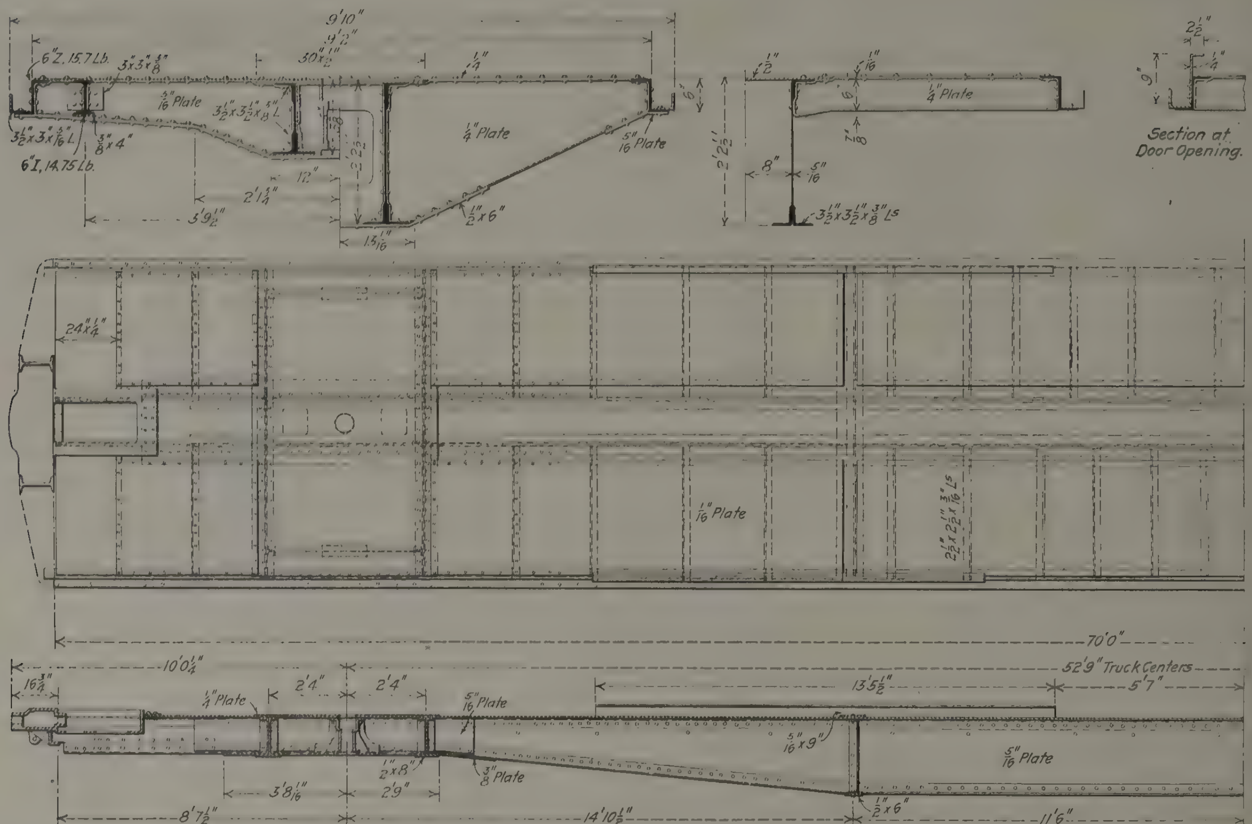


Fig. 2879—Underframe for the U. S. R. A. Standard 70-ft. Baggage Car with Built-Up Ends. (See Figs. 2877-2878.)

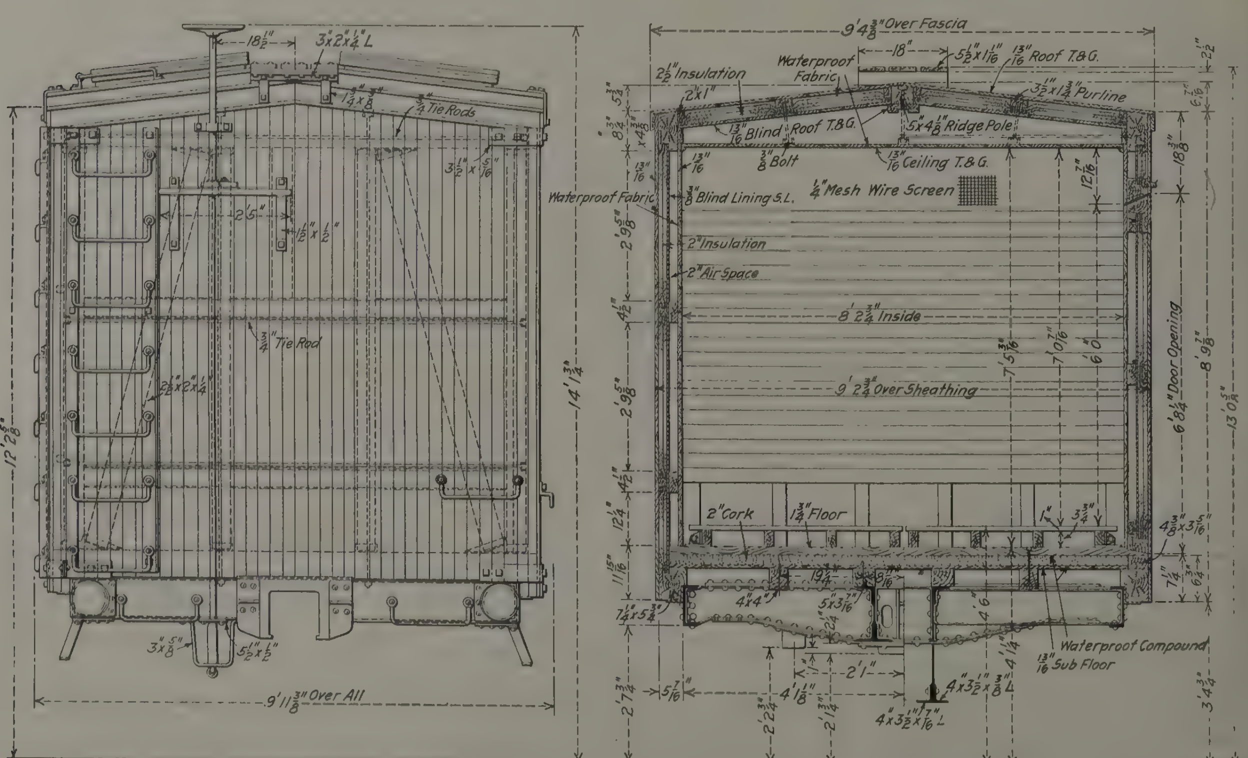


Fig. 2880—End Elevation and Section of U. S. R. A. Standard Refrigerator Car Shown in Figs. 2881-2885.

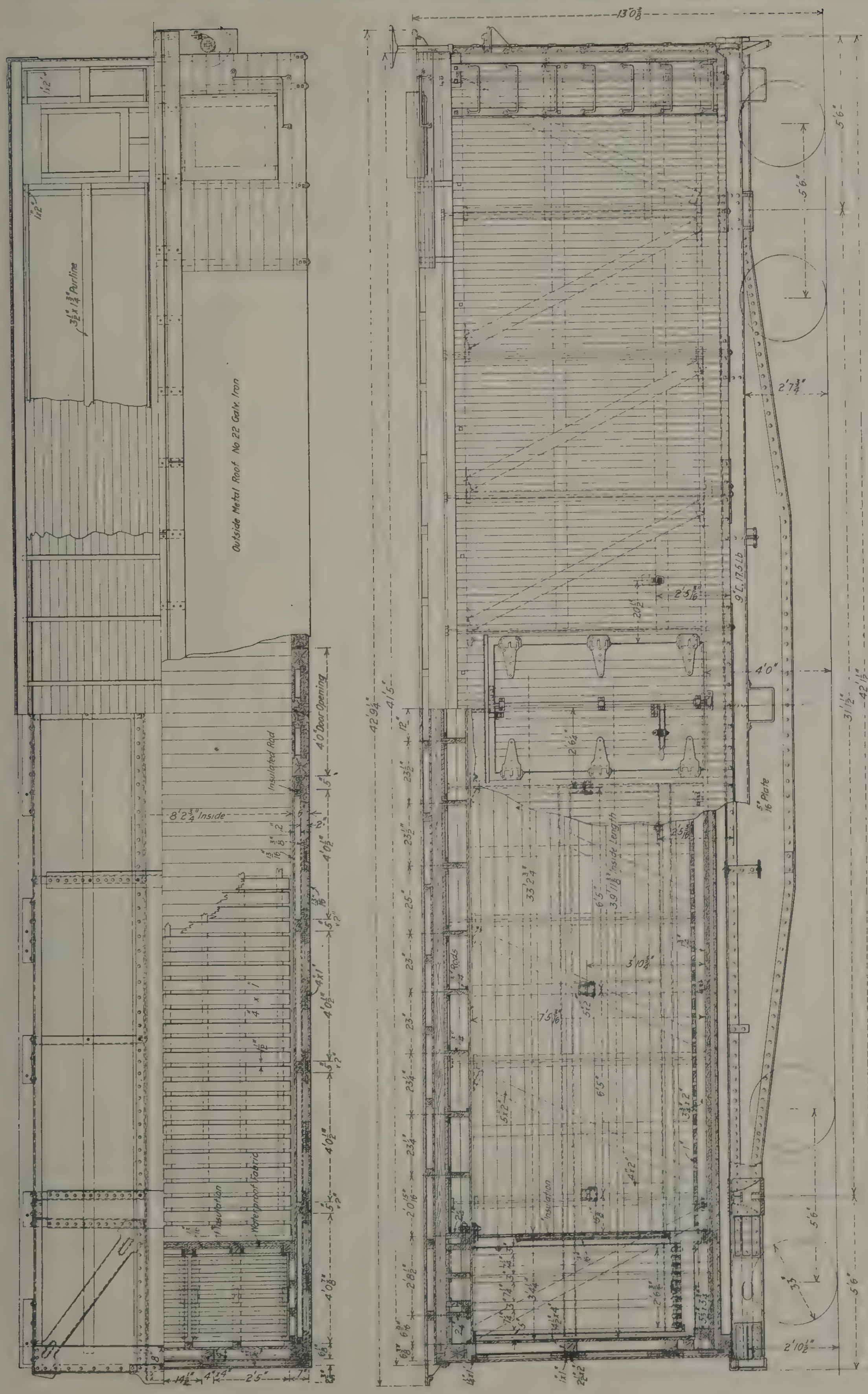


Fig. 2881—Elevation and Plan of U. S. R. A. Standard Refrigerator Car.
(See Figs. 2880 and 2882-2885.)

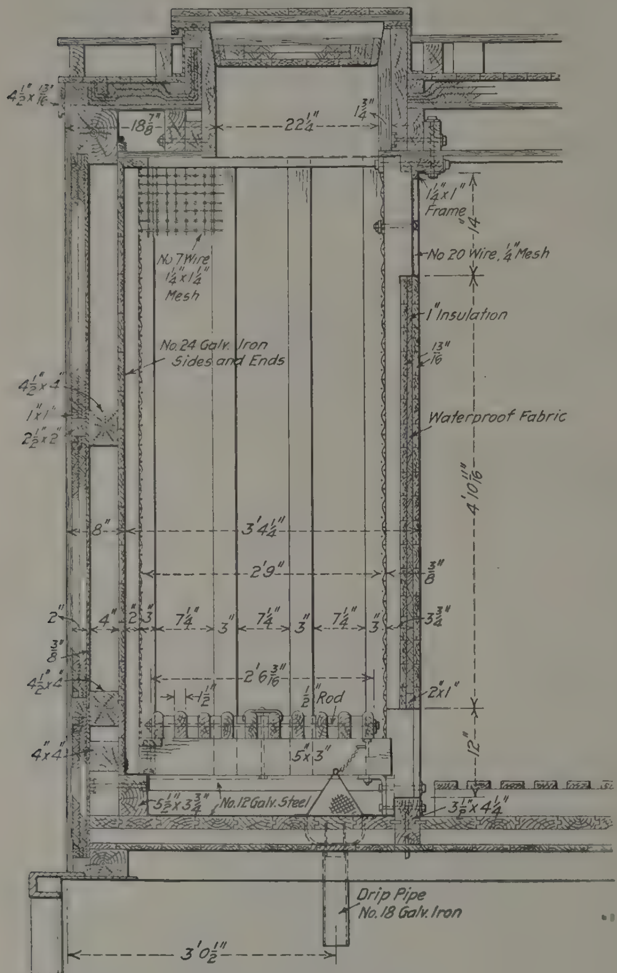


Fig. 2882—Arrangement of Ice Box for U. S. R. A. Standard Refrigerator Cars.

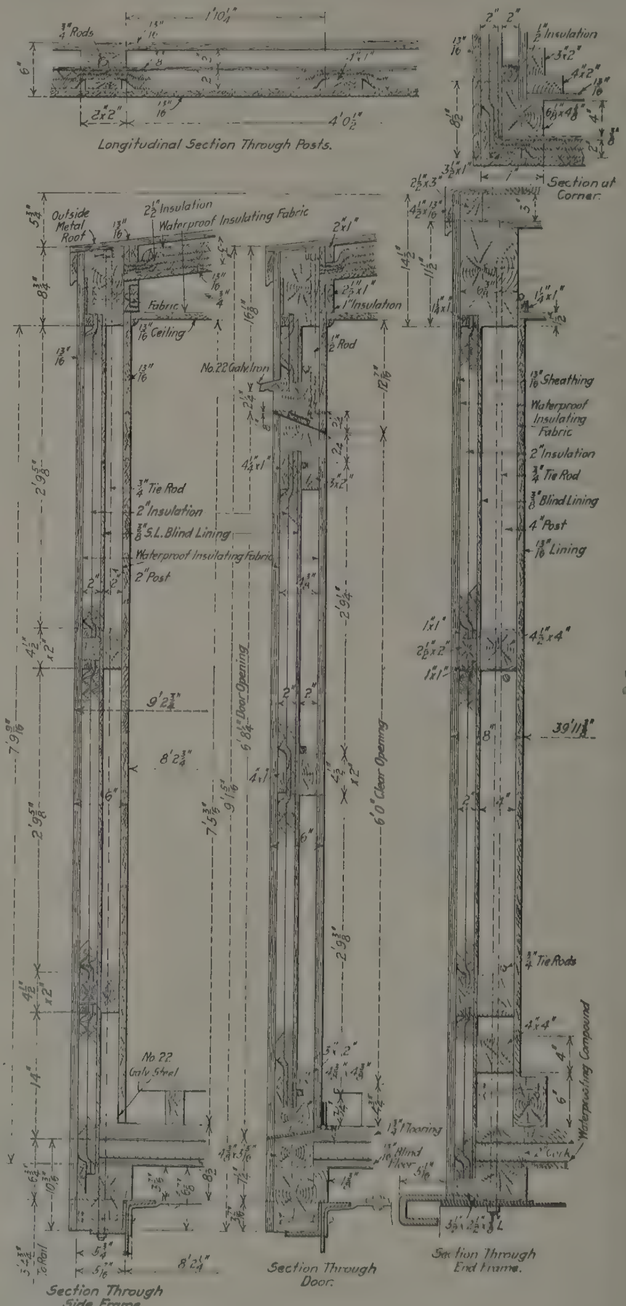


Fig. 2883—U. S. R. A. Standard Refrigerator Car Sections Showing Insulation.

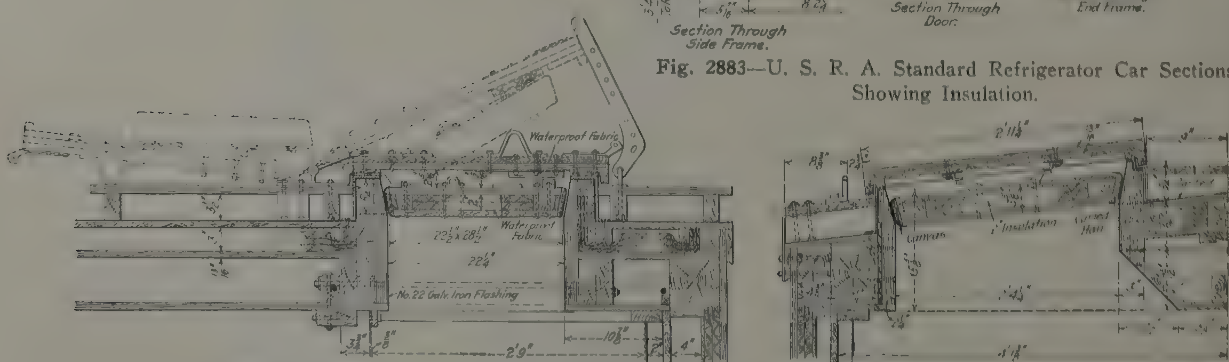


Fig. 2884—Sections Through Ice Box Hatch for U. S. R. A. Standard Refrigerator Cars.

(See Figs. 2880-2885.)

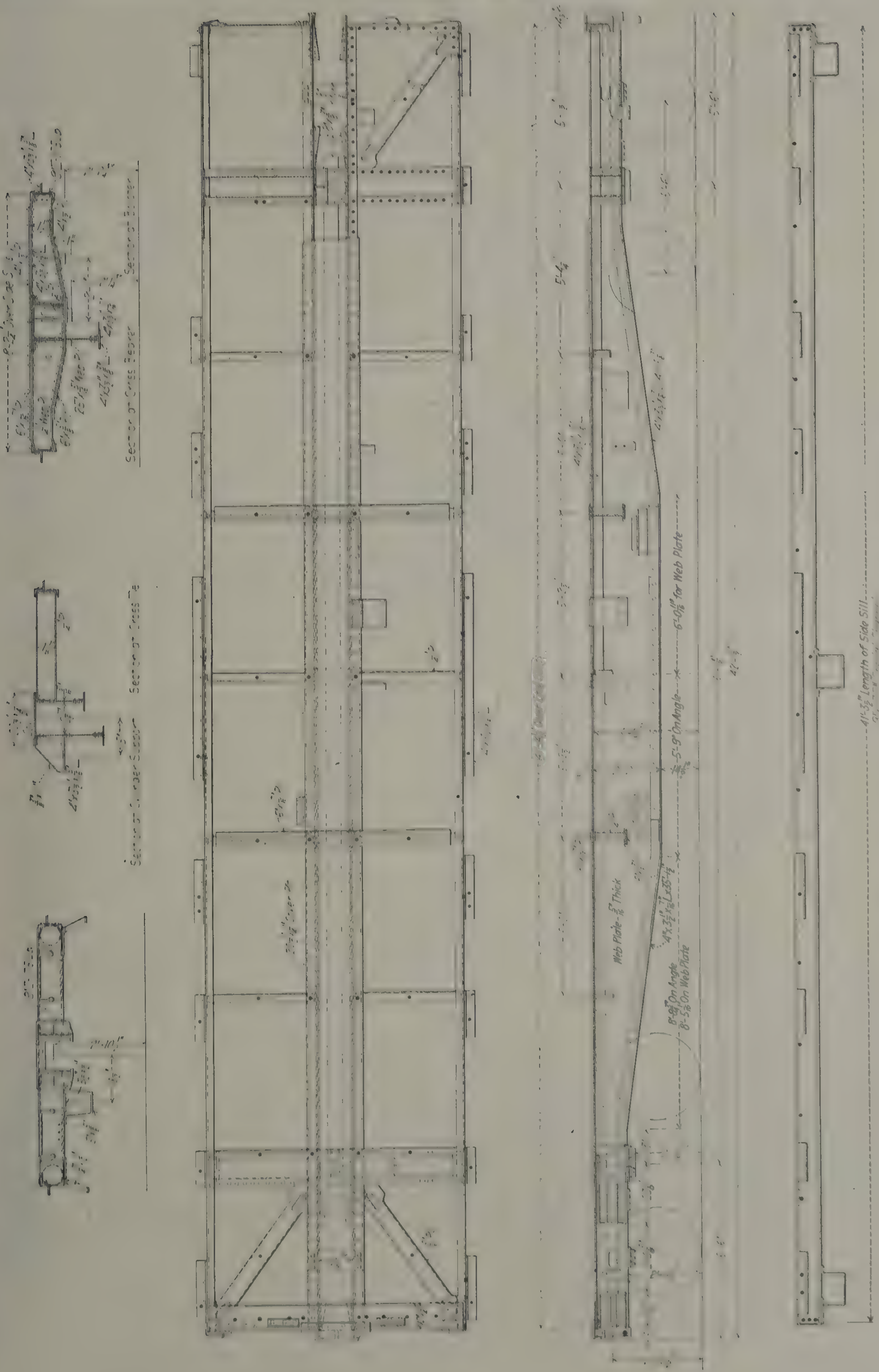


Fig. 2885—Steel Underframe for U. S. R. A. Standard Refrigerator Car.

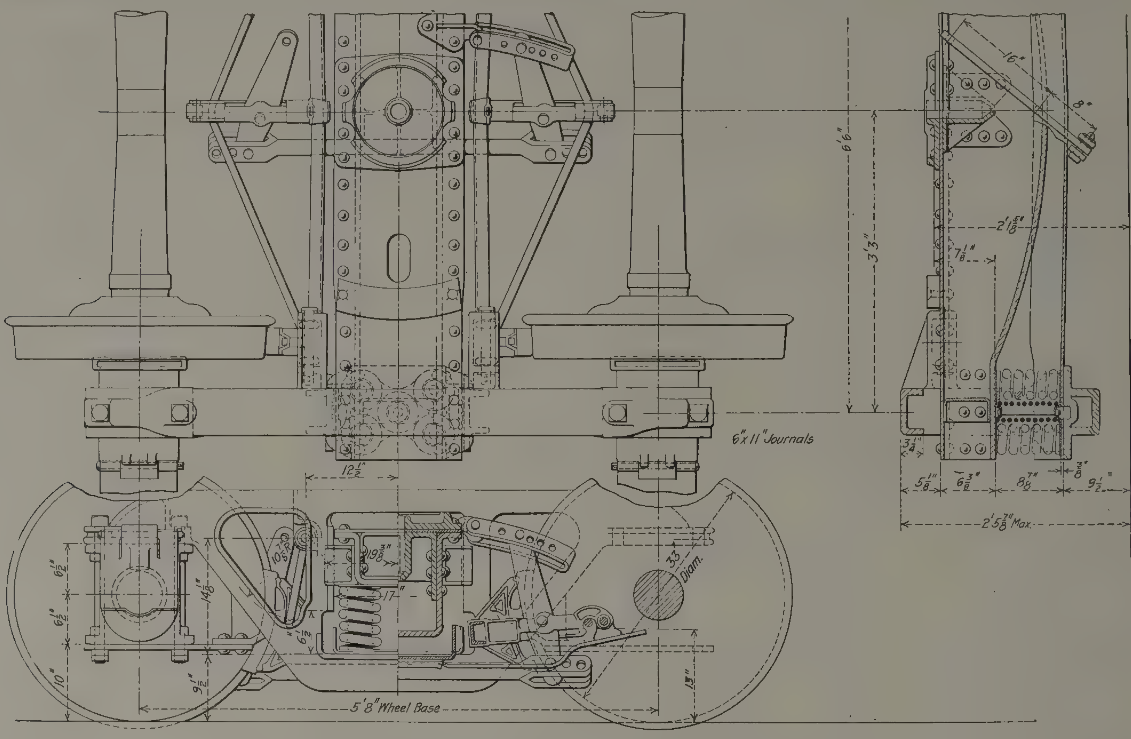


Fig. 2886—General Plan of U. S. R. A. Standard 70-Ton Truck with Cast Steel Side Frame.

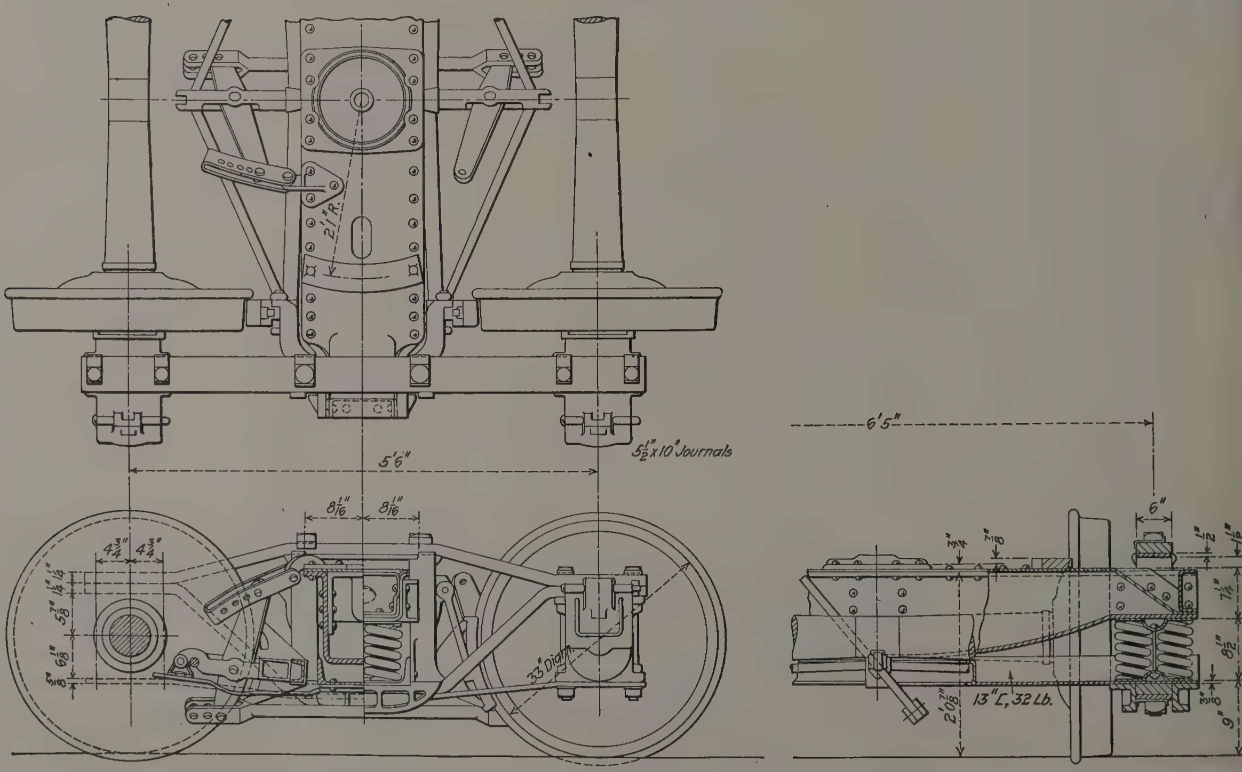


Fig. 2887—General Plan of U. S. R. A. Standard 50-Ton Arch Bar Truck.

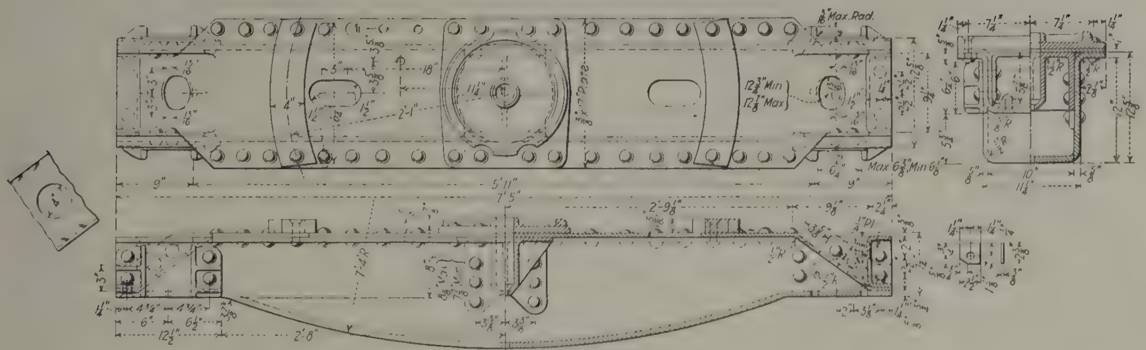


Fig. 2888—Pressed Steel U. S. R. A. Standard 50-Ton Truck Bolster.

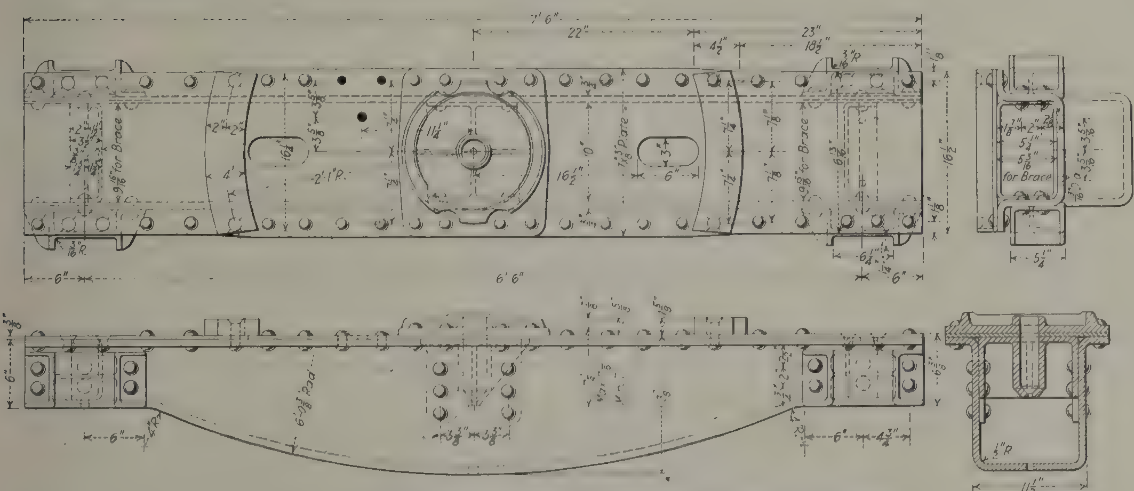
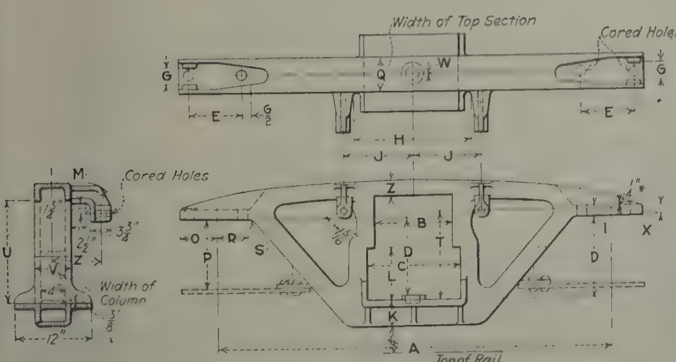


Fig. 2889—Pressed Steel U. S. R. A. Standard 70-Ton Truck Bolster.



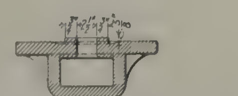


Table of Dimensions & Tolerances

Frame	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Z
40 Ton	5'6"	13"	6"	12 1/4"	9"	1 3/16"	1 1/8"	18"	1/2"	11 5/8"	4 1/8"	6 1/2"	5"	3 1/4"	6 1/4"	11 1/2"	5"	5 1/2"	1/2"	14 3/4"	11 5/8"	6"		2 1/4"	8
50 Ton	5'6"	13"	16"	13 3/4"	9 1/2"	1 5/16"	2 1/16"	18"	1/4"	11 5/8"	4 5/8"	6 1/2"	5"	3 1/4"	6 1/2"	12"	6"	6"	1 1/2"	15"	11 7/8"	6"		2 1/2"	8 1/2"
70 Ton	5'8"	17"	20"	13 1/2"	10 1/2"	1 1/16"	2 1/4"	20"	5/8"	12 1/2"	5 1/2"	6 1/2"	5 1/2"	3 1/4"	7 1/4"	13"	6"	6 1/2"	1 1/2"	14 7/8"	11 7/8"	6"		2 1/2"	9"
Tolerance +	+3/32"	+1/8"	+1/4"	+1/4"	+1/32"	+1/16"	+1/8"	+3/16"	+1/8"	+1/4"	+1/8"	+1/8"	+1/8"	+0"	+1/8"	-1/16"	+*	1/16"	+1/8"	+1/8"	+3/16"	+1/16"	+1/16"	+1/16"	+1/16"
Tolerance -	1/16"	0"	0"	-0"	1/32"	-0"	-0"	1/8"	-1/8"	-1/8"	-*	-0	-*	-*	-1/8"	1/8"	-1/16"	+1/8"	1/16"	-1/8"	1/8"	1/16"	-1/16"	-1/16"	-1/16"

* = To Suit

Fig. 2890—Limiting Dimensions of Side Frames for U. S. R. A. Standard Trucks.

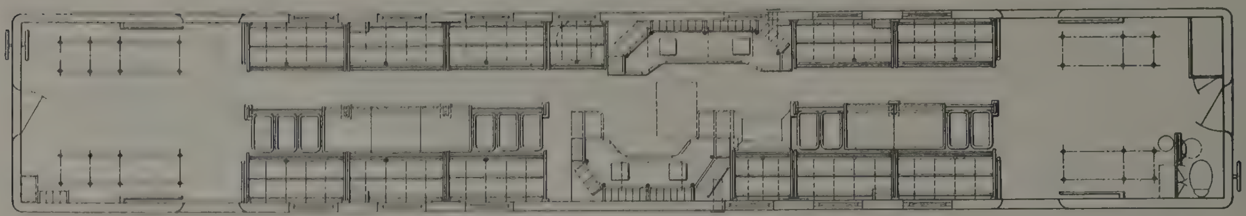


Fig. 2891—Floor Plan of 60-ft. Postal Car.
(See Figs. 2892 and 2903.)

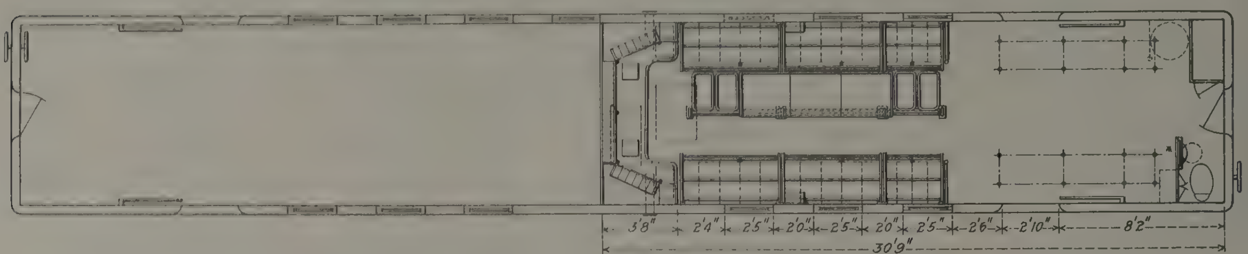


Fig. 2892—Plan for Converting the 60-ft. Postal Car to the 30-ft. Compartment.
(See Figs. 2891, 2895 and 2903.)

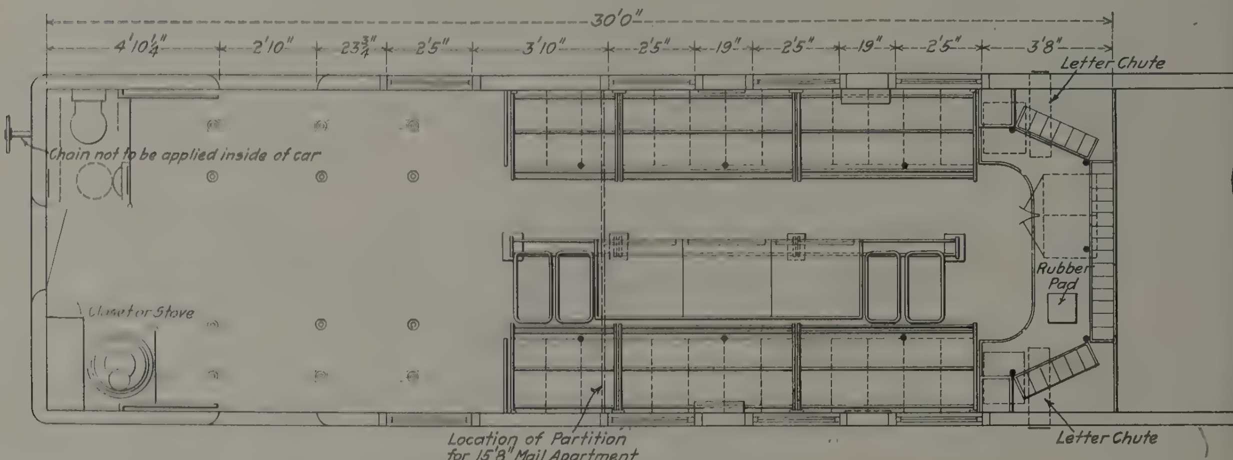


Fig. 2893—Floor Plan of 30-ft. Compartment.
(See Figs. 2892, 2893 and 2895.)

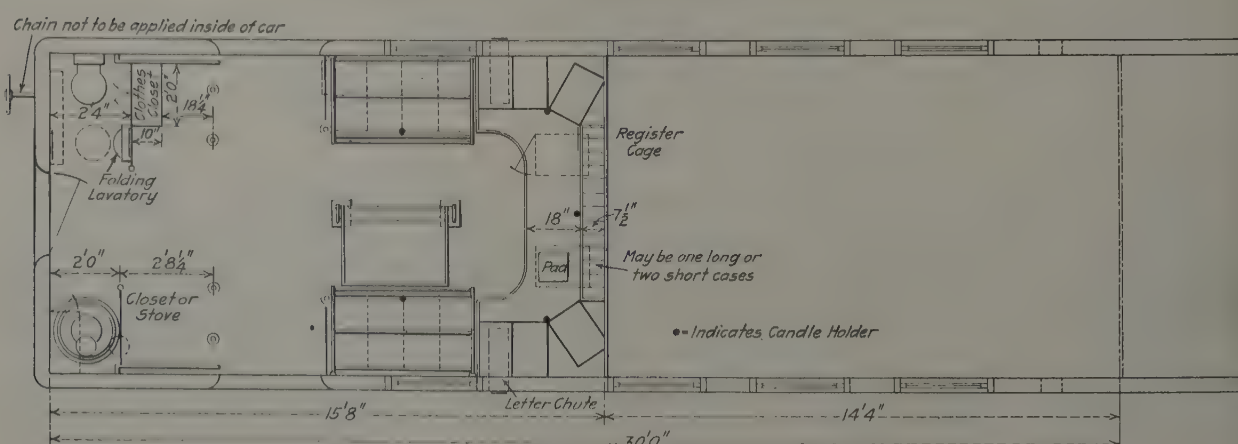


Fig. 2894—Optional Floor Plan for 15-ft. and 30-ft. Compartments.
United States Government Specifications for Postal Cars.

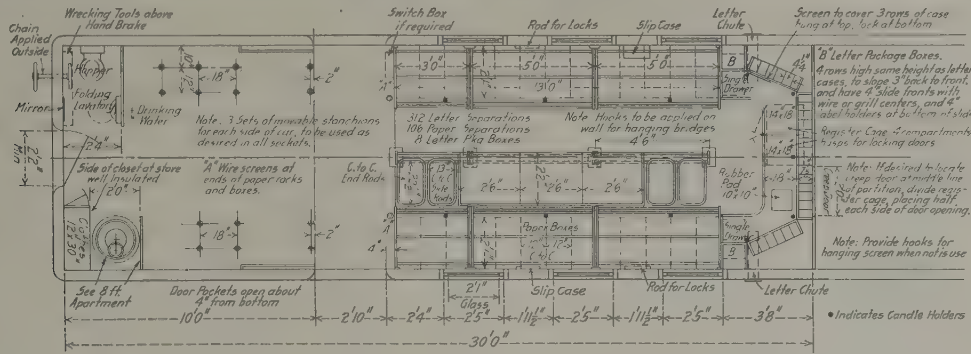


Fig. 2895—Floor Plan Showing U. S. Government Requirements for 30-ft. Mail Apartment.

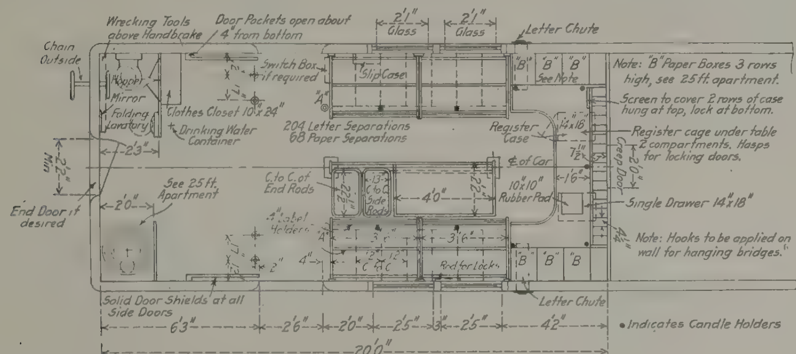


Fig. 2896—Floor Plan Showing U. S. Government Requirements for 20-ft. Mail Apartment.

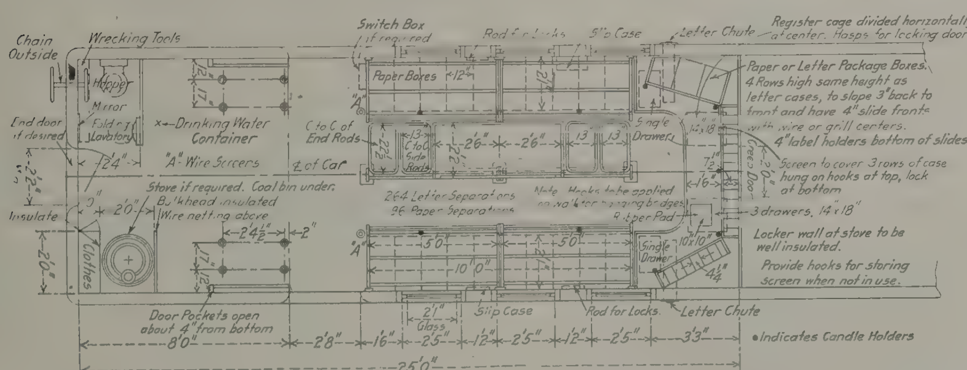


Fig. 2897—Floor Plan Showing U. S. Government Requirements for 25-ft. Mail Apartment.

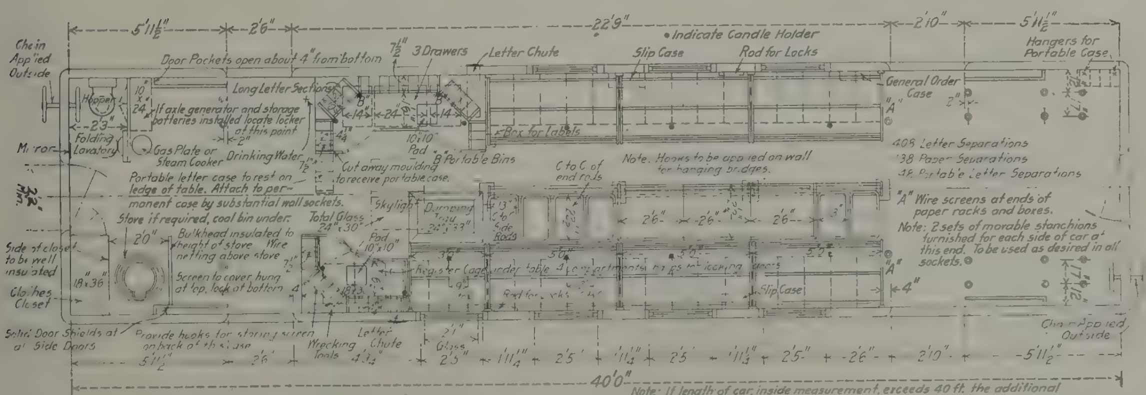


Fig. 2898—Floor Plan Showing U. S. Government Requirements for 40-ft. Postal Car.
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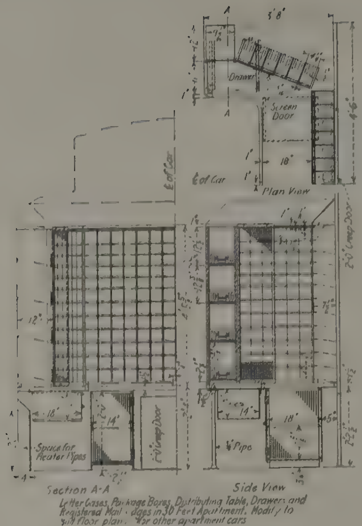


Fig. 2899—Letter Cases, etc., in 30 ft. Apartment. U. S. Government Specifications for Postal Cars.

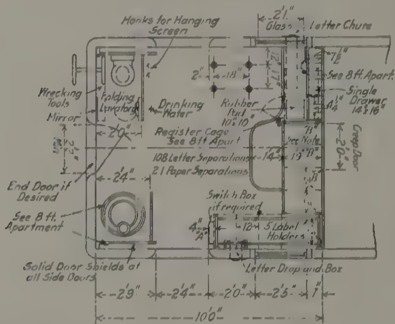


Fig. 2900—Floor Plan of 10 ft. Mail Apartment.

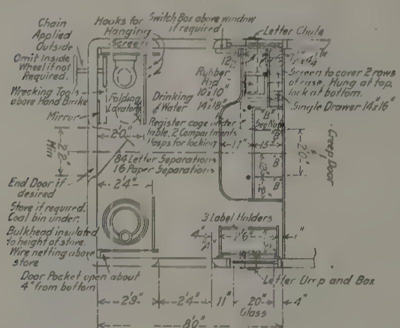


Fig. 2901—Floor Plan of 8 ft. Mail Apartment.

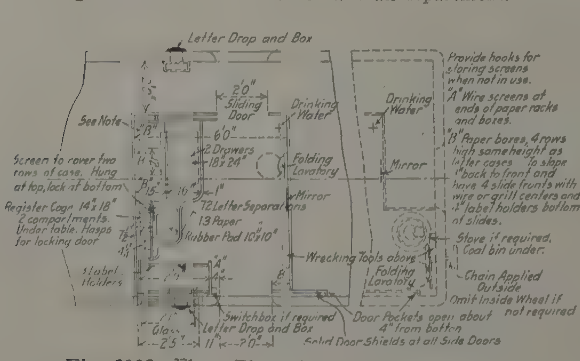


Fig. 2902—Floor Plan of 6 ft. Alley Apartment.

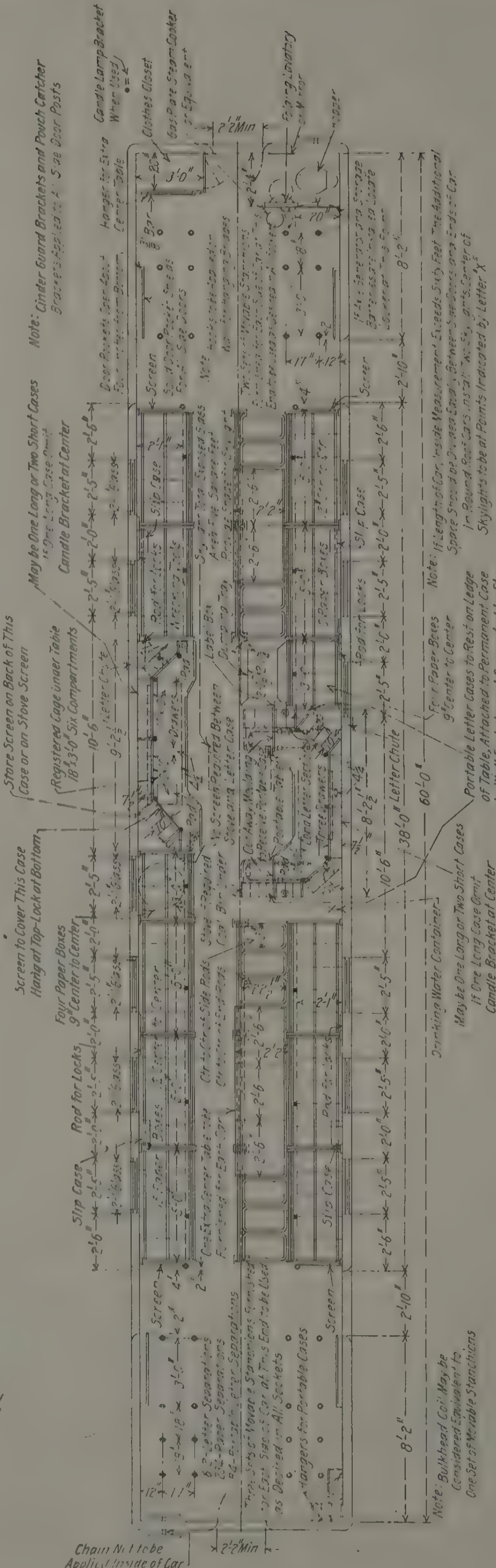
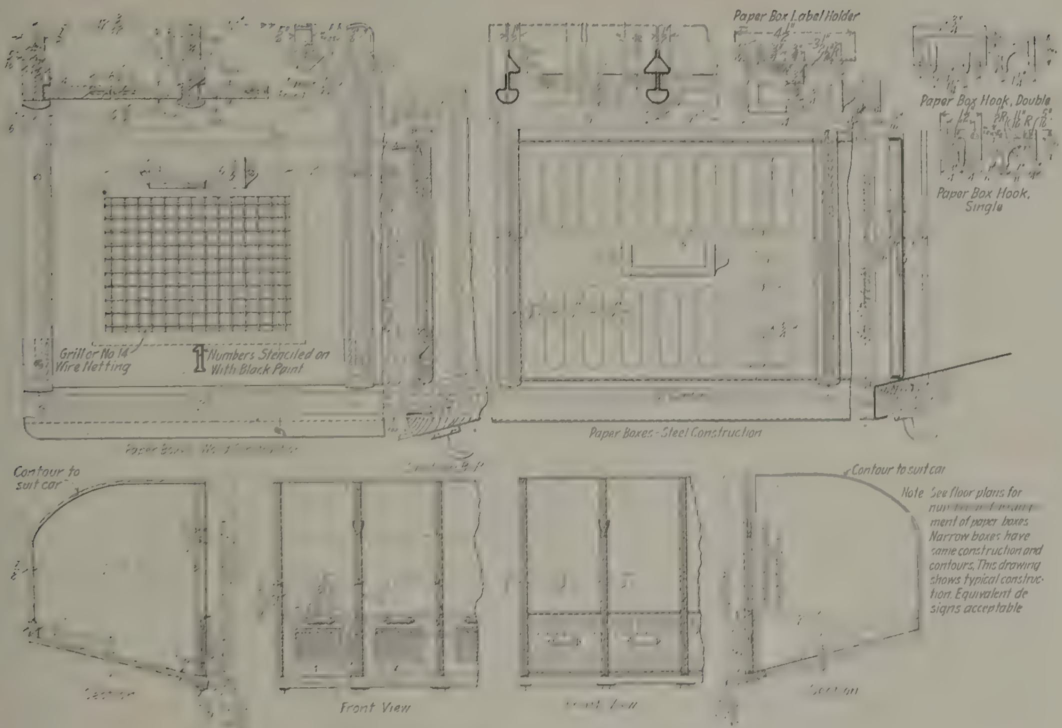


Fig. 2903—Floor Plan Showing U. S. Government Requirements for 60 ft. Postal Car. United States Government Specifications for Postal Cars.



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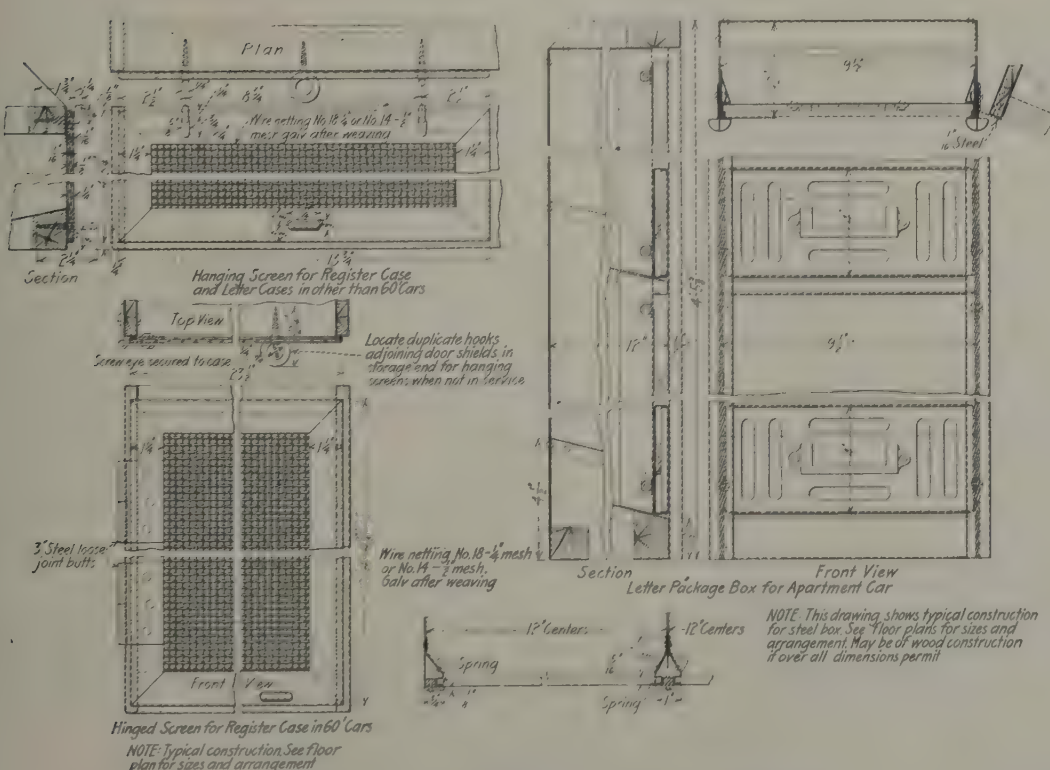

Fig. 2905—Screens for Register Case, and Letter Package Box.
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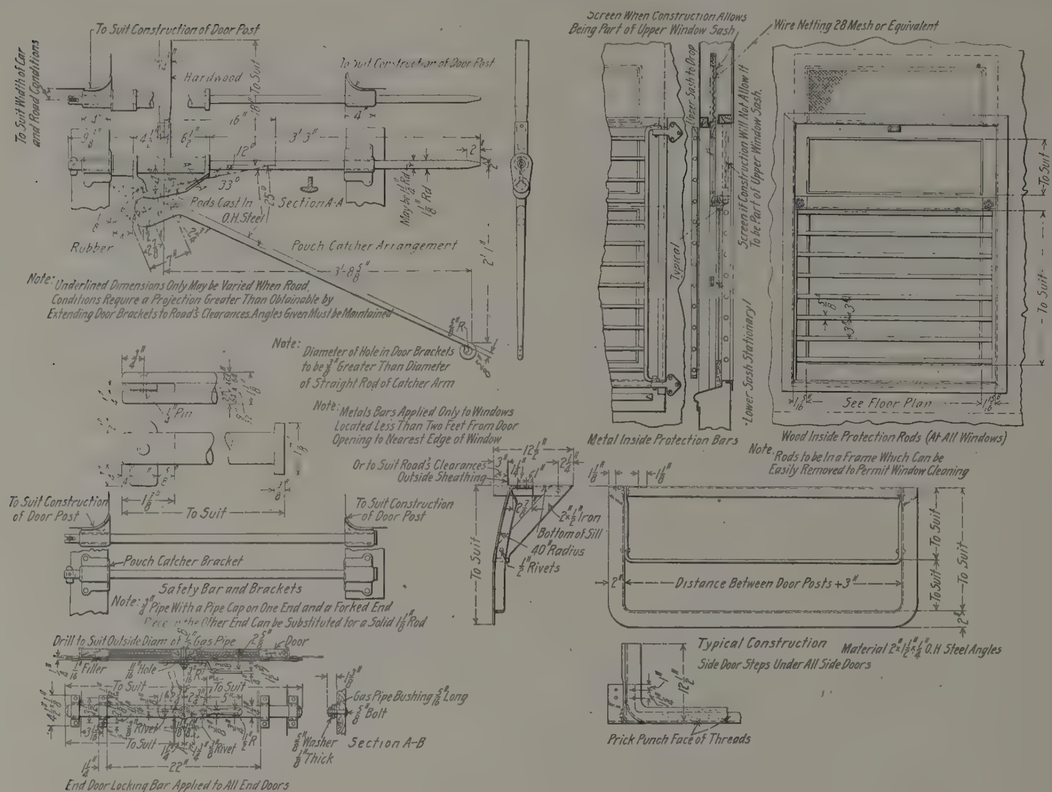
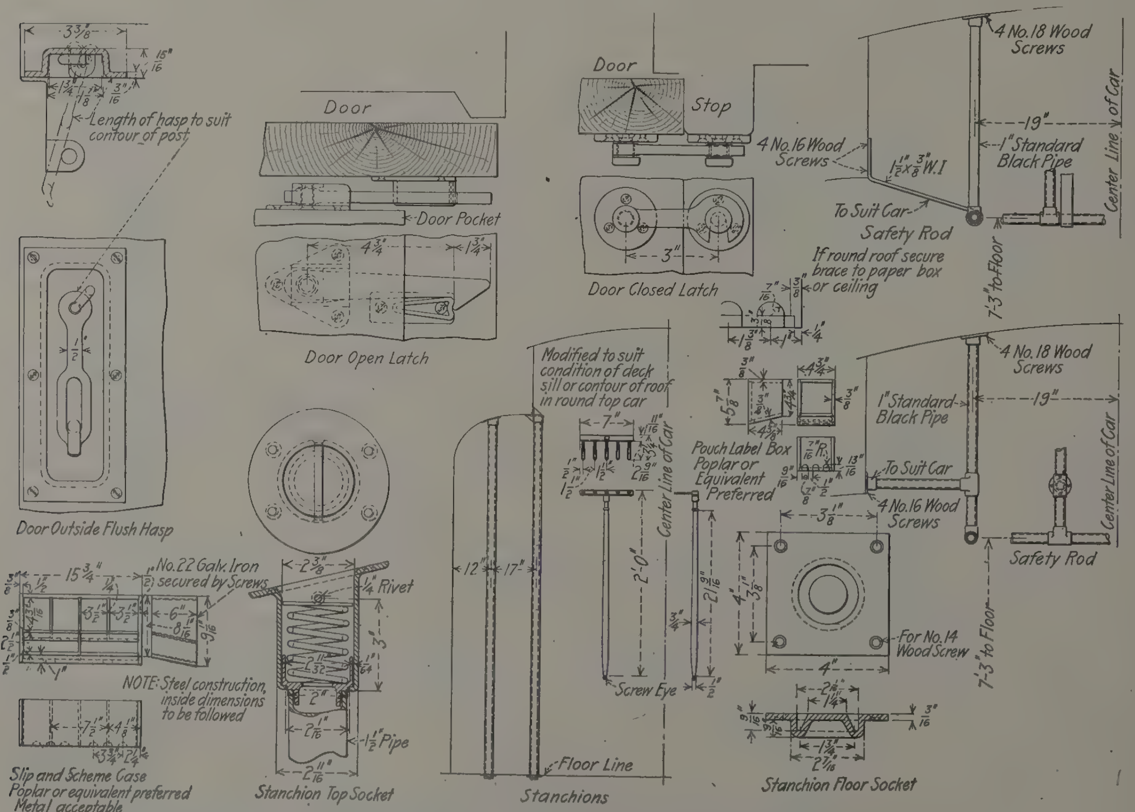


Fig. 2906—Pouch Catcher and Window Protection Bars.



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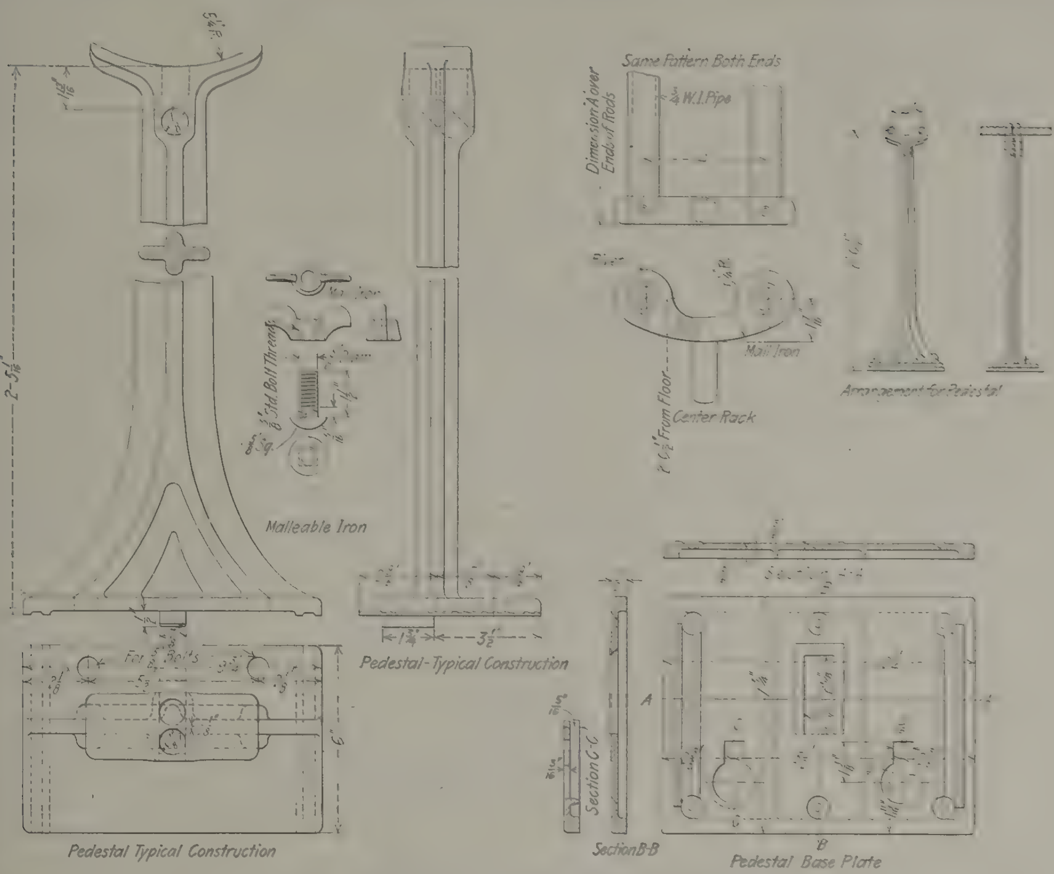

Fig. 2908—Pedestal, Center Rack and Details.

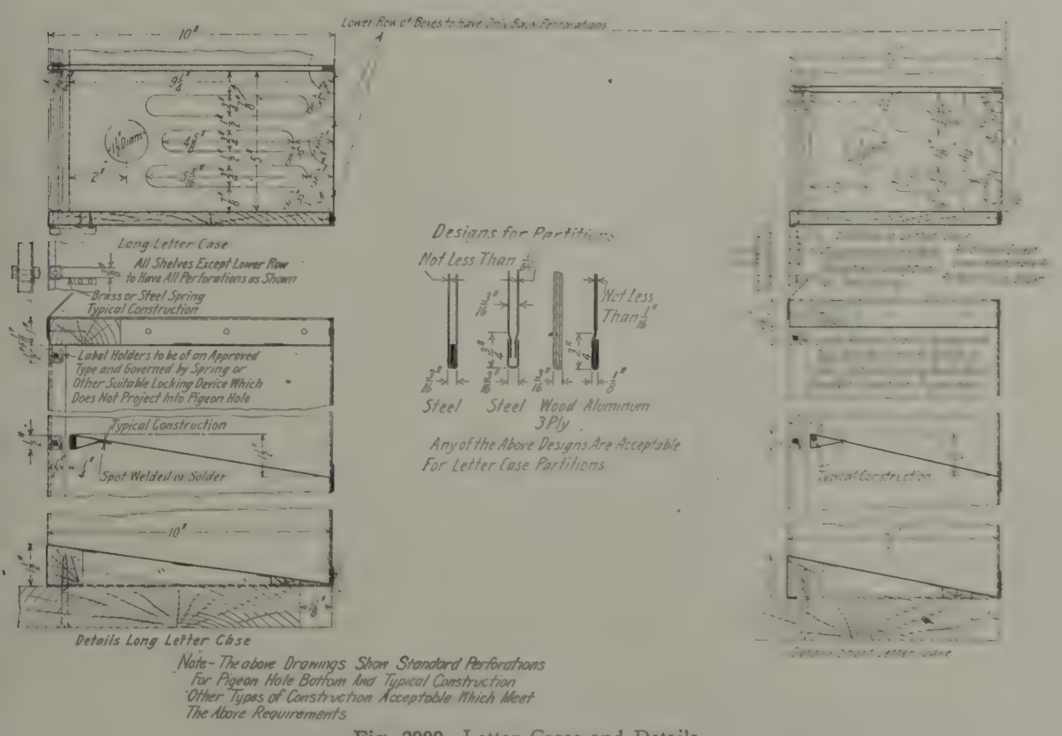

Fig. 2909—Letter Cases and Details.
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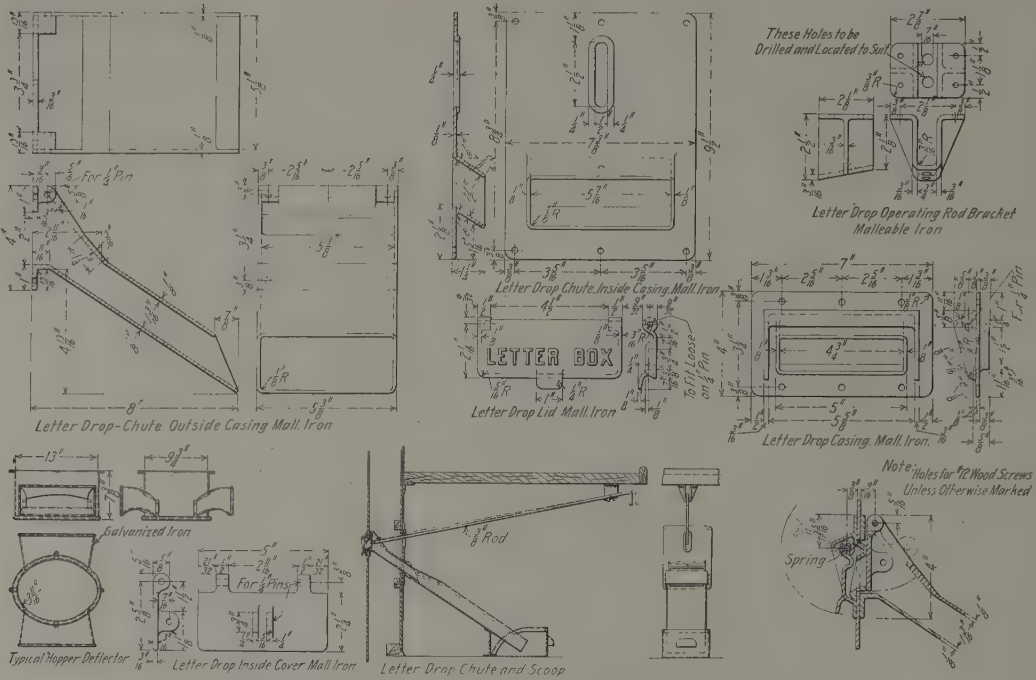
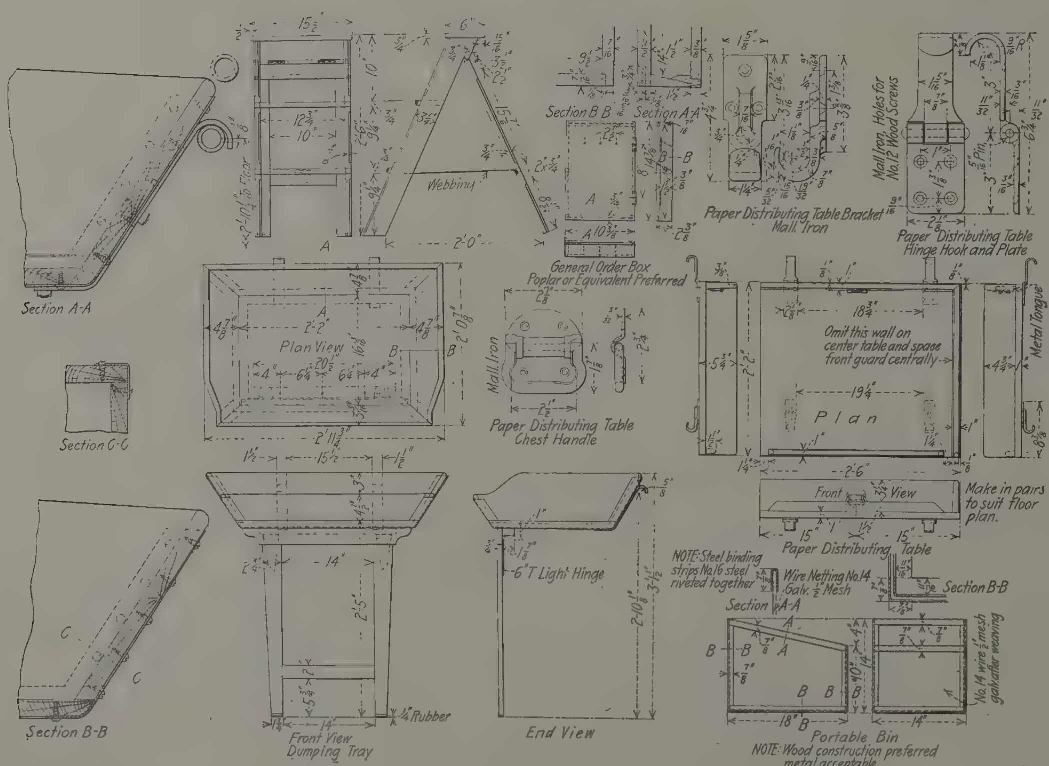


Fig. 2910—Letter Drop and Chute, and Hopper Deflector.



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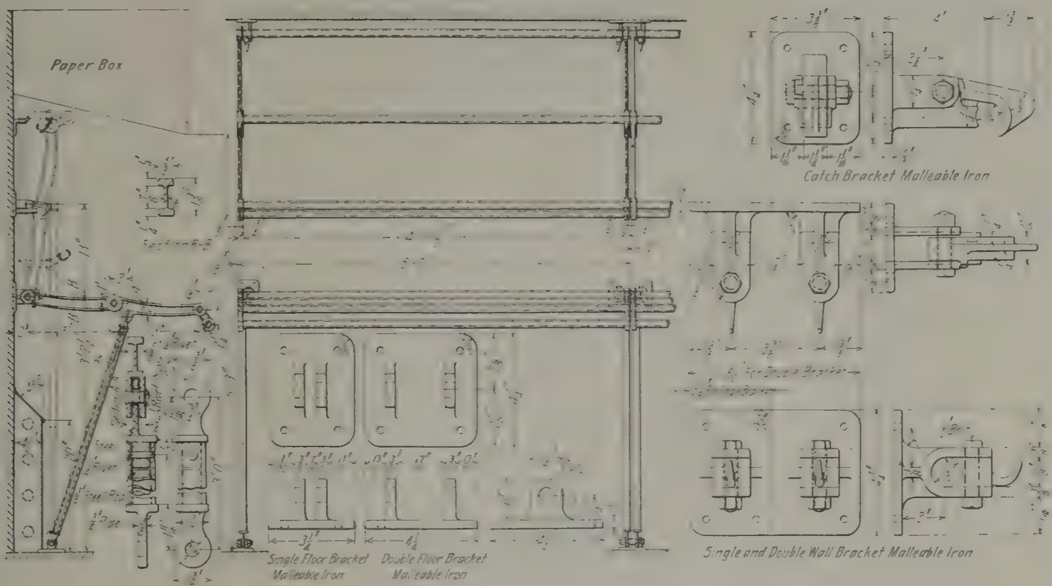

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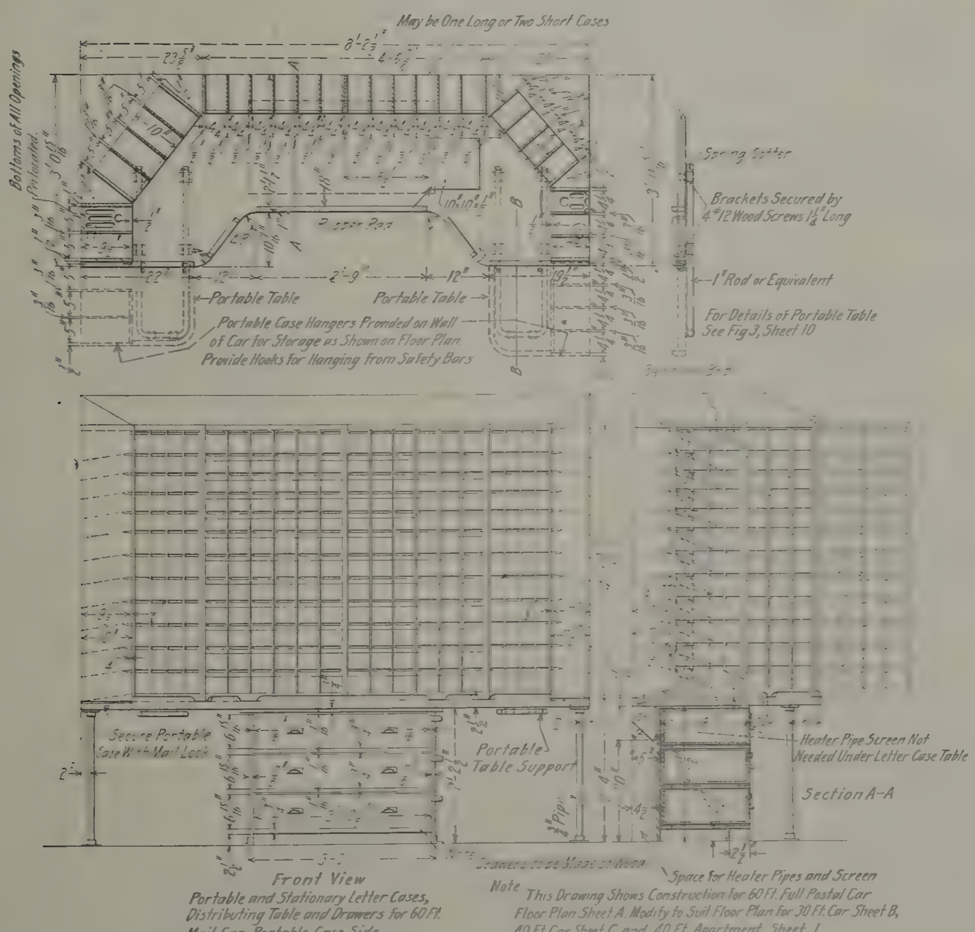

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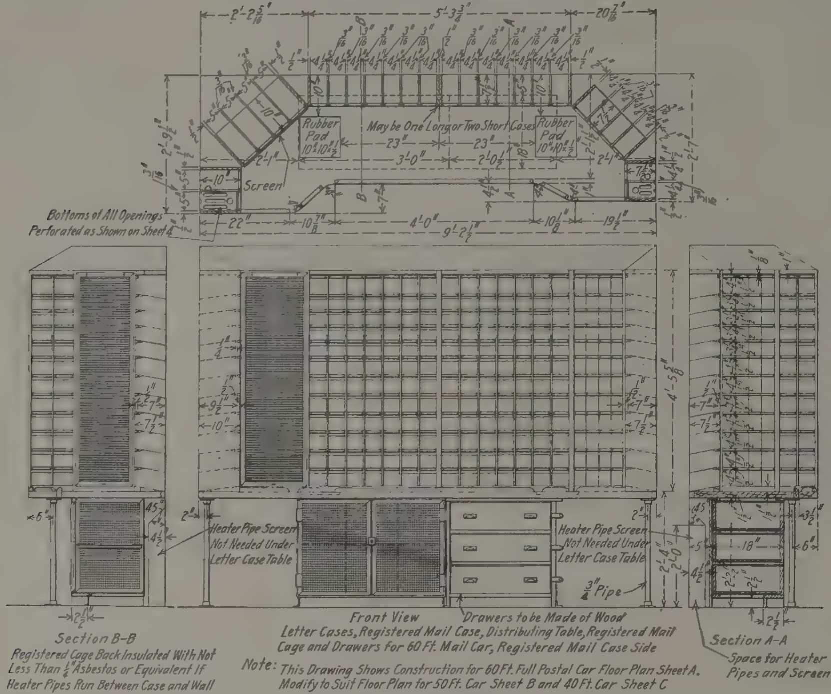

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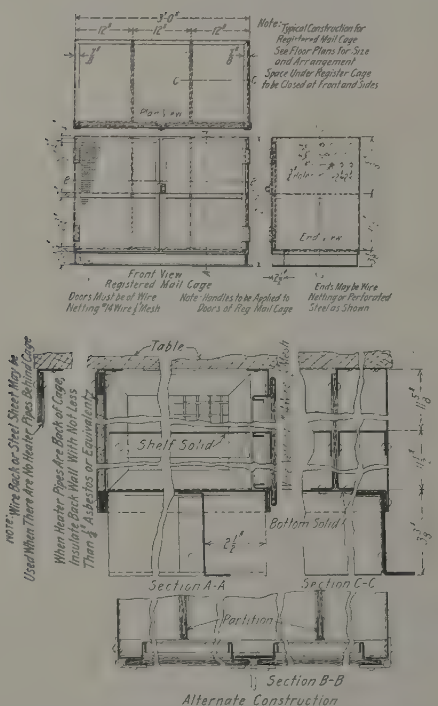

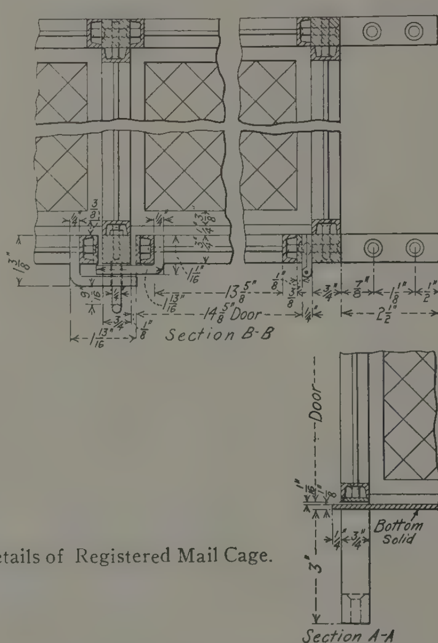

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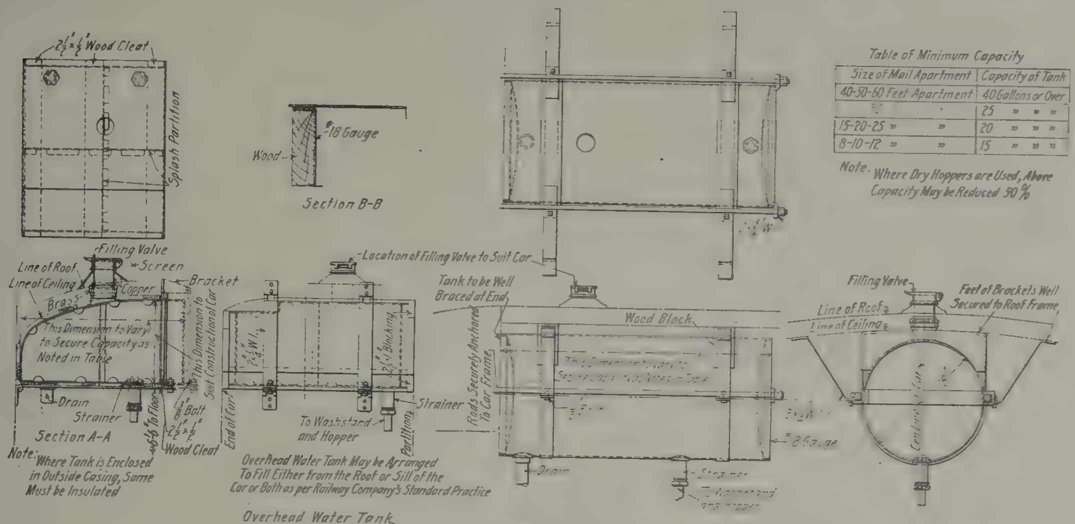

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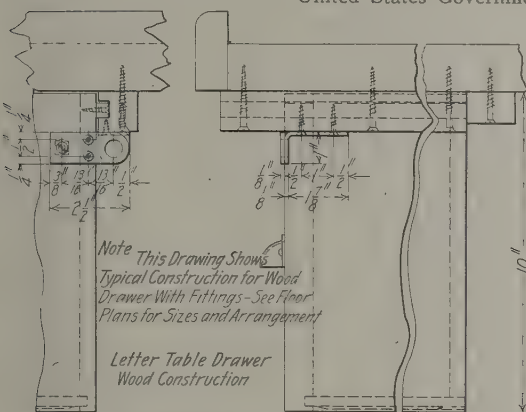

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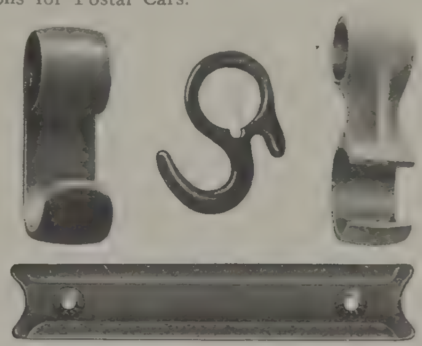
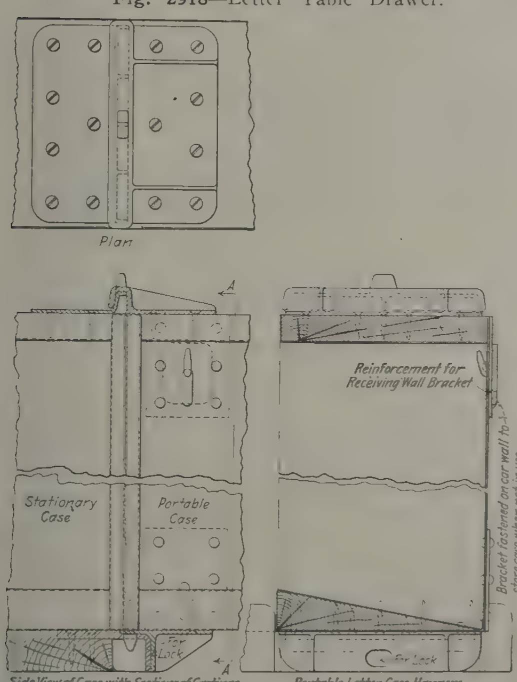


Fig. 2920—Pouch Rack Fittings. Dayton Manufacturing Company.



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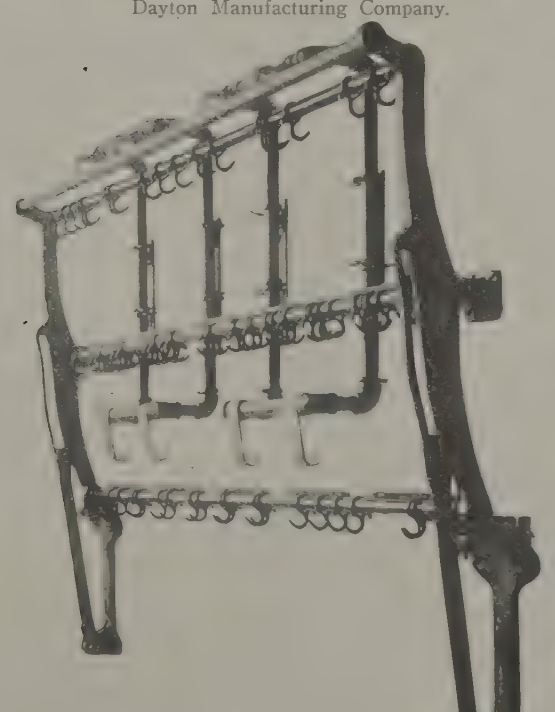

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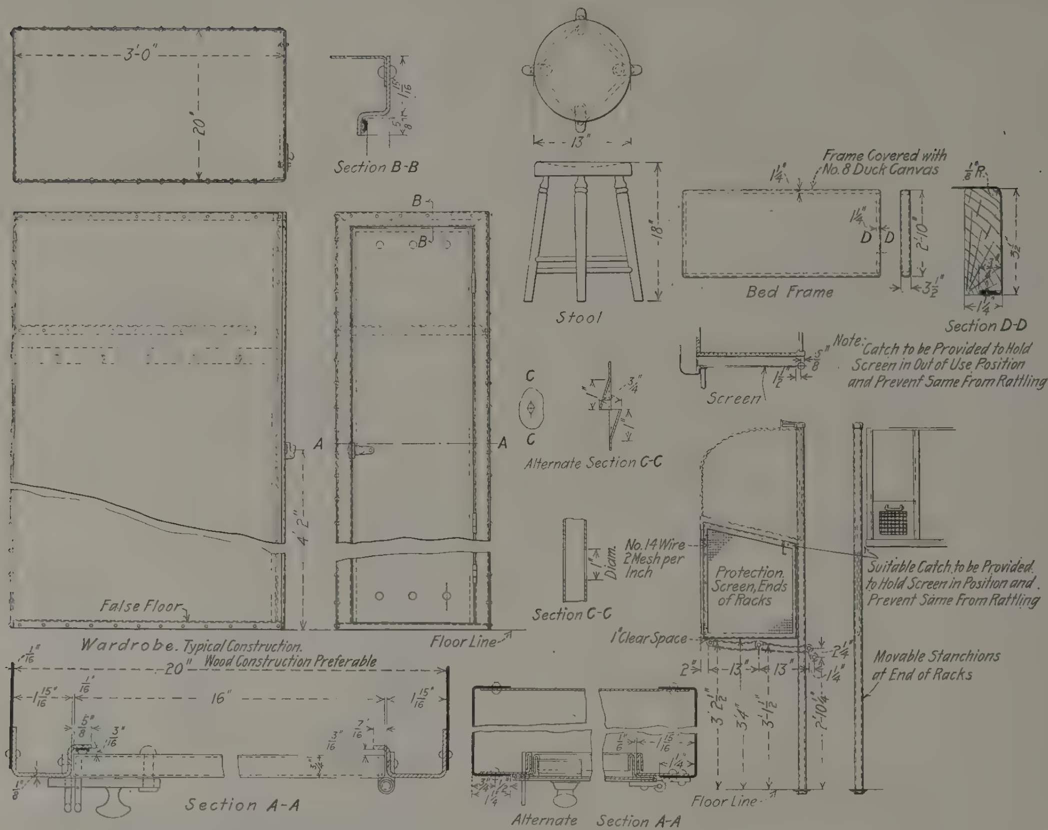

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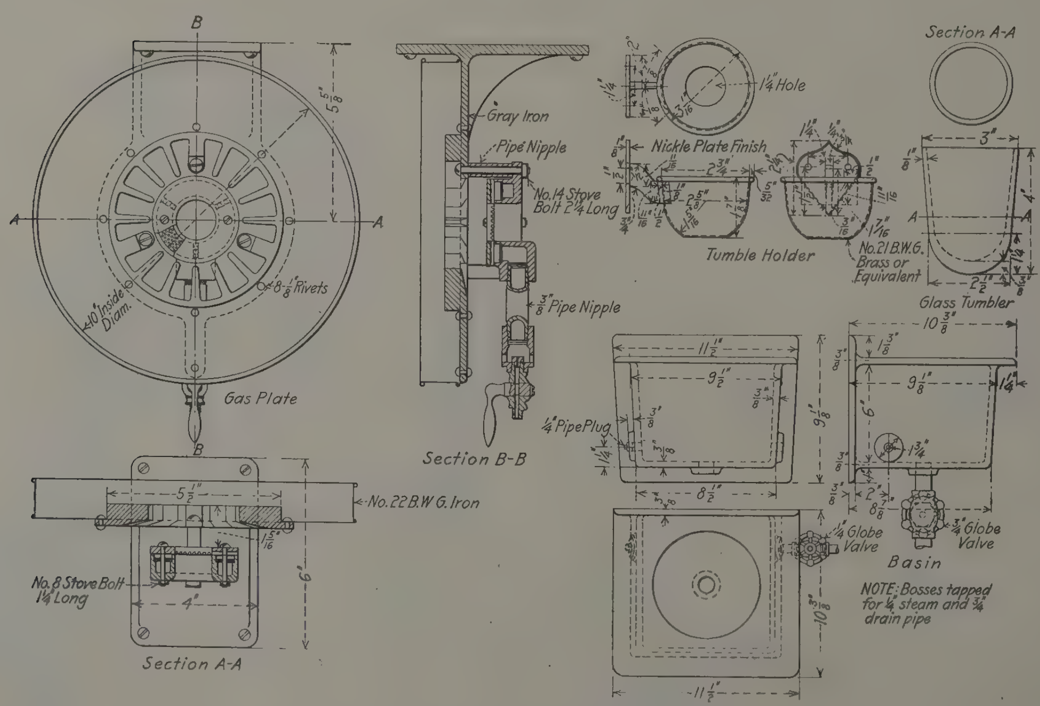

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Master Car Builders' Association

Standards and Recommended Practice.

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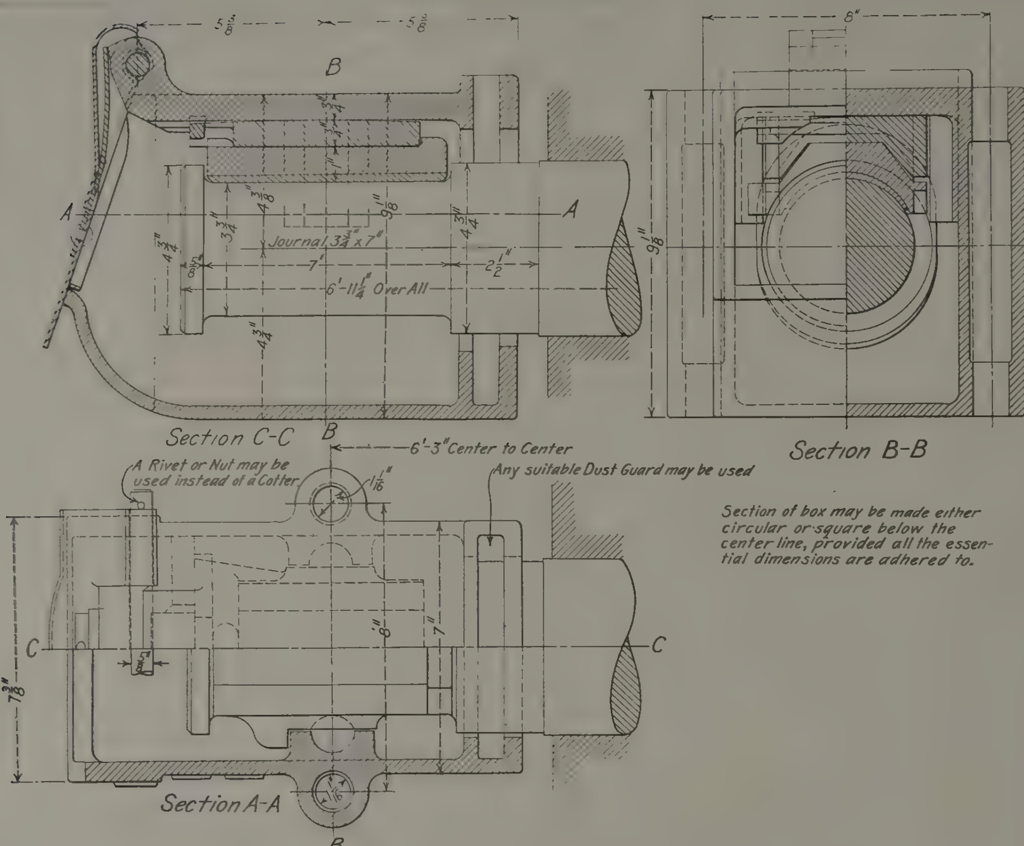
Standards

Recommended Practice



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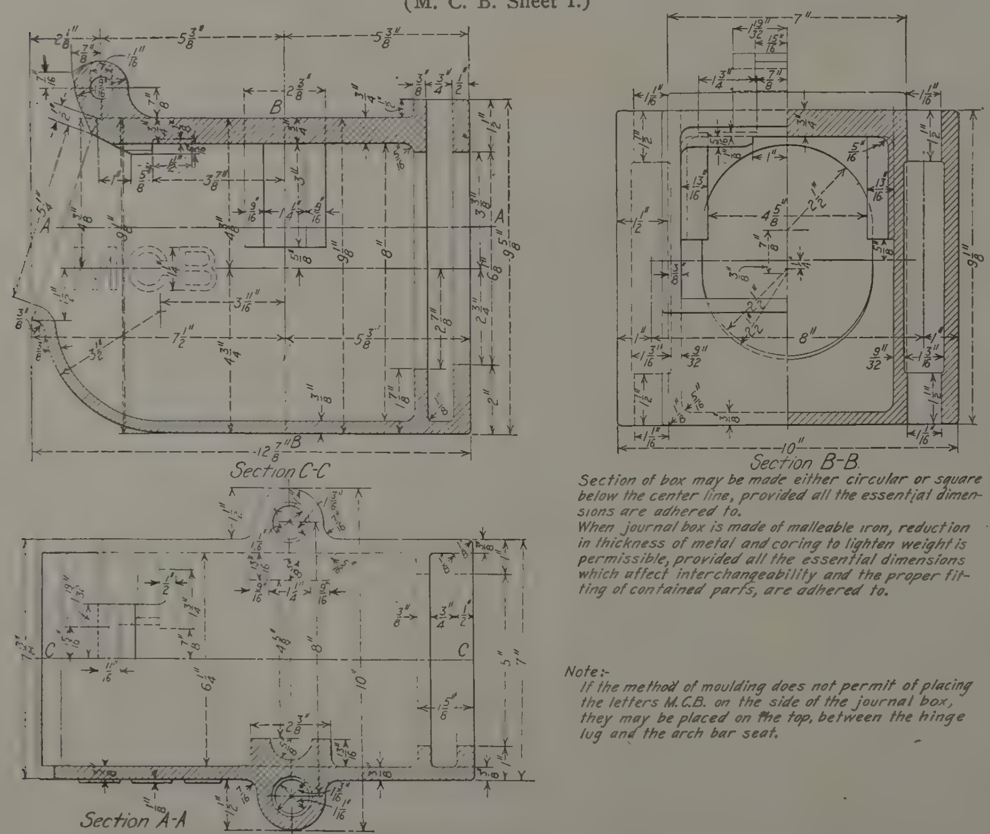

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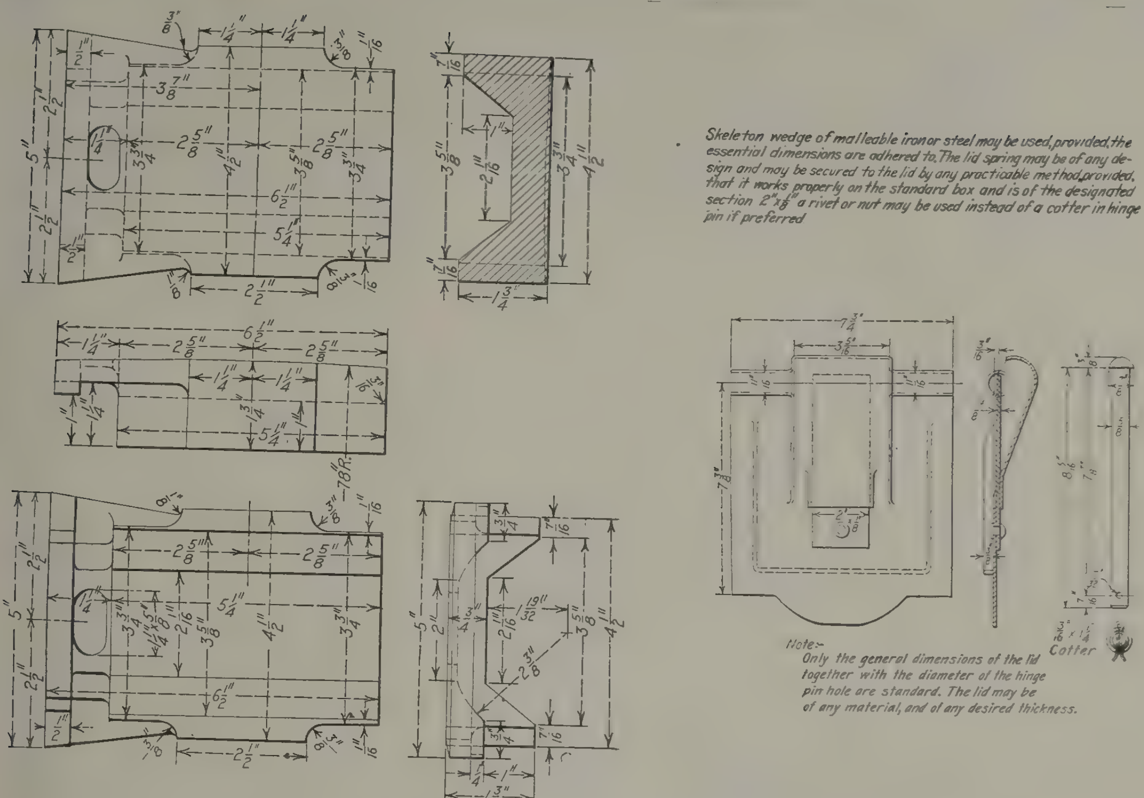

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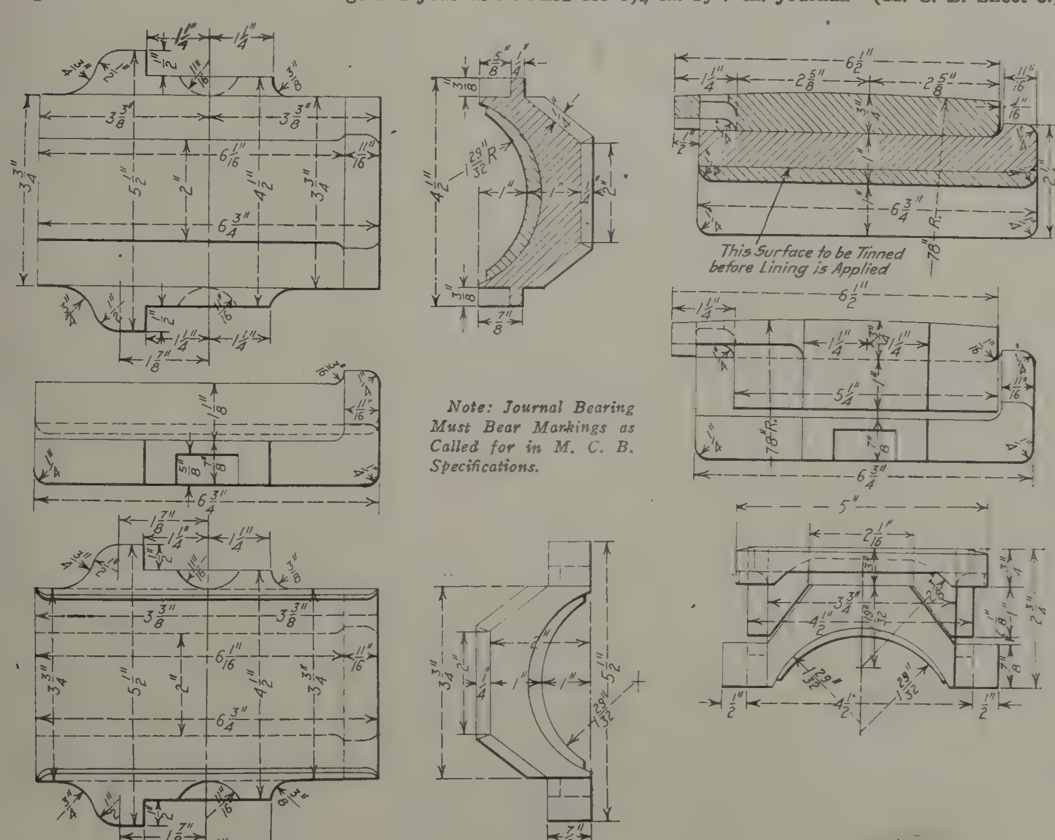

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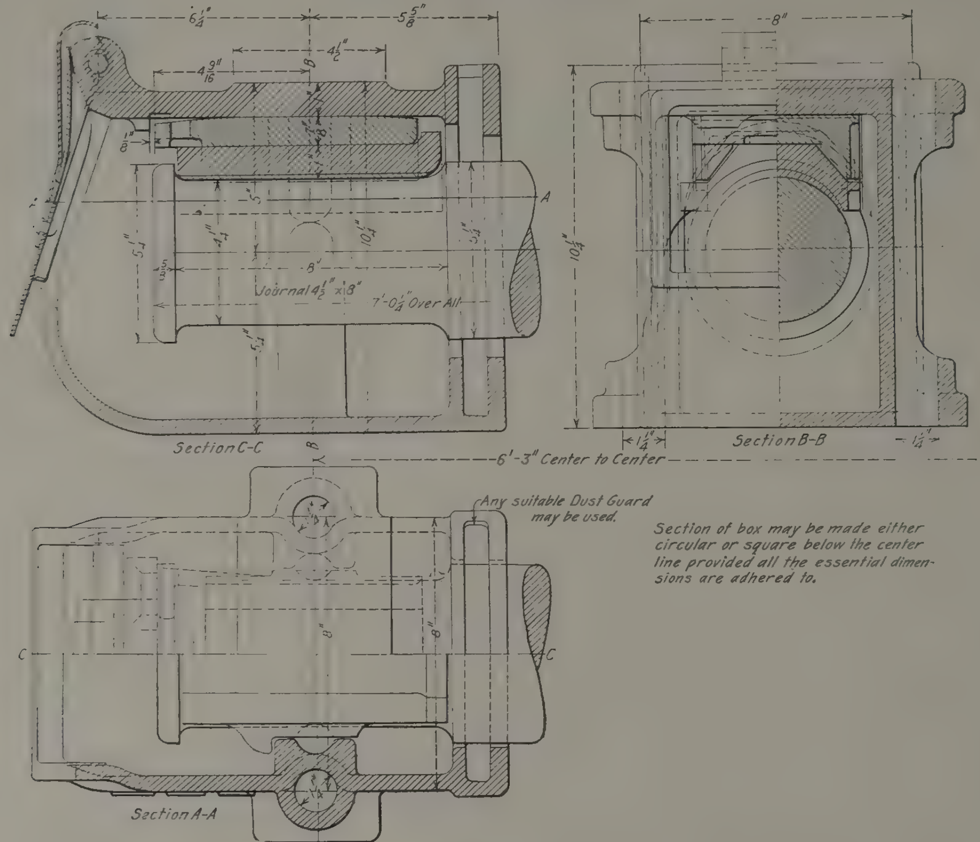

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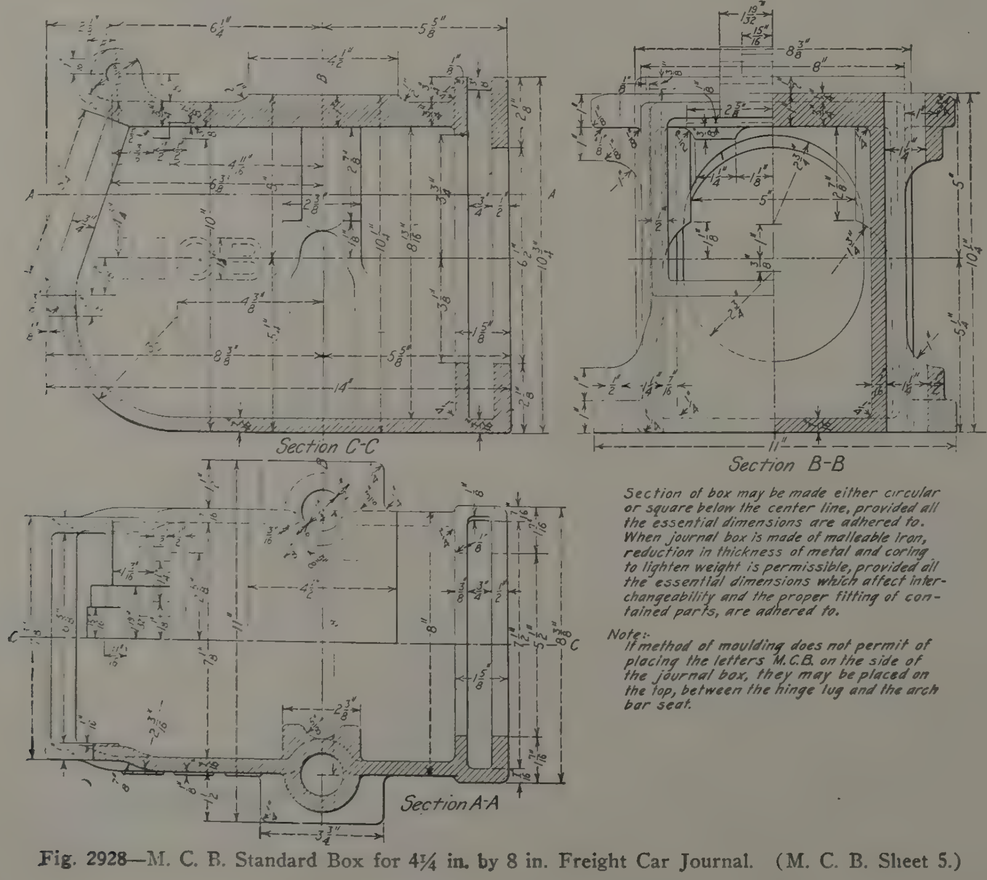

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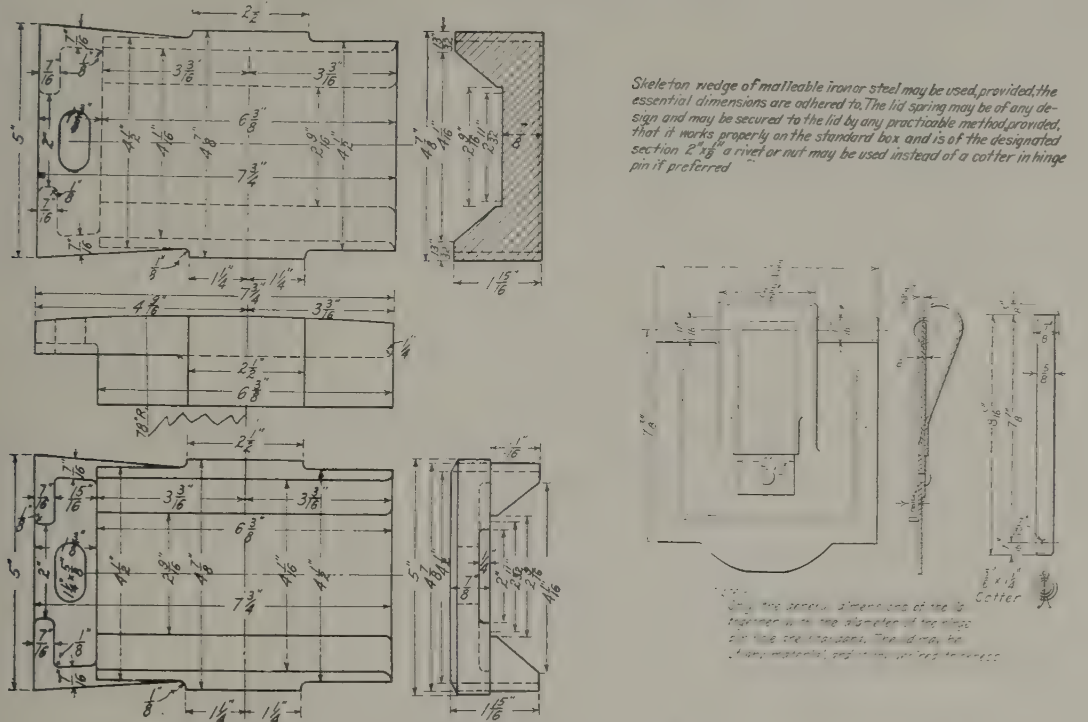

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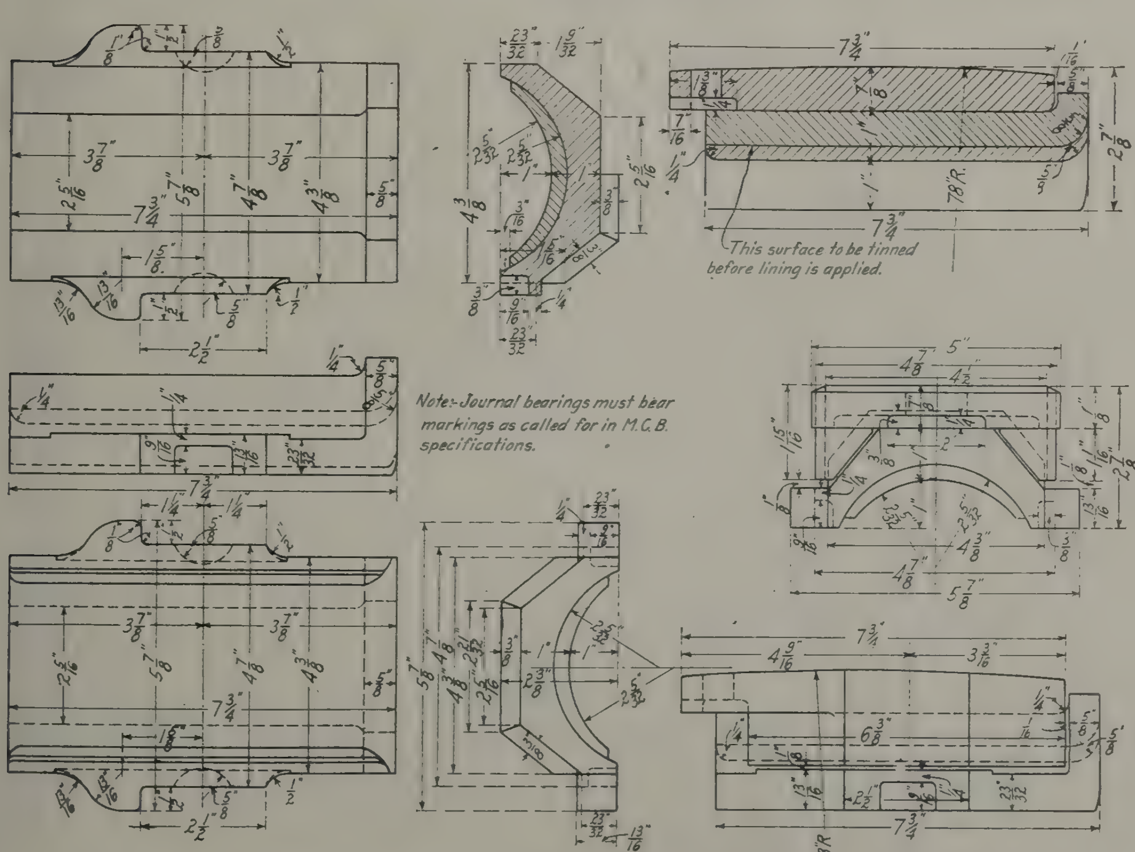
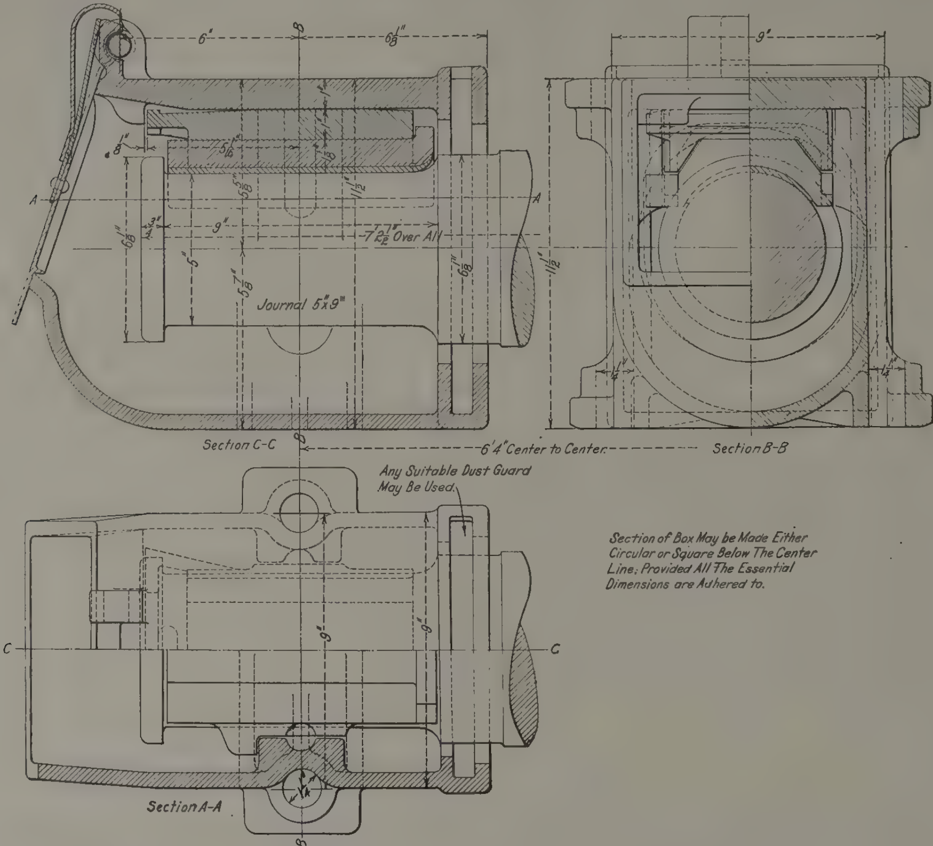


Fig. 2930—M. C. B. Standard Bearing and Wedge for 4¼ in. by 8 in. Journal. (M. C. B. Sheet 6.)



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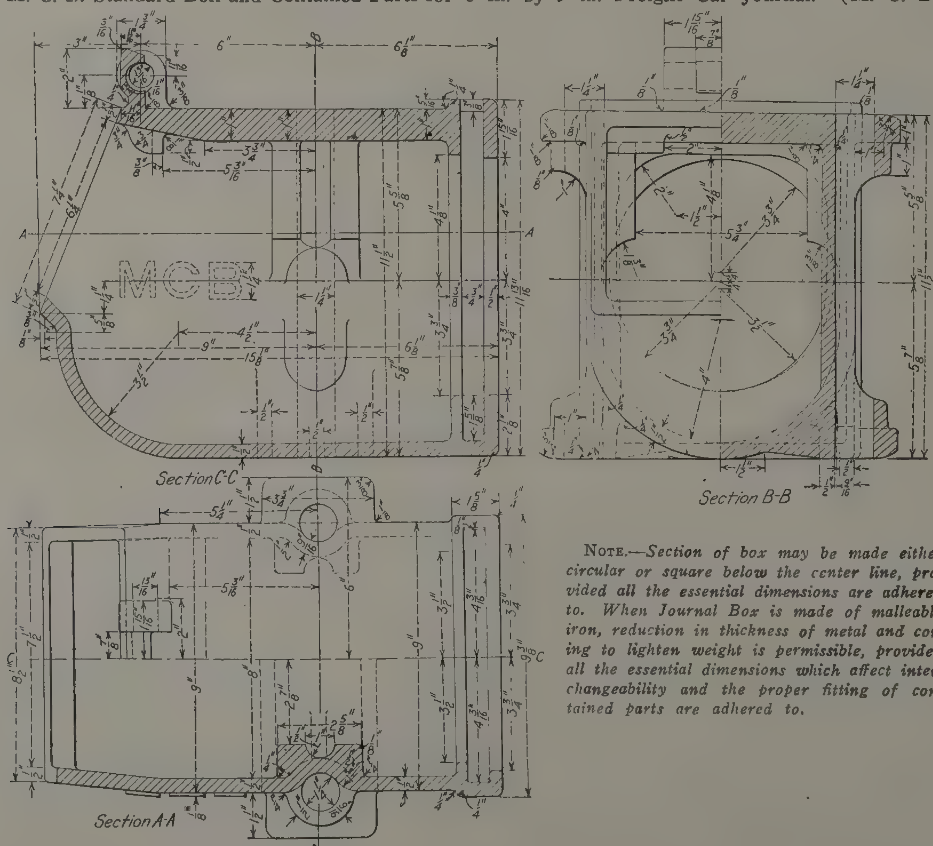
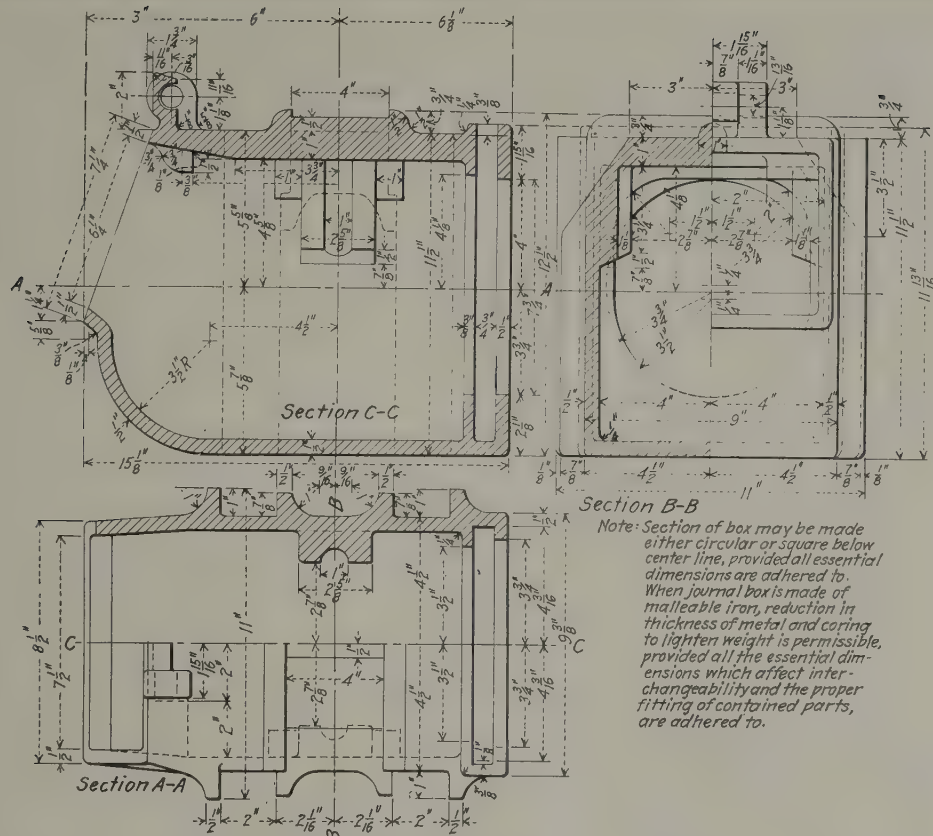


NOTE.—*Section of box may be made either circular or square below the center line, provided all the essential dimensions are adhered to. When Journal Box is made of malleable iron, reduction in thickness of metal and coring to lighten weight is permissible, provided all the essential dimensions which affect interchangeability and the proper fitting of contained parts are adhered to.*

Fig. 2932—M. C. B. Standard Box for 5 in. by 9 in. Freight Car Journal. (M. C. B. Sheet 8.)



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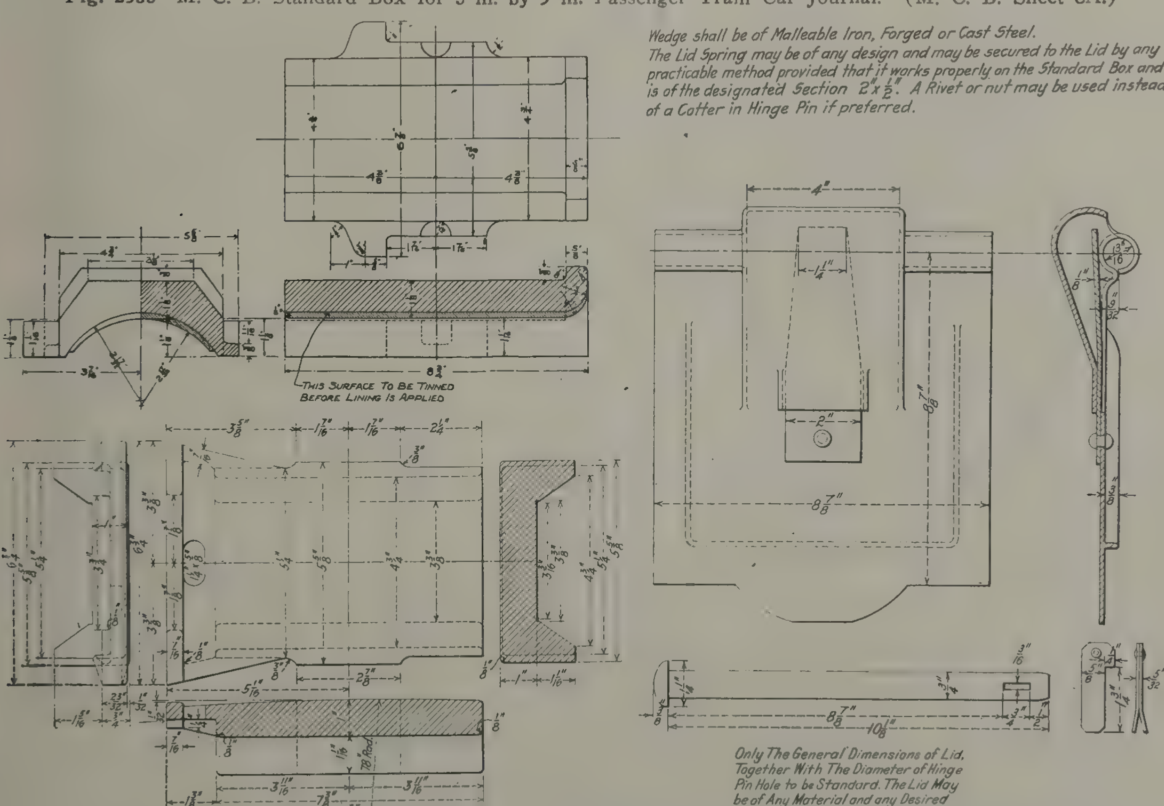


Fig. 2934—M. C. B. Standard Bearing, Wedge and Journal Box Lid for 5 in. by 9 in. Journal. (M. C. B. Sheet 9.)

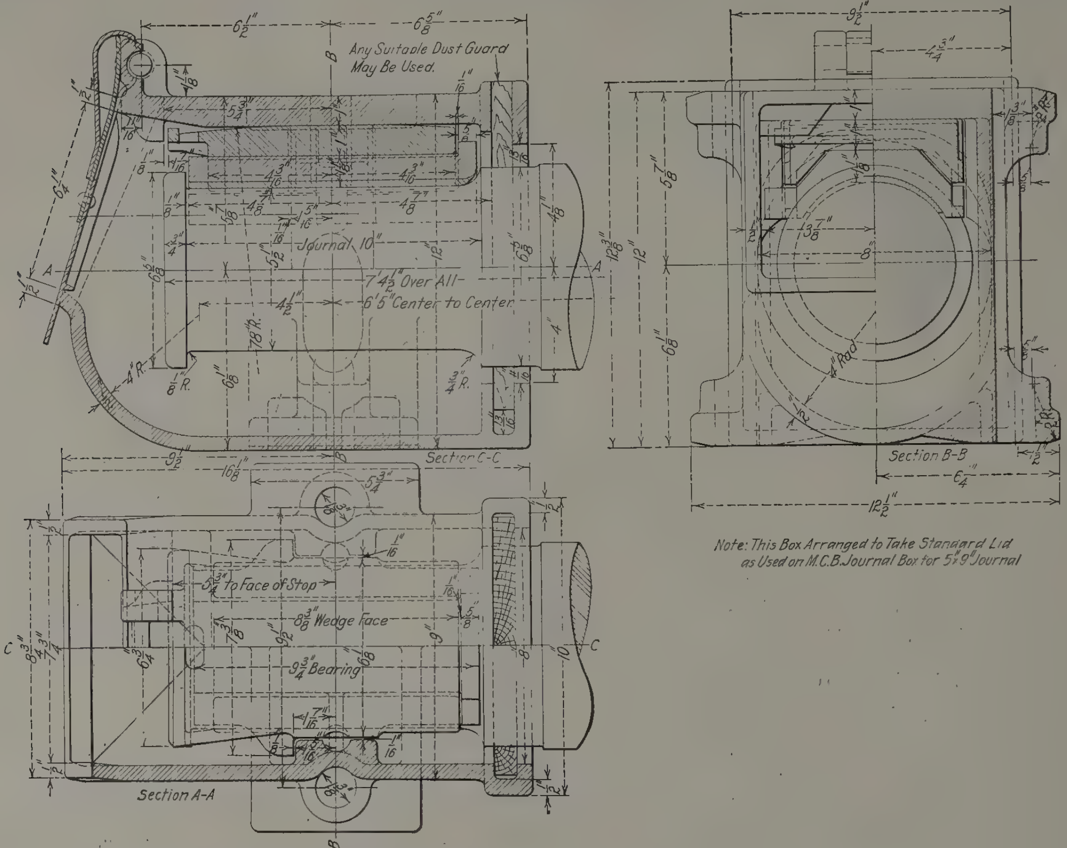


Fig. 2935—M. C. B. Standard Box and Contained Parts for 5½ in. by 10 in. Freight Car Journal. (M. C. B. Sheet 10.)

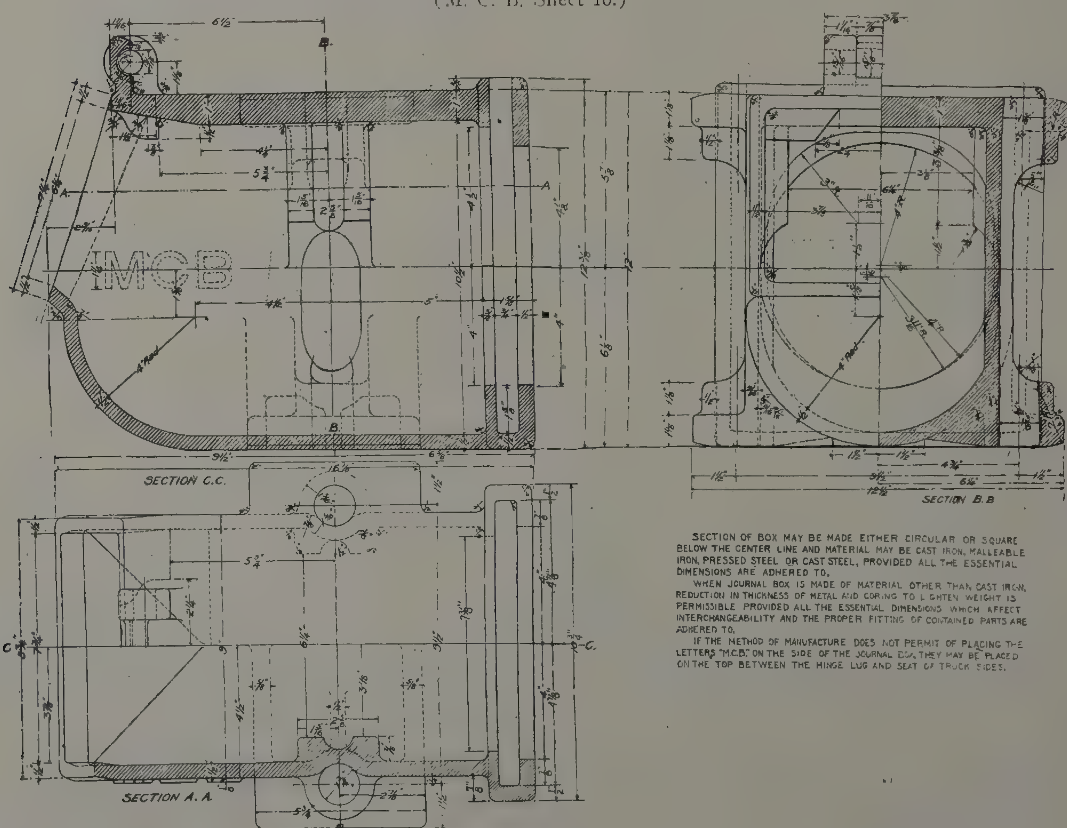


Fig. 2936—M. C. B. Standard Box for 5½ in. by 10 in. Freight Car Journal. (M. C. B. Sheet 11.)

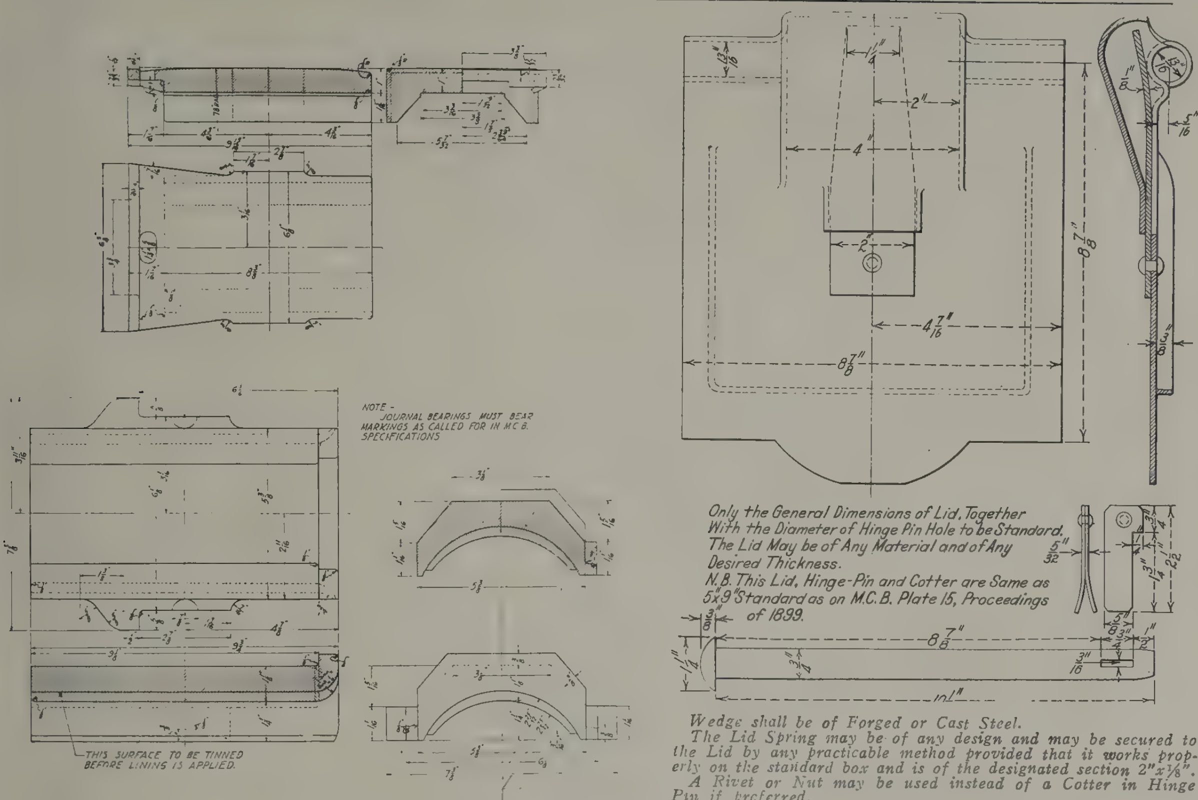
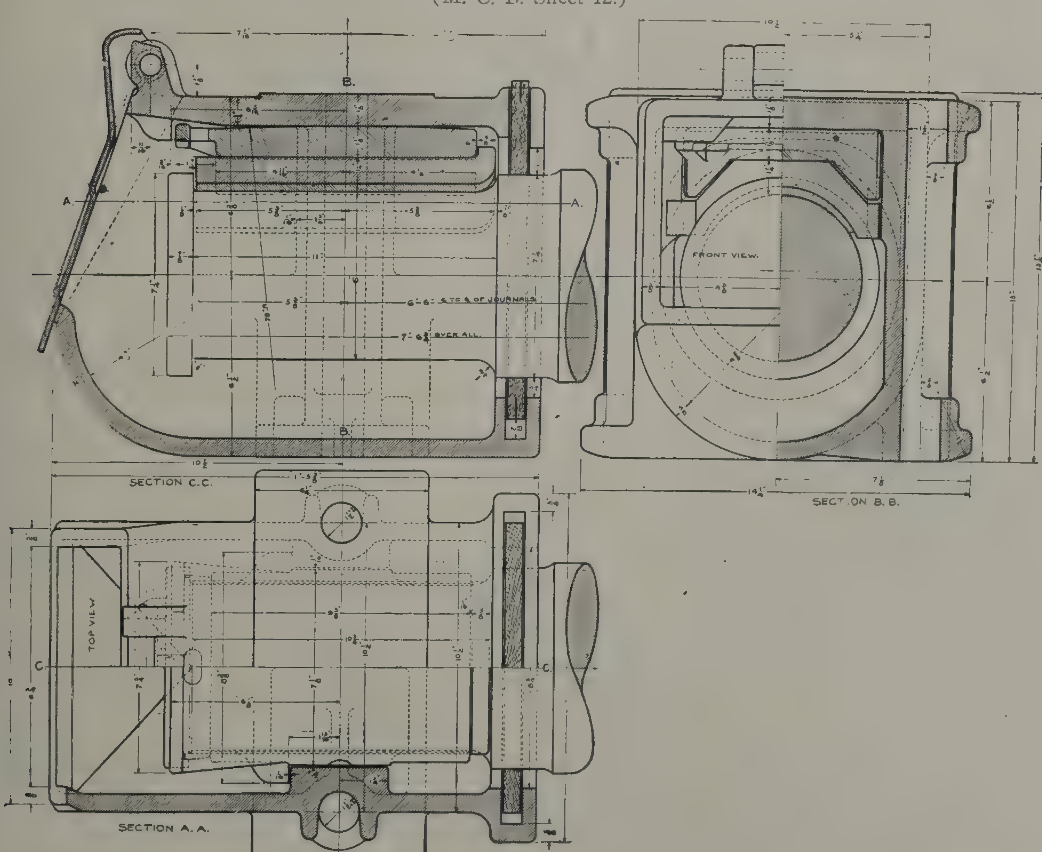


Fig. 2937—M. C. B. Standard Bearing, Wedge and Journal Box Lid for 5½ in. by 10 in. Journal. (M. C. B. Sheet 12.)



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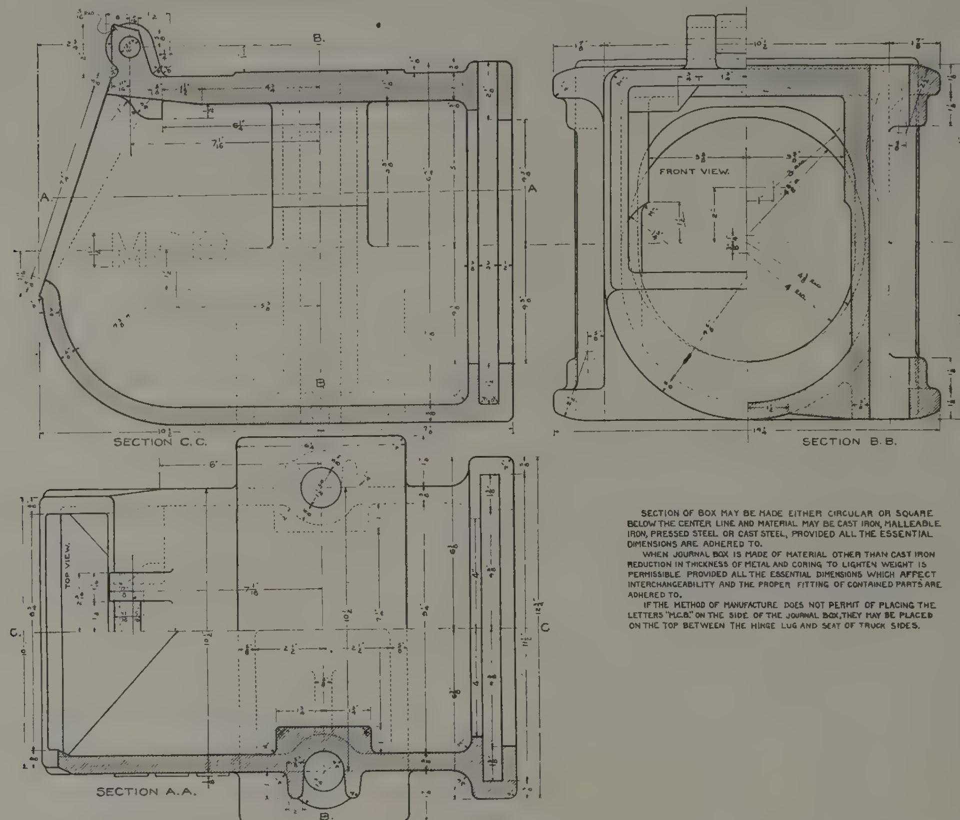

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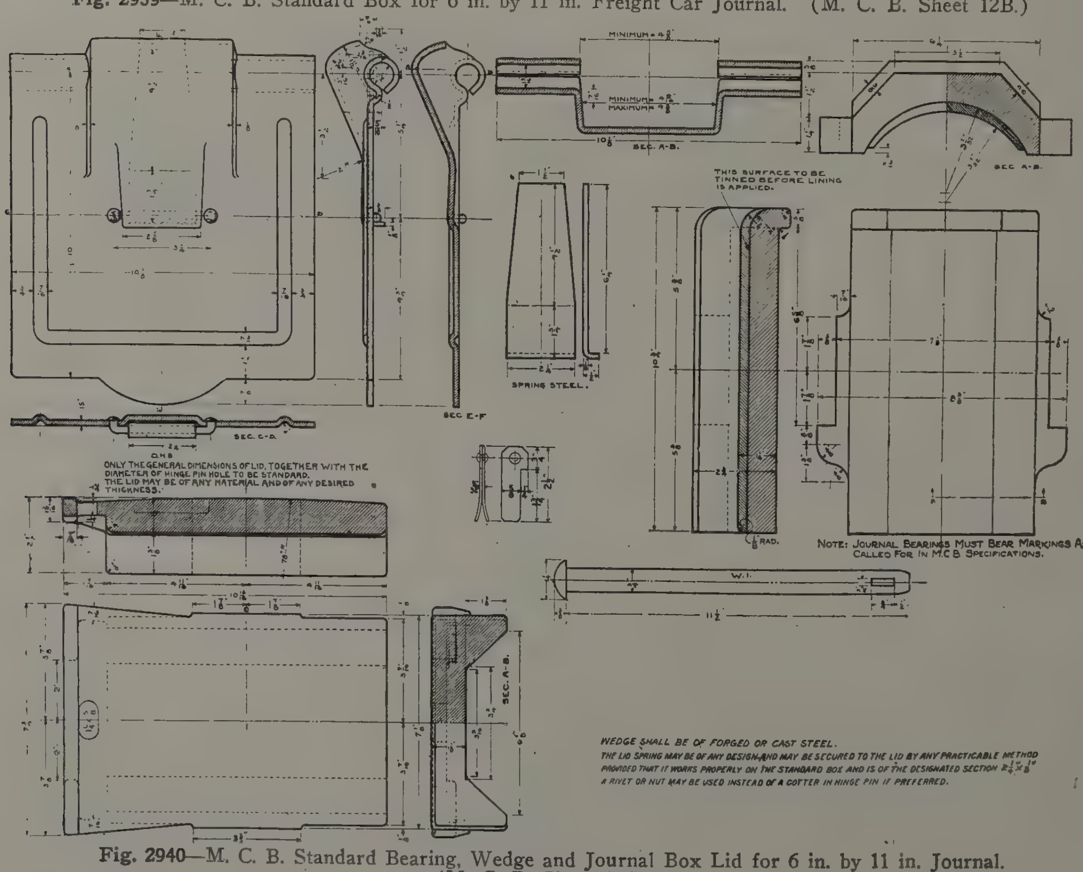

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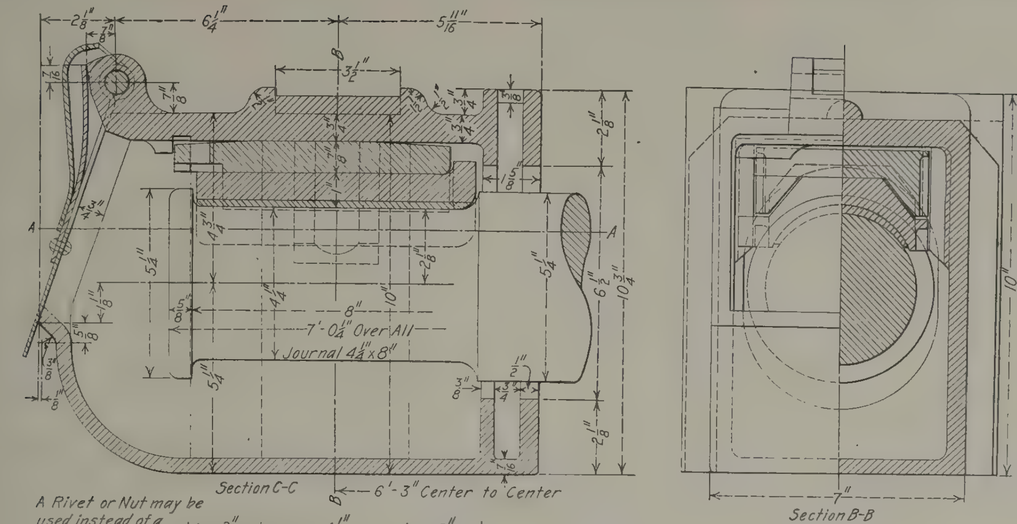

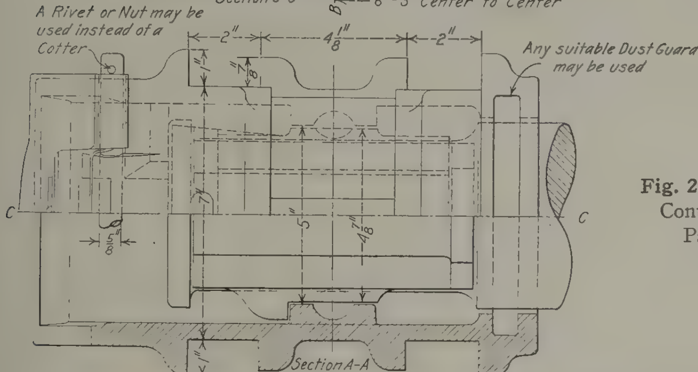

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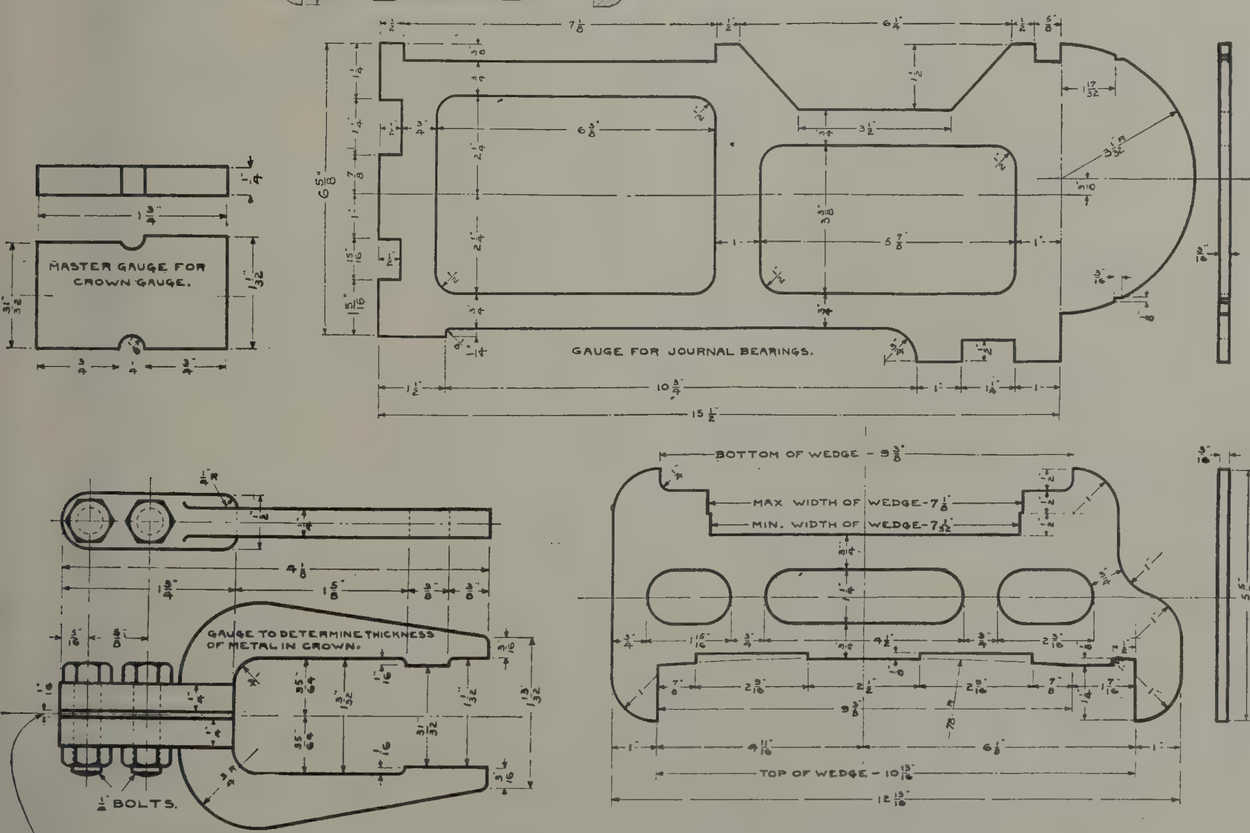

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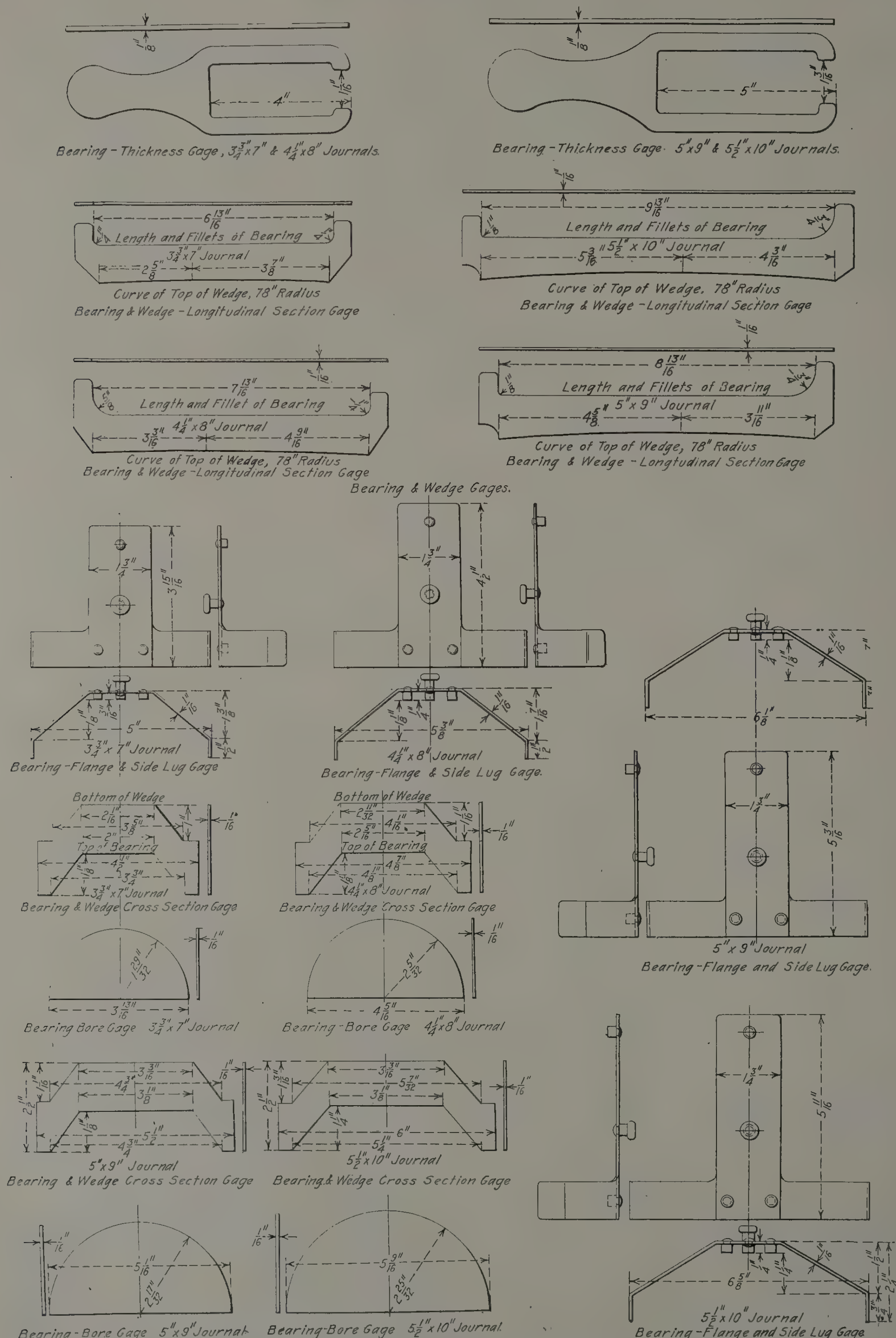
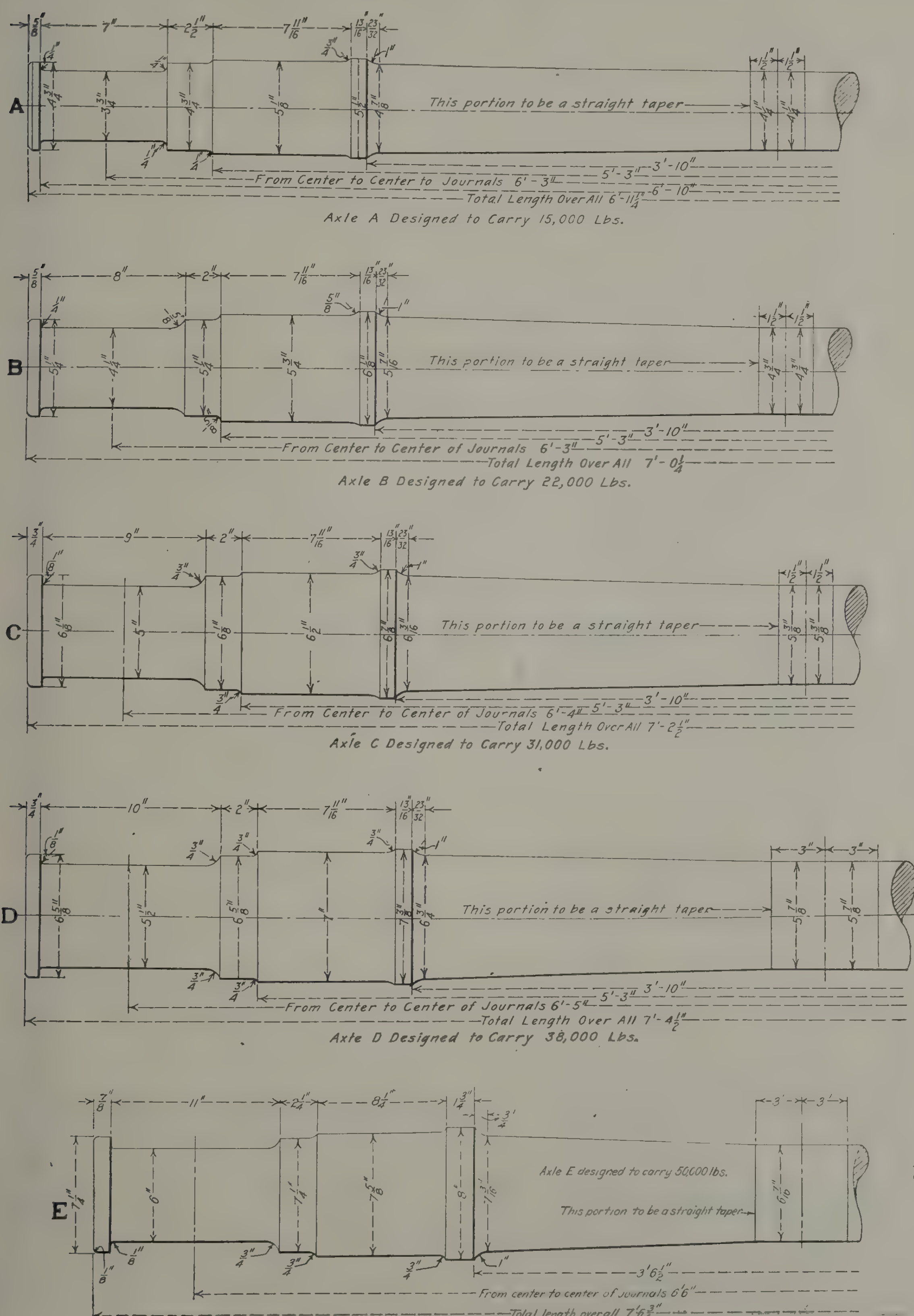


Fig. 2943—Journal Bearings and Wedge Gages. (M. C. B. Sheet 14.)

(See Fig. 2942 for Gages for 6 in. by 11 in. Journal Bearings and Wedges.)



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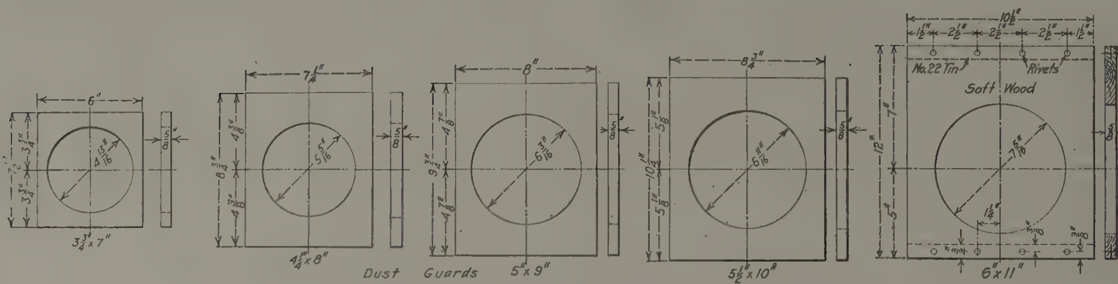

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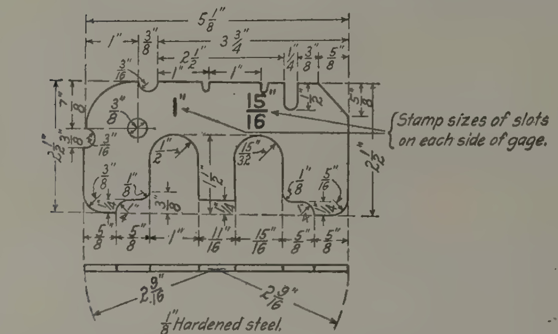

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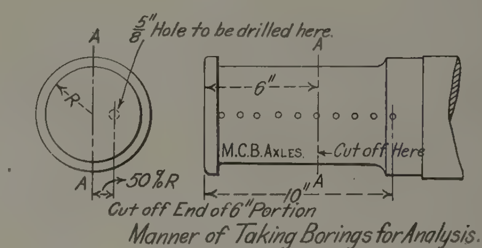

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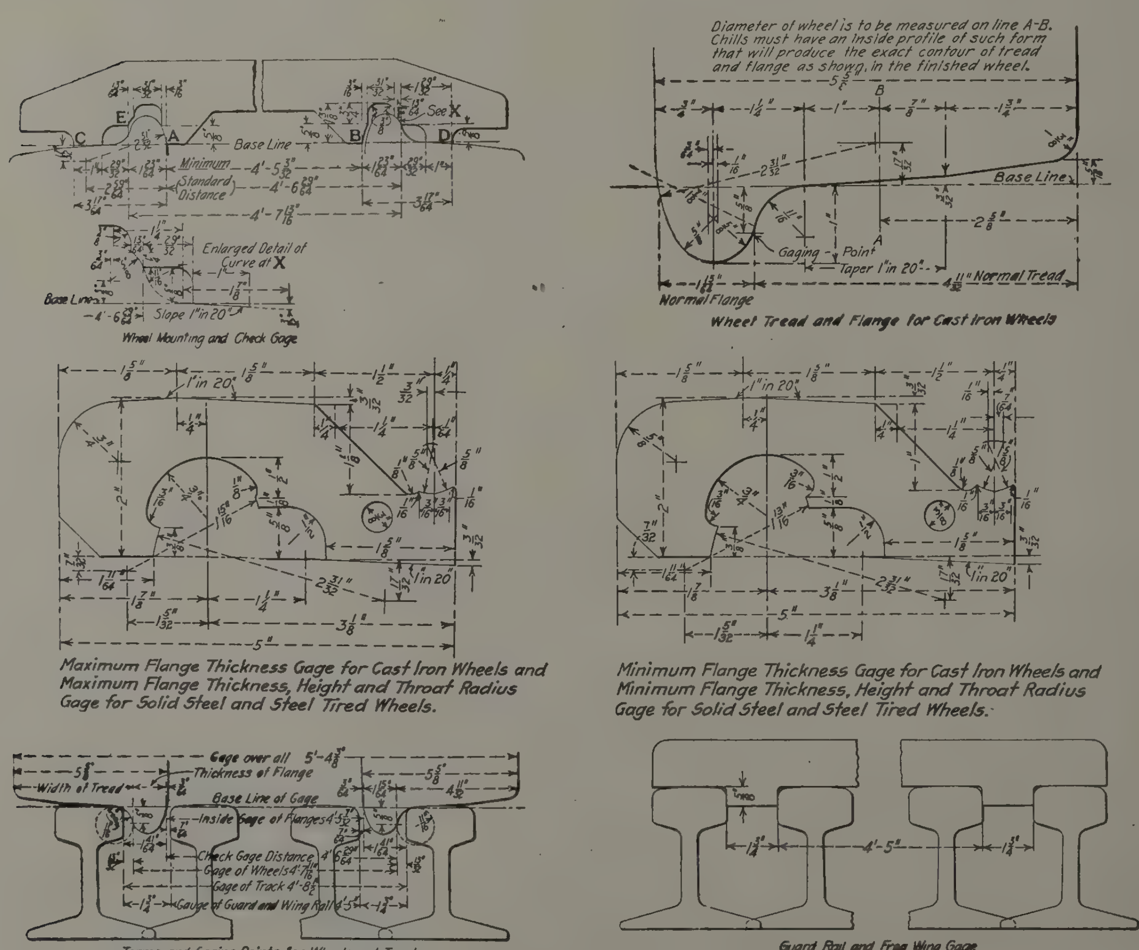

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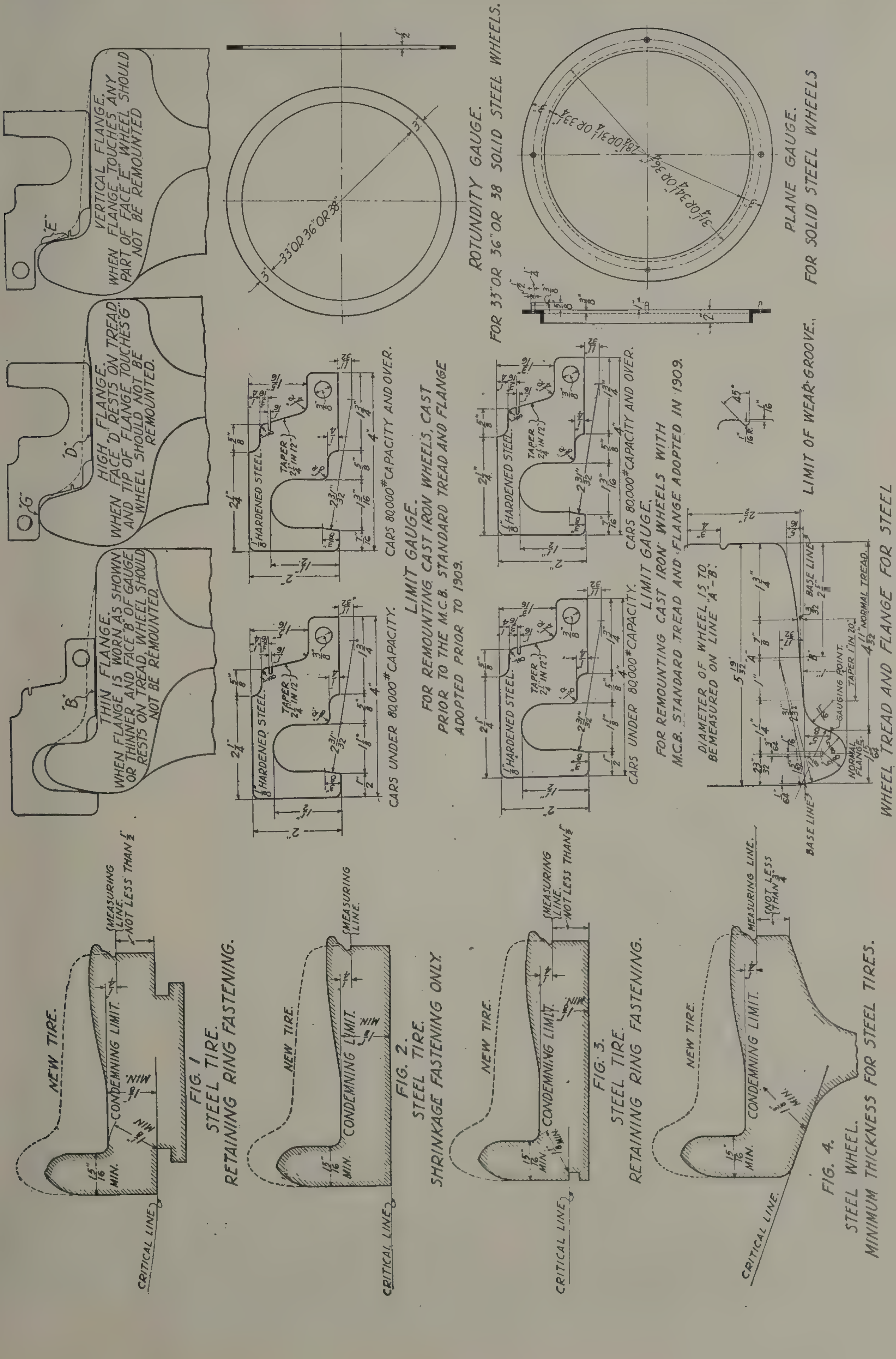

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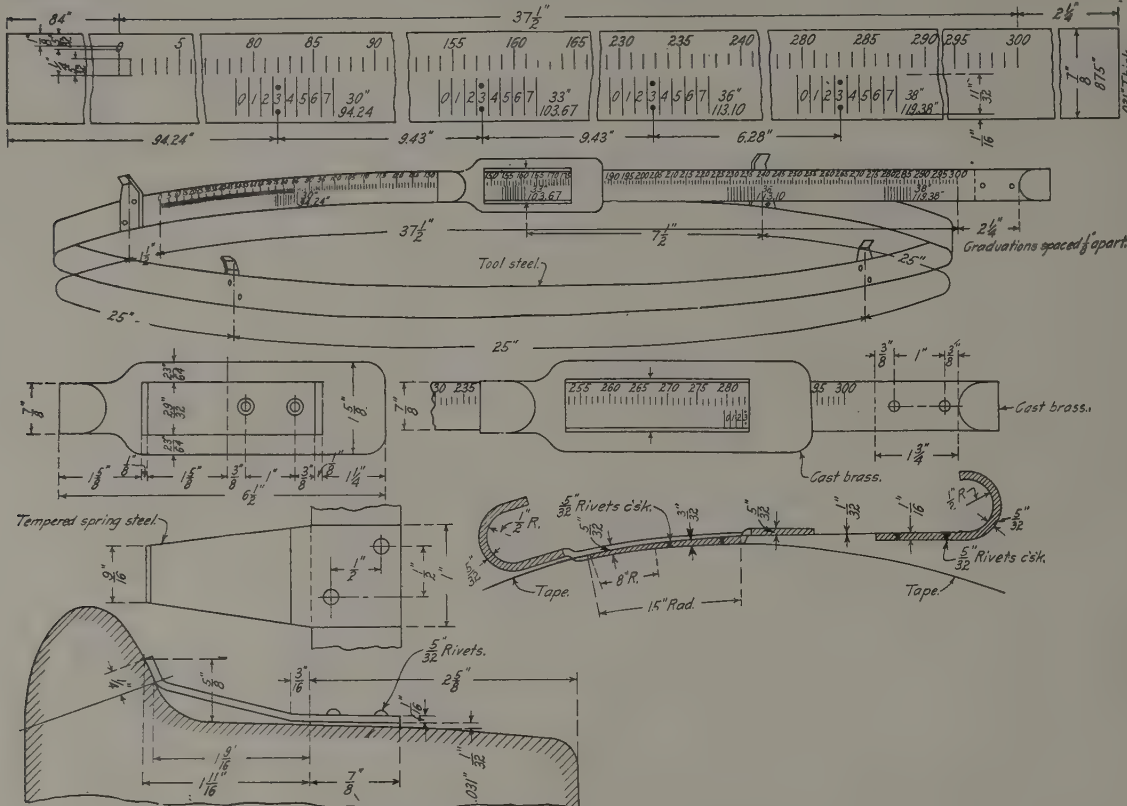

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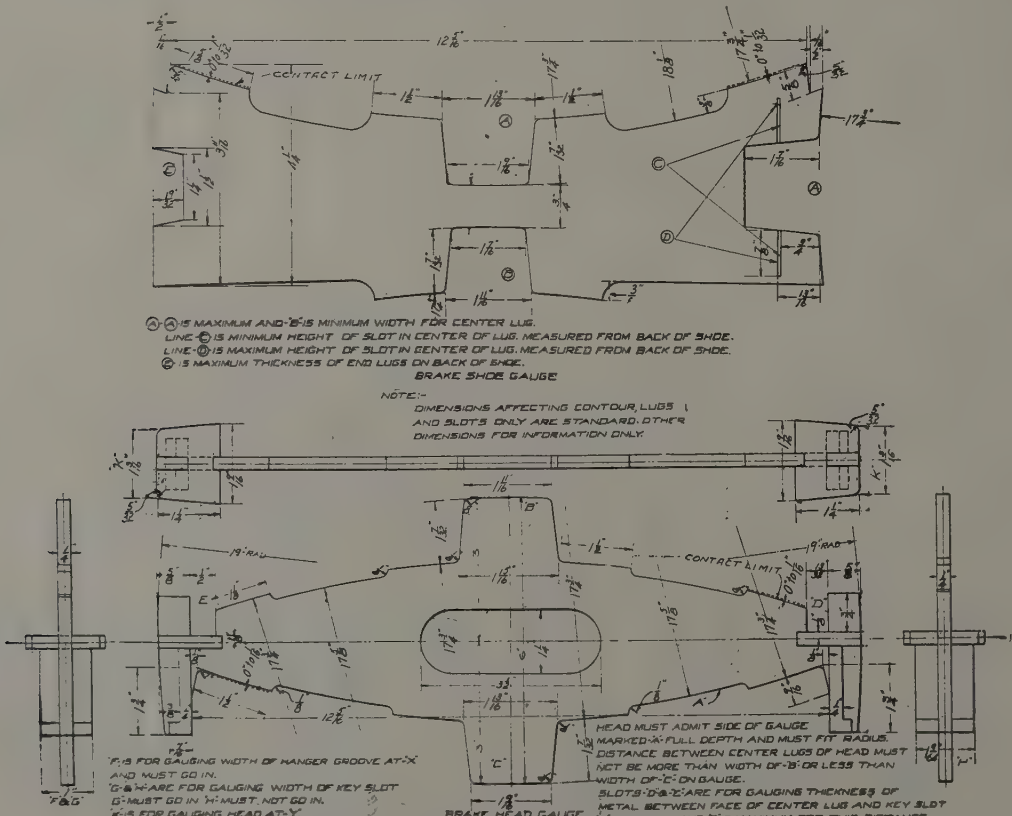


Fig. 2951—M. C. B. Standard Brake Head and Shoe Gages. (M. C. B. Sheet 17.)

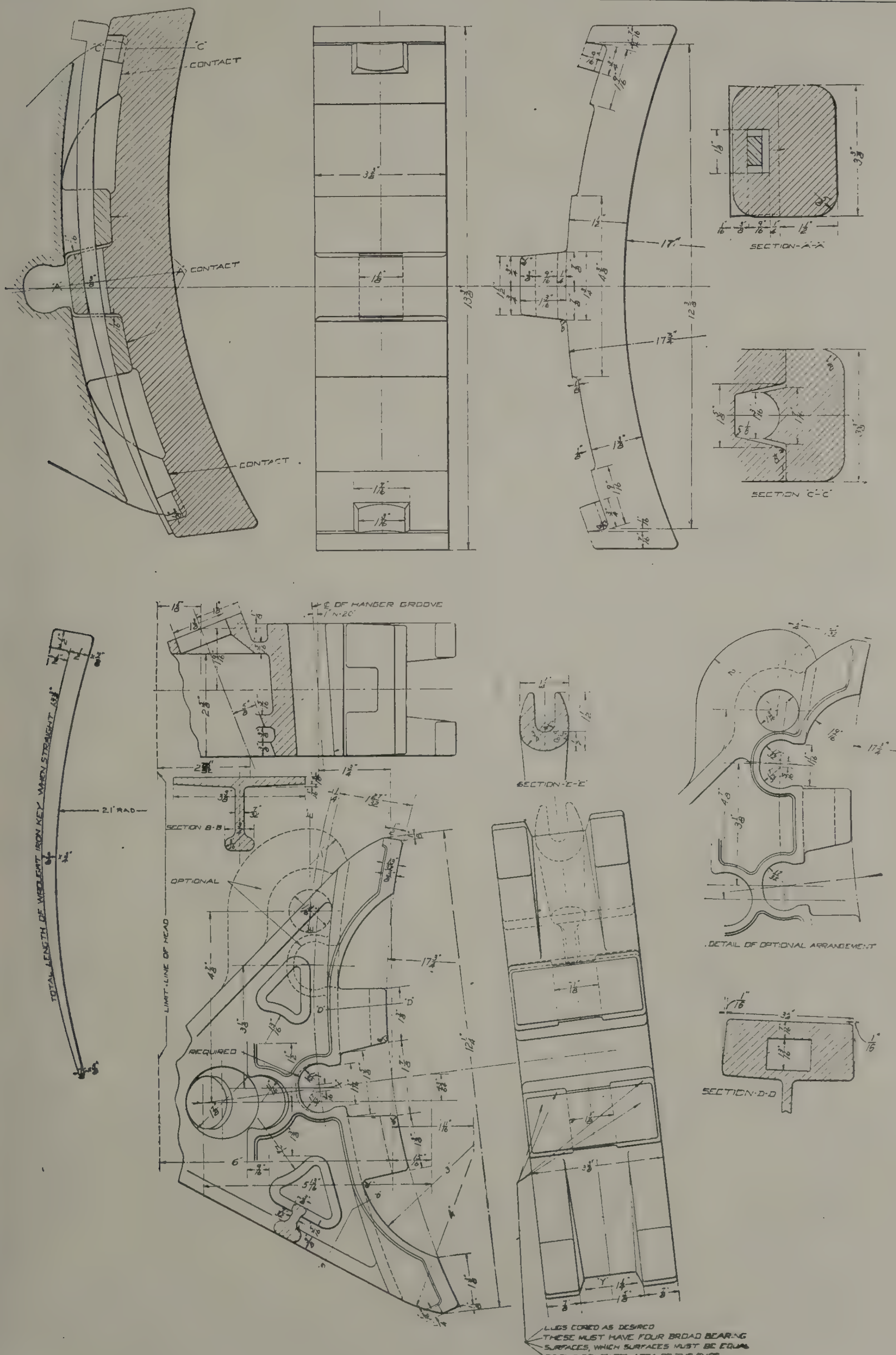


Fig. 2952—Standard Brake Head, Shoe and Key. (M. C. B. Sheet 17.)

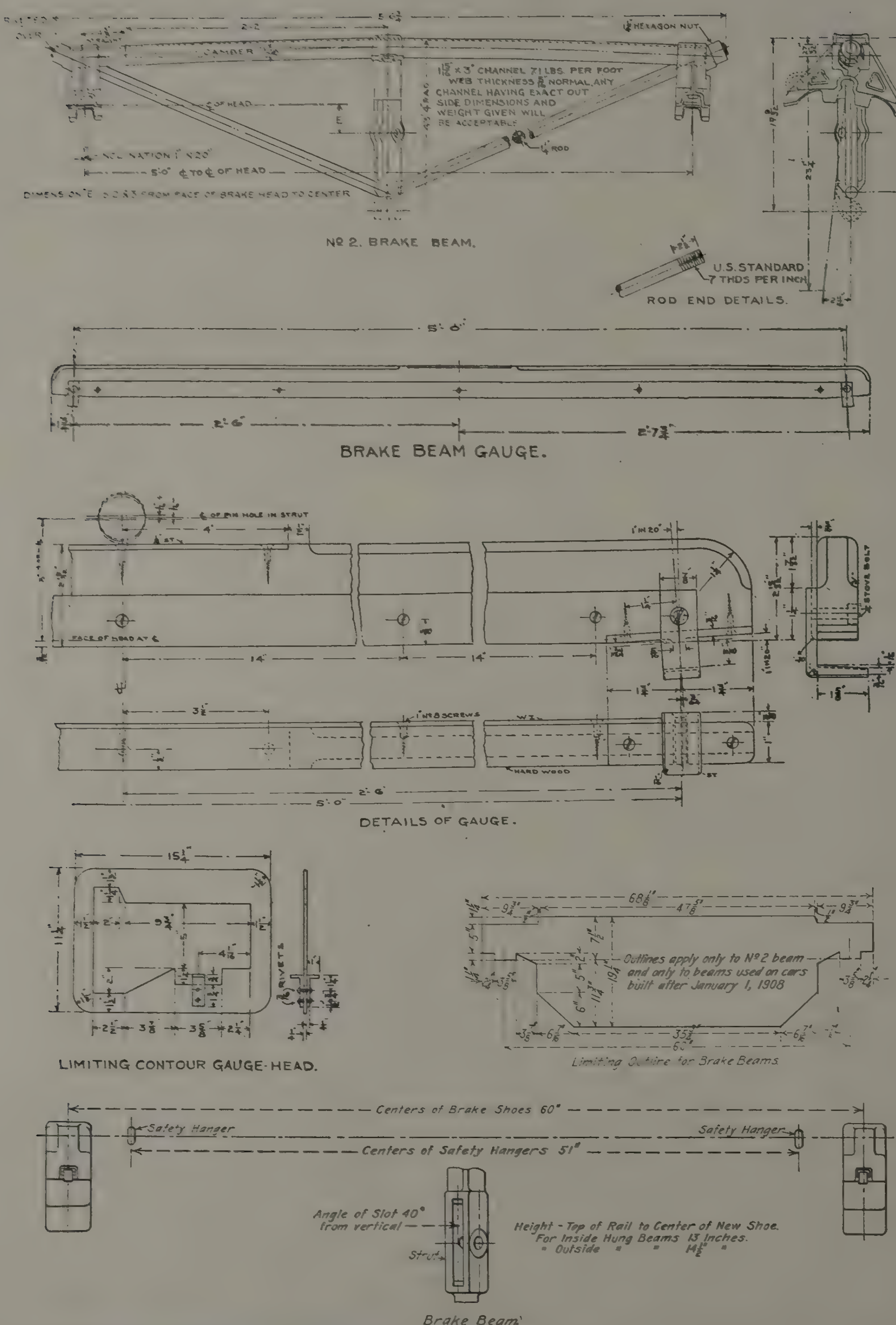


Fig. 2953—No. 2 Brake Beam, Brake Beam Gage, and Details, Limiting Outline for Brake Beams, Limiting Contour Gage Head. Standard Brake Beam Dimensions. (M. C. B. Sheets 17A and 17B.)

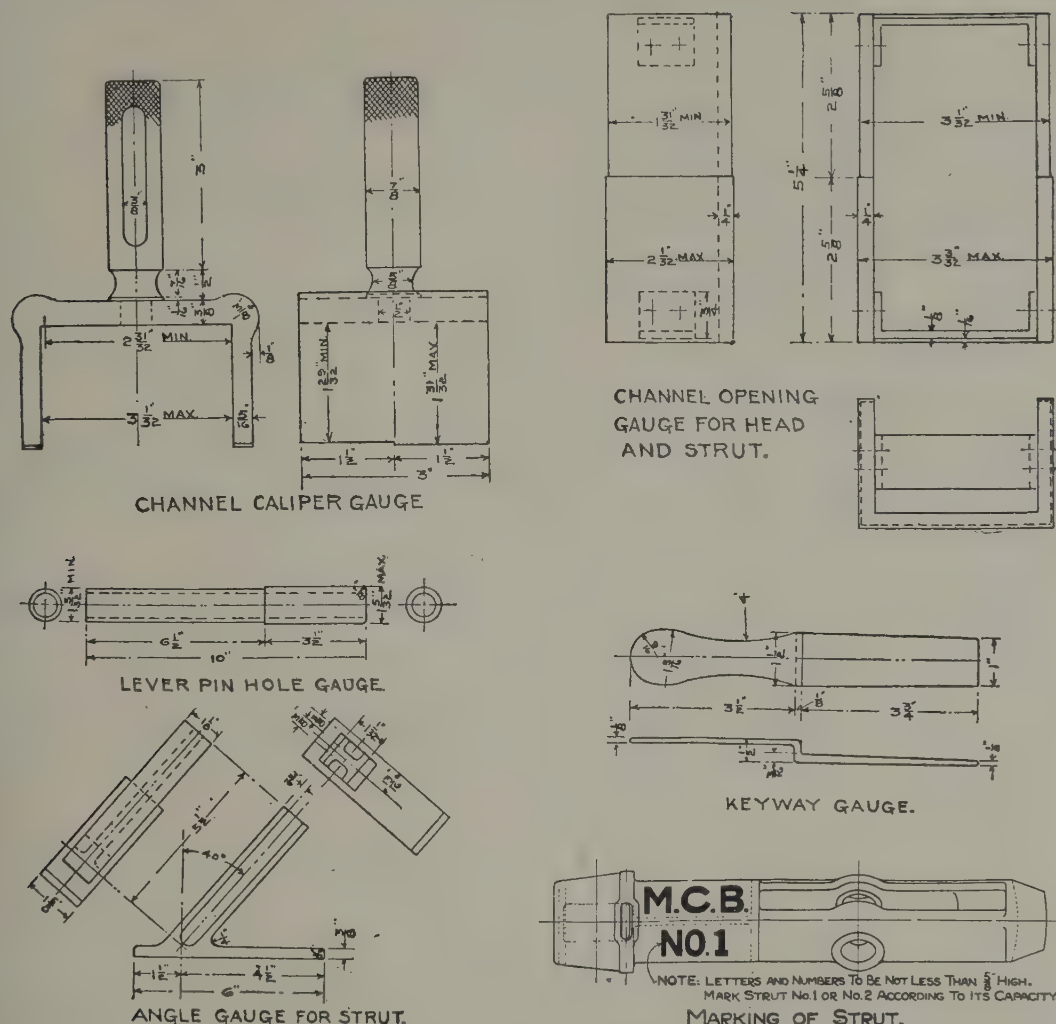


Fig. 2954—Gages for Brake Beam Channel, Channel Opening for Head and Strut. Lever Pin Hole, Keyway, Angle of Strut, and Marking of Strut. (M. C. B. Sheets 17A and 17B.)

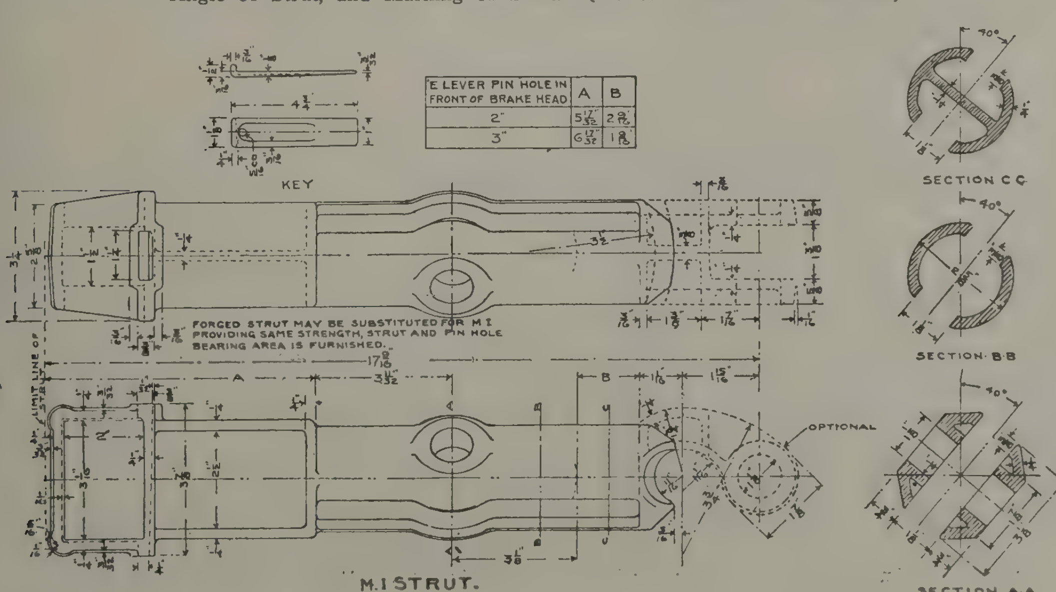


Fig. 2955—Details of Malleable Iron Strut for No. 2 Brake Beam. (M. C. B. Sheet 17B.)

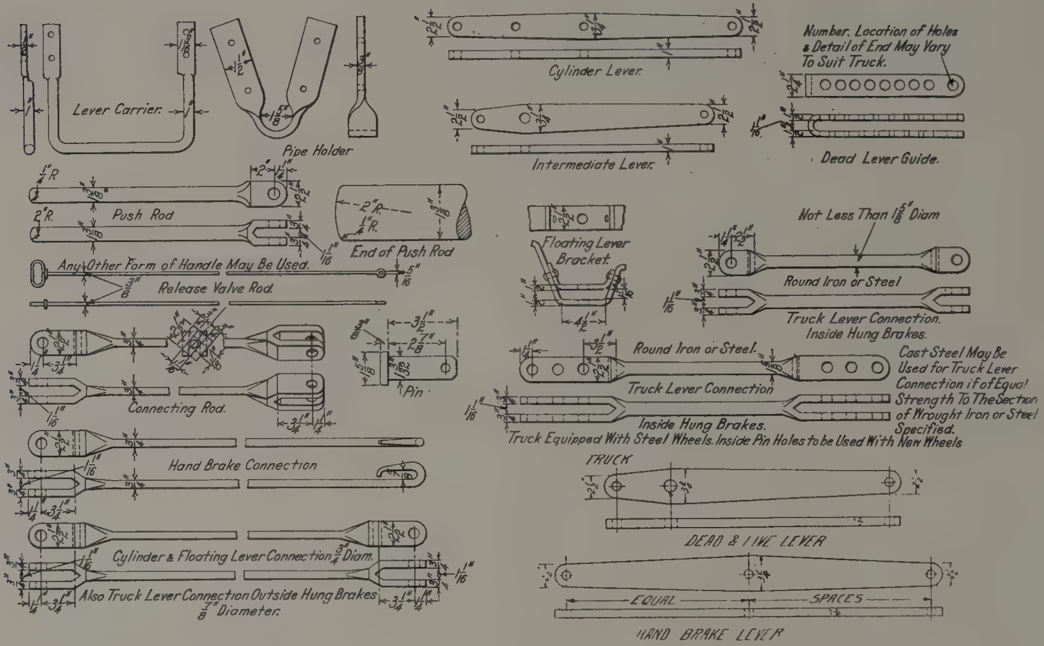
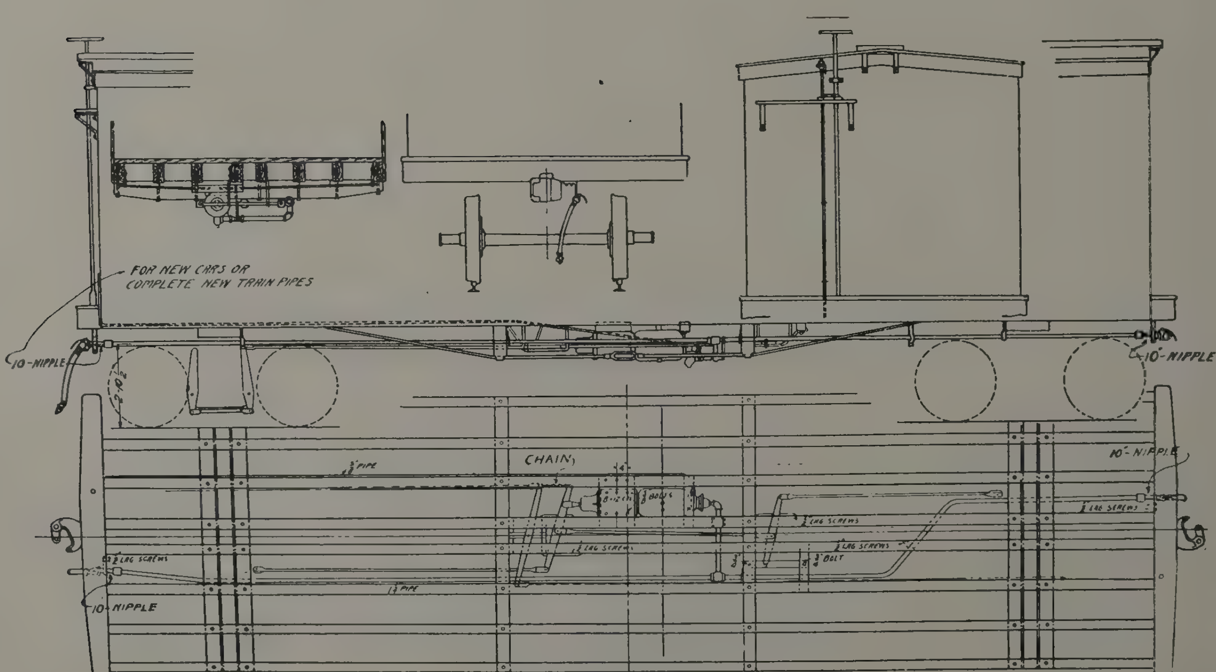


Fig. 2956—Standards for Air Brakes on Freight Cars. Details. (M. C. B. Sheet 18.)

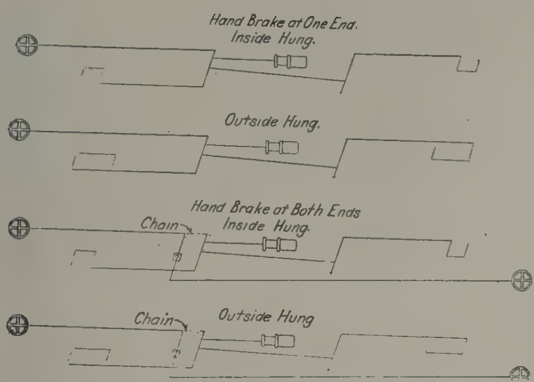
(See also Figs. 2957-2959.)



GENERAL ARRANGEMENT

Fig. 2957—Standards for Air Brakes on Freight Cars. (M. C. B. Sheet 18.)

(See also Figs. 2956, 2958 and 2959.)

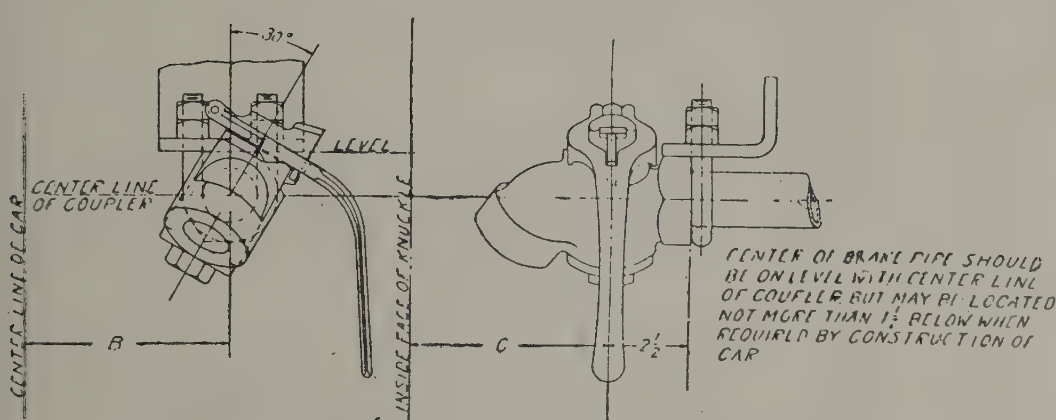


For Brake Cylinders Larger Than 8" or for Brake Cylinder Pressures Above 50 Lbs. Per Square Inch, The Size of Brake Rods and Brake Levers Shown Should Be Increased So That The Fibre Stress Shall Not Exceed 15,000 Lbs. Per Square Inch for Rods and 23,000 Lbs. Per Square Inch for Levers

The Form of Jaws May Be Varied Provided The Essential Dimensions Are Adhered To. Jaws May Be Made With Two (or more) Holes if Desired. All Rods Must Be At Least 3/4" Diam. and Truck Lever Connection For Outside Hung Brakes 7/8" Diam.

All Holes For Brake Pins Not Less Than 1 3/32" Diam. Nor More Than 1 1/8" Diam. Brake Beams Must Not Be Hung From Any Portion of Body of Cars On Cars Built After Sept. 1st 1909.

Fig. 2958—Standard Brake Diagrams. (M. C. B. Sheet 18.)



	B	C
WOODEN UNDERFRAME CARS	13	13
STEEL UNDERFRAME CARS BUILT AFTER 1916	15	9

DIMENSION B MUST BEAR A FIXED RELATION TO DIMENSION C WHERE DIMENSION B MUST BE INCREASED OR DECREASED FROM DIMENSIONS SHOWN IN TABLE, DIMENSION C SHALL BE DETERMINED FROM THE FORMULA C = 39 - 2B

Fig. 2959—Standard Location of Angle Cock on Freight Cars. (M. C. B. Sheet 18.)

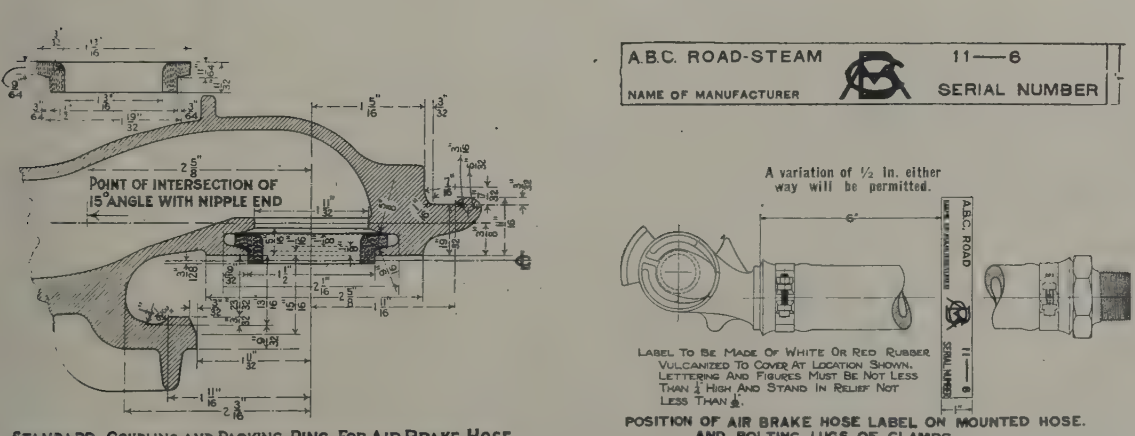


Fig. 2960—Standard Coupling and Packing Ring for Air Brake Hose. Also Label for Air Brake Hose and Instructions for Its Application. (M. C. B. Sheet 18A.)

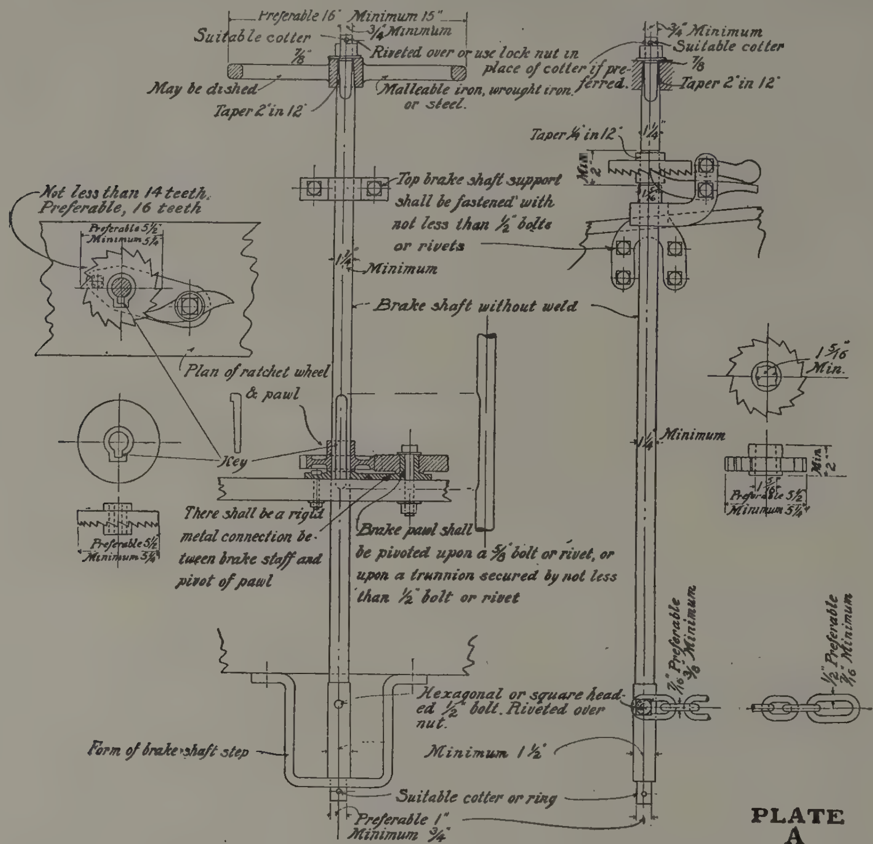


Fig. 2961—Standard Safety Appliances for Brake Wheel, Shaft, etc. (M. C. B. Sheet 19A.)

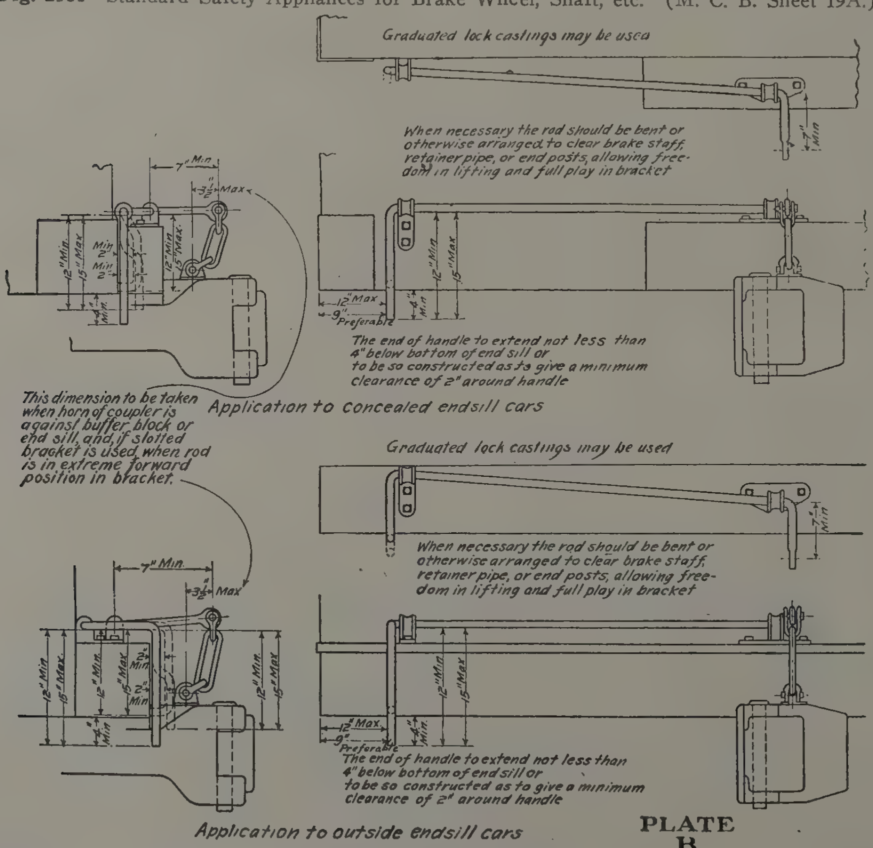


Fig. 2962—Standard Safety Appliances. Application of Uncoupling Device to Outside End Sill Cars. (M. C. B. Sheet 19B.)

APPLIANCE	DIMENSIONS	PREFERABLY	MAXIMUM	MINIMUM
BRAKE SHAFT	A	-	22"	17"
RUNNING BOARD (WIDTH)	B	20"	-	18"
" " (CLEARANCE)	C	-	10"	6"
⊙ SILL STEPS (LENGTH OF TREAD)	D	12"	-	10"
" " (HEIGHT ABOVE RAIL)	E	22"	24"	-
LADDERS (SPACING FROM ROOF)	F	-	18"	12"
" & HANDHOLDS (CLEARANCE)	G	2½"	-	2"
ROOF HANDHOLDS (FROM EDGE OF ROOF)	H	-	15"	8"
* HOR. SIDE & END HANDHOLDS (LENGTH)	I	24"	-	16"
" " " " (HEIGHT)	J	-	30"	24"

⊙ ADDITIONAL SILL STEP TREAD, WHEN NEEDED, SEE TEXT.
* HORIZONTAL END HANDHOLDS. WHEN 16" LENGTH CANNOT BE APPLIED, 14" LENGTH MAY BE USED.

ALL BOLTS & RIVETS ½" MIN DIA.
BOLTS ⅜" DIA. MAY BE USED FOR WOODEN TREADS WHICH ARE GAINED INTO STILES.
ALL IRON OR STEEL LADDER TREADS & HANDHOLDS ⅝" MIN. DIA.
MINIMUM CLEARANCE OF ALL LADDER TREADS & HANDHOLDS 2" PREFERABLY 2½"

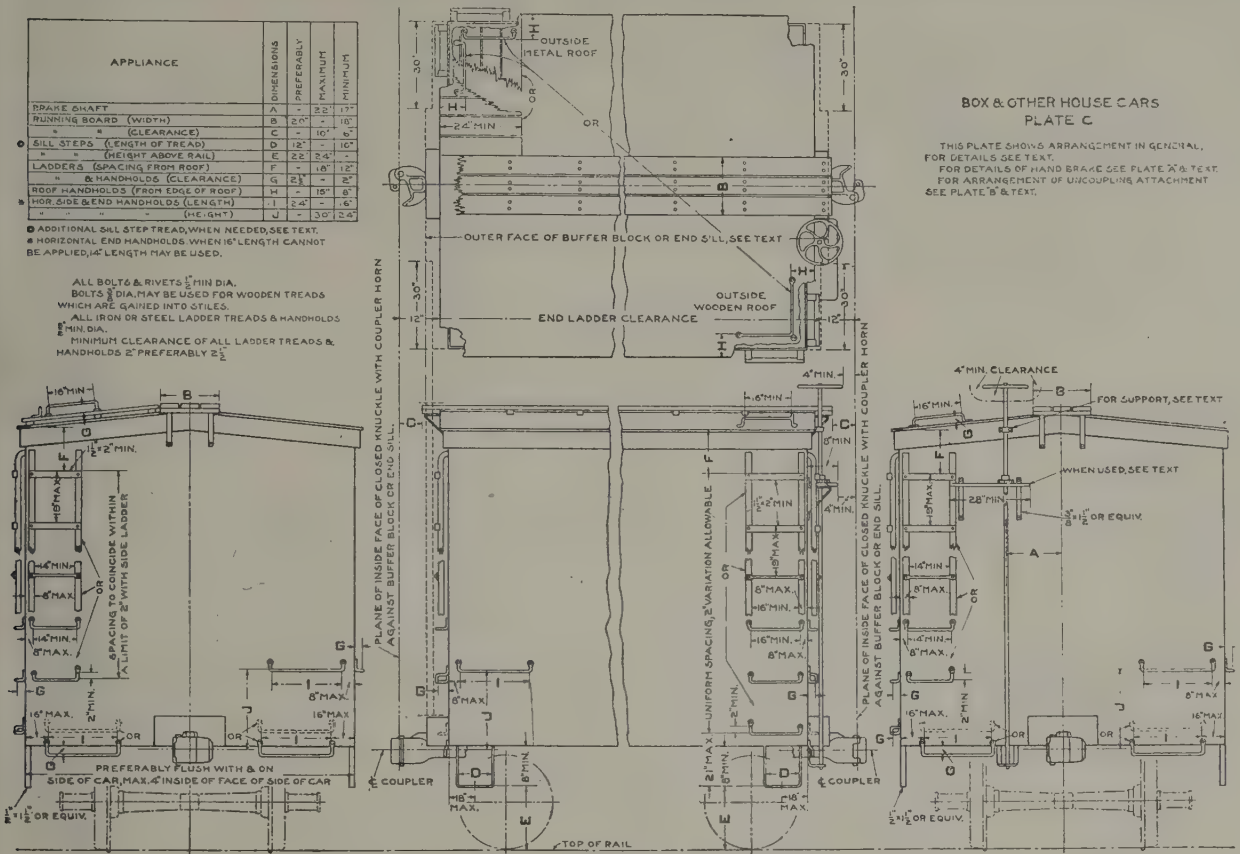


Fig. 2963.—Standard Safety Appliances for Box and Other House Cars. (M. C. B. Sheet 19C.)

APPLIANCE	DIMENSIONS	PREFERABLY	MAXIMUM	MINIMUM
BRAKE SHAFT	A	—	22"	17"
RUNNING BOARD (WIDTH)	B	20"	—	18"
" " (CLEARANCE)	C	—	10"	6"
⊙ SILL STEPS (LENGTH OF TREAD)	D	12"	—	10"
" " (HEIGHT ABOVE RAIL)	E	22"	24"	—
LADDERS (SPACING FROM ROOF)	F	—	18"	12"
" & HANDHOLDS (CLEARANCE)	G	2½"	—	2"
ROOF HANDHOLDS (FROM EDGE OF ROOF)	H	—	15"	8"
* HOR. SIDE & END HANDHOLDS (LENGTH)	I	24"	—	16"
" & VERT. SIDE & END HANDHOLDS (HEIGHT)	J	—	30"	24"
ADDITIONAL HOR. END HANDHOLDS "	K	—	60"	30"
VERTICAL END HANDHOLDS (LENGTH)	L	24"	—	18"

⊙ ADDITIONAL SILL STEP TREAD, WHEN NEEDED, SEE TEXT.
* HORIZONTAL END HANDHOLDS: WHEN 16" LENGTH CANNOT BE APPLIED, 14" LENGTH MAY BE USED.

ALL BOLTS & RIVETS ½" MIN. DIA.
BOLTS ⅜" DIA. MAY BE USED FOR WOODEN TREADS WHICH ARE GAINED INTO STILES.
ALL IRON OR STEEL LADDER TREADS & HANDHOLDS ⅝" MIN. DIA.
MIN. CLEARANCE OF ALL LADDER TREADS & HANDHOLDS 2" PREFERABLY 2½".

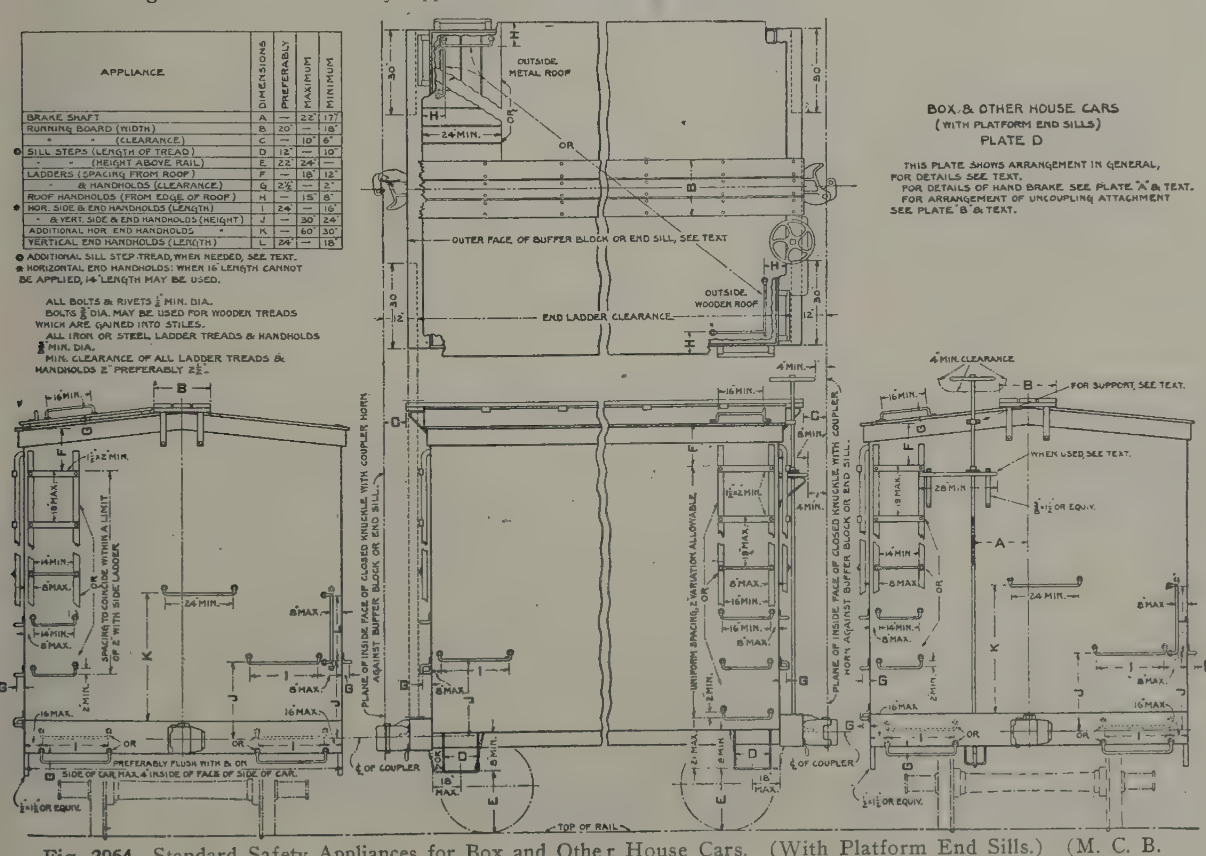


Fig. 2964—Standard Safety Appliances for Box and Other House Cars. (With Platform End Sills.) (M. C. B. Sheet 19D.)

APPLIANCE	DIMENSIONS	PREFERABLY	MAXIMUM	MINIMUM
● SILL STEPS (LENGTH OF TREAD)	D	12"	-	10"
" " (HEIGHT ABOVE RAIL)	E	22"	24"	-
LADDERS & HANDHOLDS (CLEARANCE)	G	2½"	-	2"
* HOR SIDE & END HANDHOLDS (LENGTH)	I	24"	-	16"
" " " " (HEIGHT)	J	-	30"	24"

● ADDITIONAL SILL STEP TREAD, WHEN NEEDED, SEE TEXT.
* HORIZONTAL END HANDHOLDS WHEN 16" LENGTH CANNOT BE APPLIED, 14" LENGTH MAY BE USED.

ALL BOLTS & RIVETS ½" MIN. DIA.
BOLTS ⅜" DIA. MAY BE USED FOR WOODEN TREADS WHICH ARE GAINED INTO STILES.
ALL IRON OR STEEL LADDER TREADS & HANDHOLDS ⅝" MIN. DIA.
MINIMUM CLEARANCE OF ALL LADDER TREADS & HANDHOLDS 2" PREFERABLY 2½".

HOPPER CARS & HIGH-SIDE GONDOLAS WITH FIXED ENDS
(CARS WITH SIDES MORE THAN 36" ABOVE FLOOR)
PLATE E

THIS PLATE SHOWS ARRANGEMENT IN GENERAL, FOR DETAILS SEE TEXT.
FOR DETAILS OF HAND BRAKE SEE PLATE "X" & TEXT.
FOR ARRANGEMENT OF UNCOUPLING ATTACHMENT SEE PLATE "B" & TEXT.

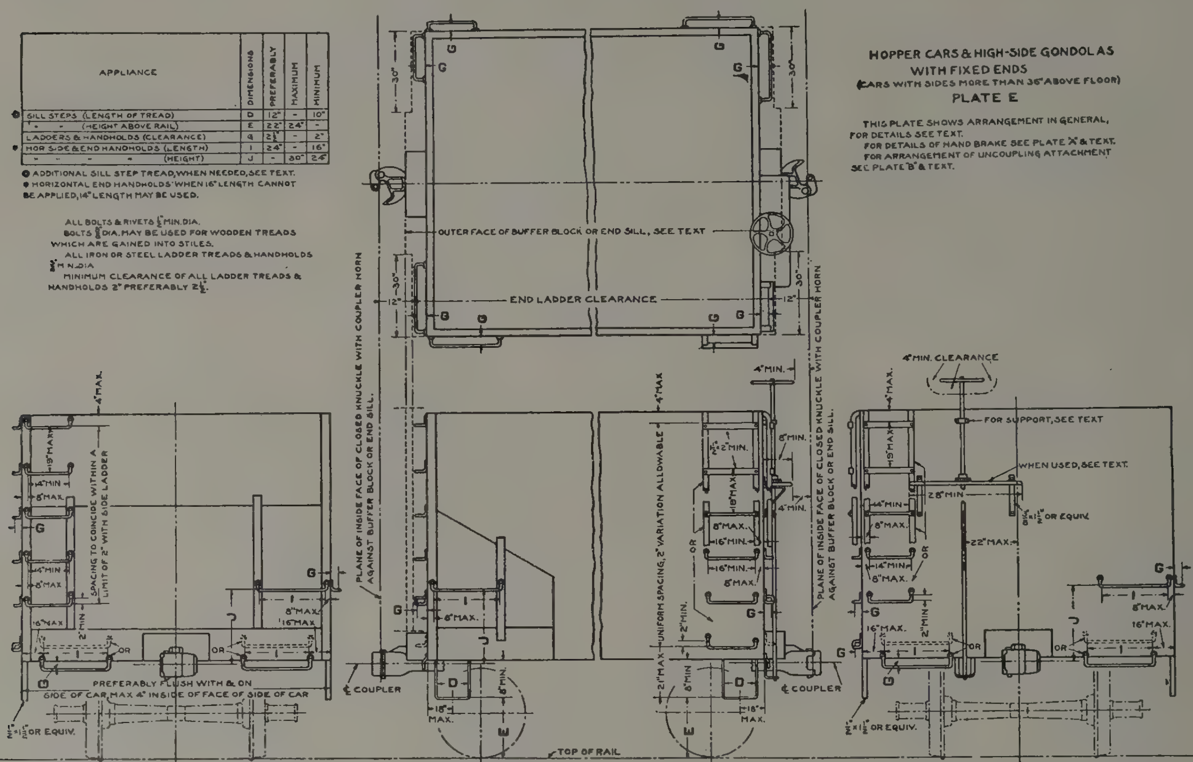


Fig. 2965—Standard Safety Appliances for Hopper Cars and High Side Gondolas with Fixed Ends. Cars With Sides More than 36 in. Above Floor. (M. C. B. Sheet 19E.)

APPLIANCE	DIMENSIONS	PREFERABLY	MAXIMUM	MINIMUM
● SILL STEPS (LENGTH OF TREAD)	D	12"	—	10"
" " (HEIGHT ABOVE RAIL)	E	22"	24"	—
LADDERS & HANDHOLDS (CLEARANCE)	G	2½"	—	2"
* HOR. SIDE & END HANDHOLDS (LENGTH)	I	24"	—	16"
HOR. & VERT. SIDE & END HANDHOLDS (HEIGHT)	J	—	30"	24"
ADDITIONAL HOR. END HANDHOLDS "	K	—	60"	30"
VERTICAL END HANDHOLDS (LENGTH)	L	24"	—	18"

● ADDITIONAL SILL STEP TREAD, WHEN NEEDED, SEE TEXT.
* HORIZONTAL END HANDHOLDS: WHEN 16" LENGTH CANNOT BE APPLIED, 14" LENGTH MAY BE USED.

ALL BOLTS & RIVETS ½" MIN. DIA.
BOLTS ⅜" DIA. MAY BE USED FOR WOODEN TREADS WHICH ARE GAINED INTO STILES.
ALL IRON OR STEEL LADDER TREADS & HANDHOLDS ⅝" MIN. DIA.
MIN. CLEARANCE OF ALL LADDER TREADS & HANDHOLDS 2" PREFERABLY 2½".

HOPPER CARS & HIGH-SIDE GONDOLAS WITH FIXED ENDS
(CARS WITH SIDES MORE THAN 36" ABOVE FLOOR)
(WITH PLATFORM END SILLS)
PLATE F

THIS PLATE SHOWS ARRANGEMENT IN GENERAL, FOR DETAILS SEE TEXT.
FOR DETAILS OF HAND BRAKE SEE PLATE "A" & TEXT
FOR ARRANGEMENT OF UNCOUPLING ATTACHMENT SEE PLATE "B" & TEXT.

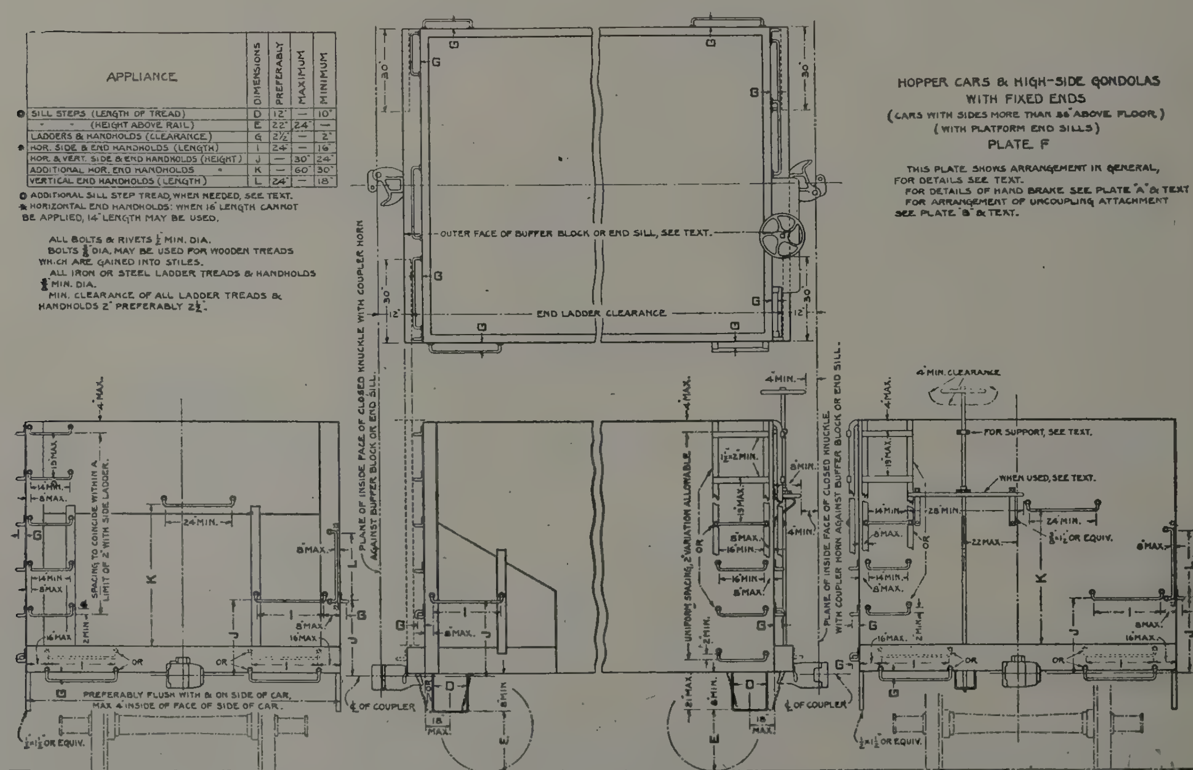


Fig. 2966—Standard Safety Appliances for Hopper Cars and High Side Gondolas With Fixed Ends. Cars With Sides More Than 36 in. Above Floor. (With Platform End Sills.) (M. C. B. Sheet 19F.)

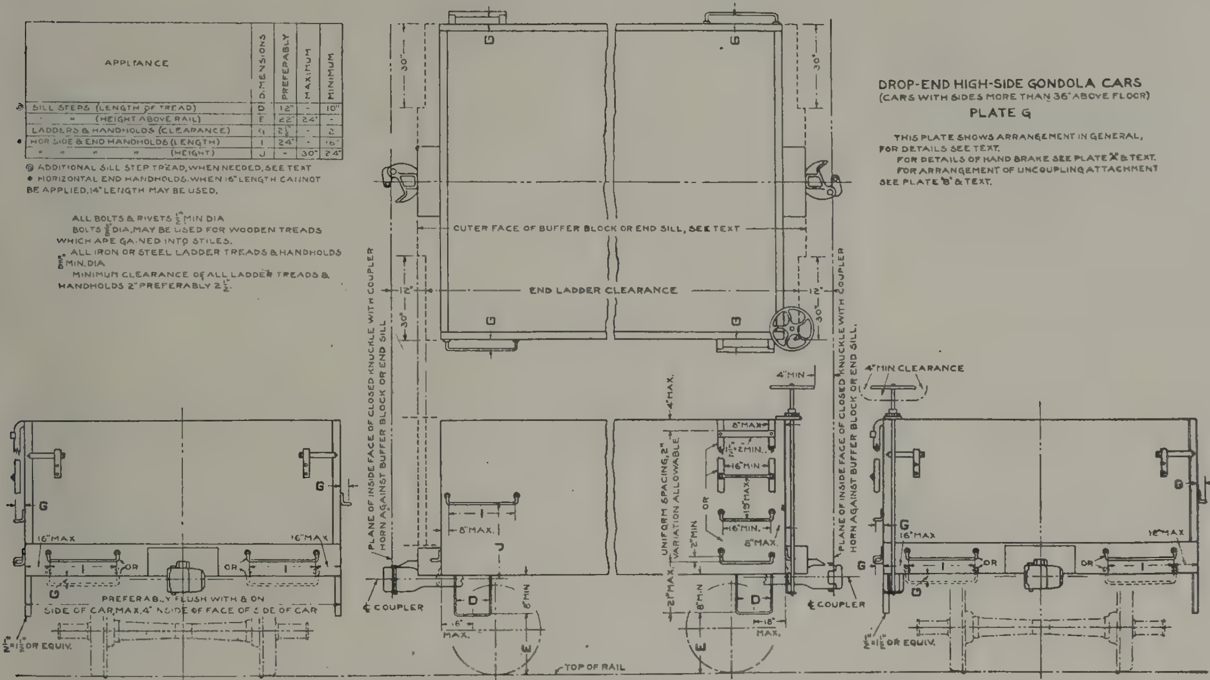


Fig. 2967—Standard Safety Appliances for Drop End High Side Gondola Cars. Cars With Sides More Than 36 in. Above Floor. (M. C. B. Sheet 19G.)

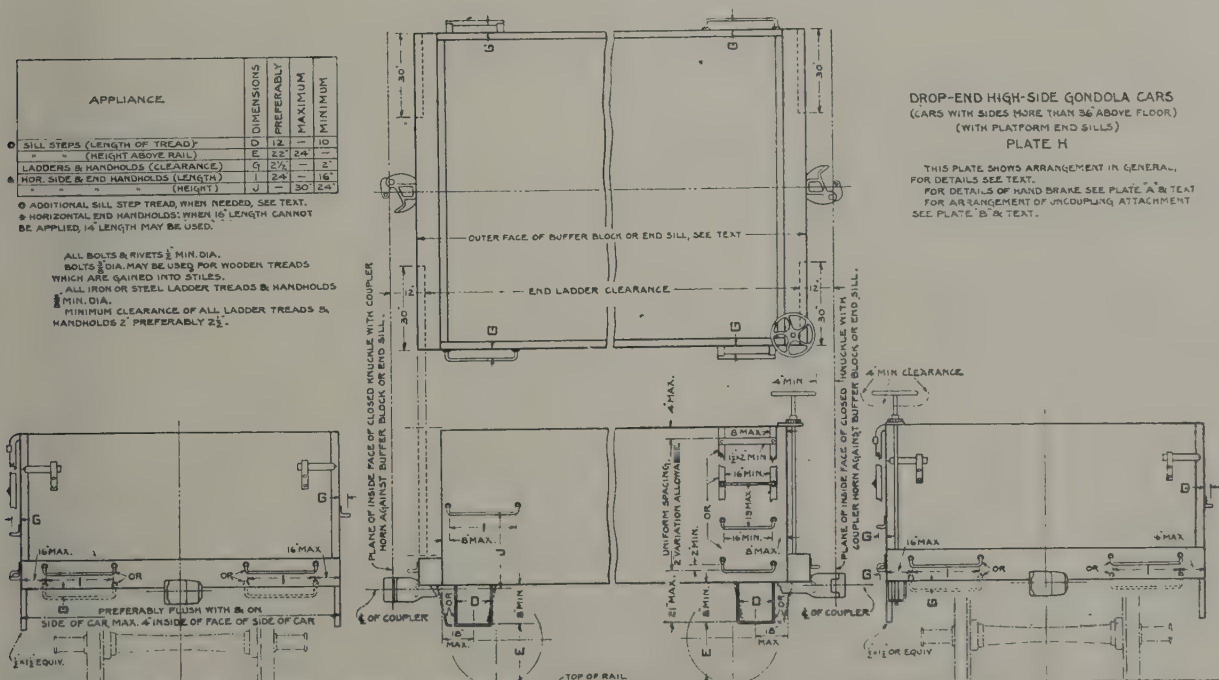


Fig. 2968—Standard Safety Appliances for Drop End High Side Gondola Cars. Cars With Sides More Than 36 in. Above Floor. With Platform End Sills. (M. C. B. Sheet 19H.)

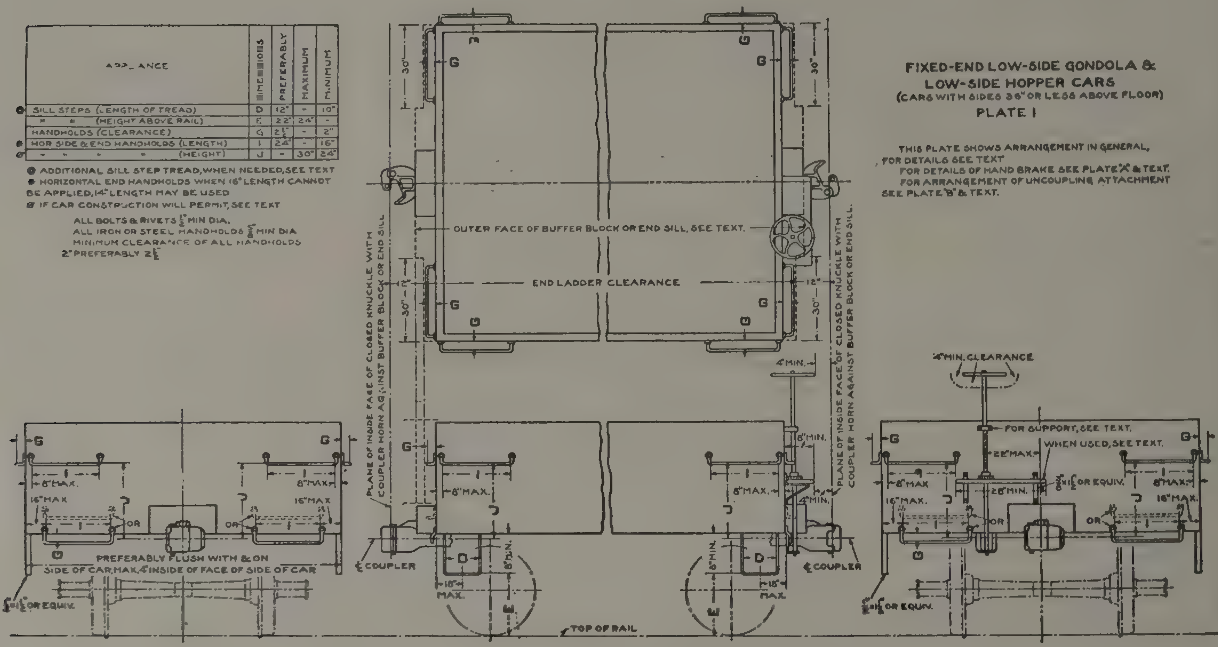


Fig. 2969—Standard Safety Appliances for Fixed End Low Side Gondola and Low Side Hopper Cars. Cars With Sides 36 in. or Less Above Floor. (M. C. B. Sheet 19I.)

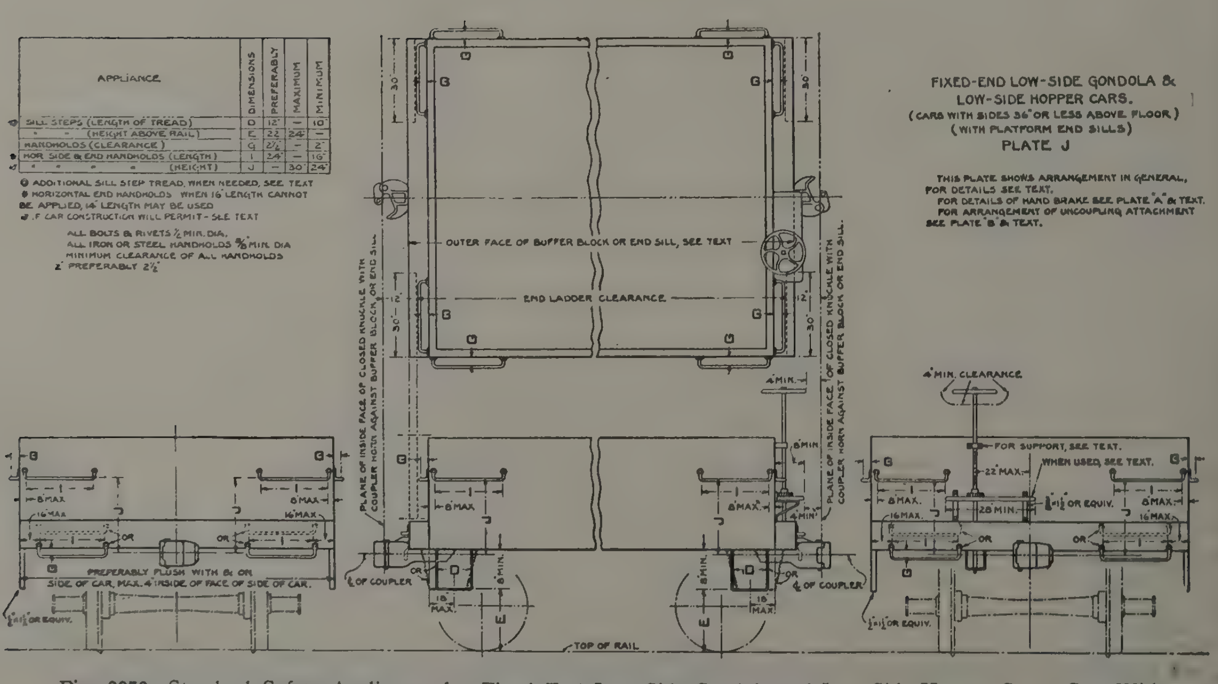
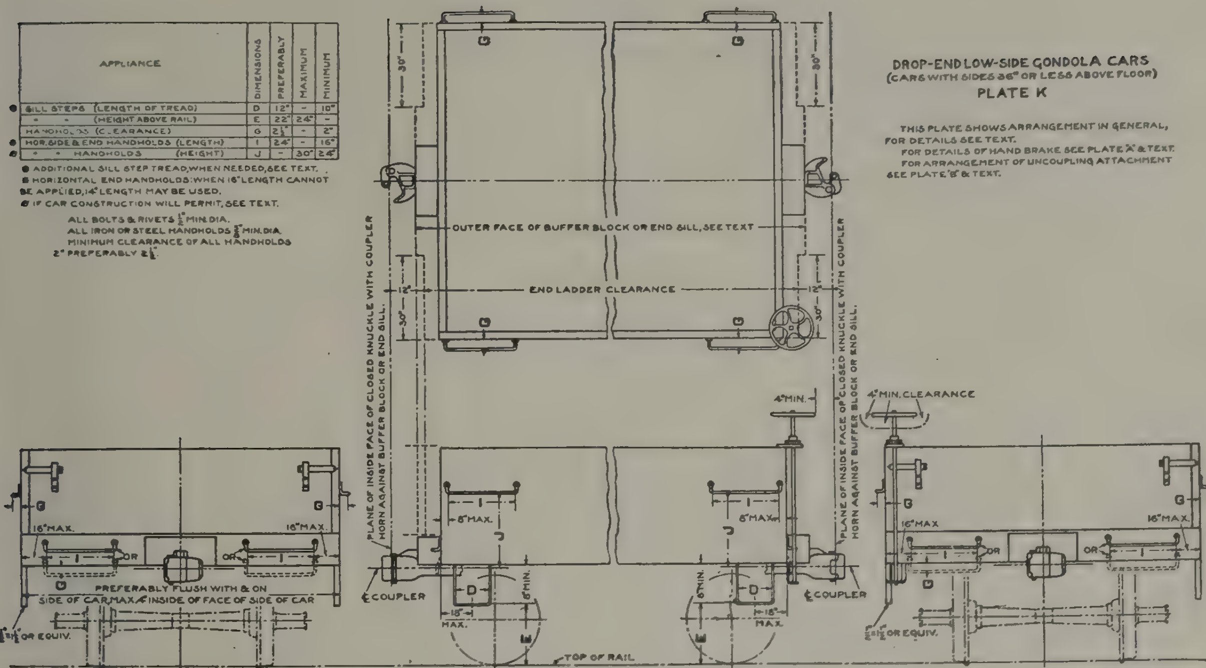
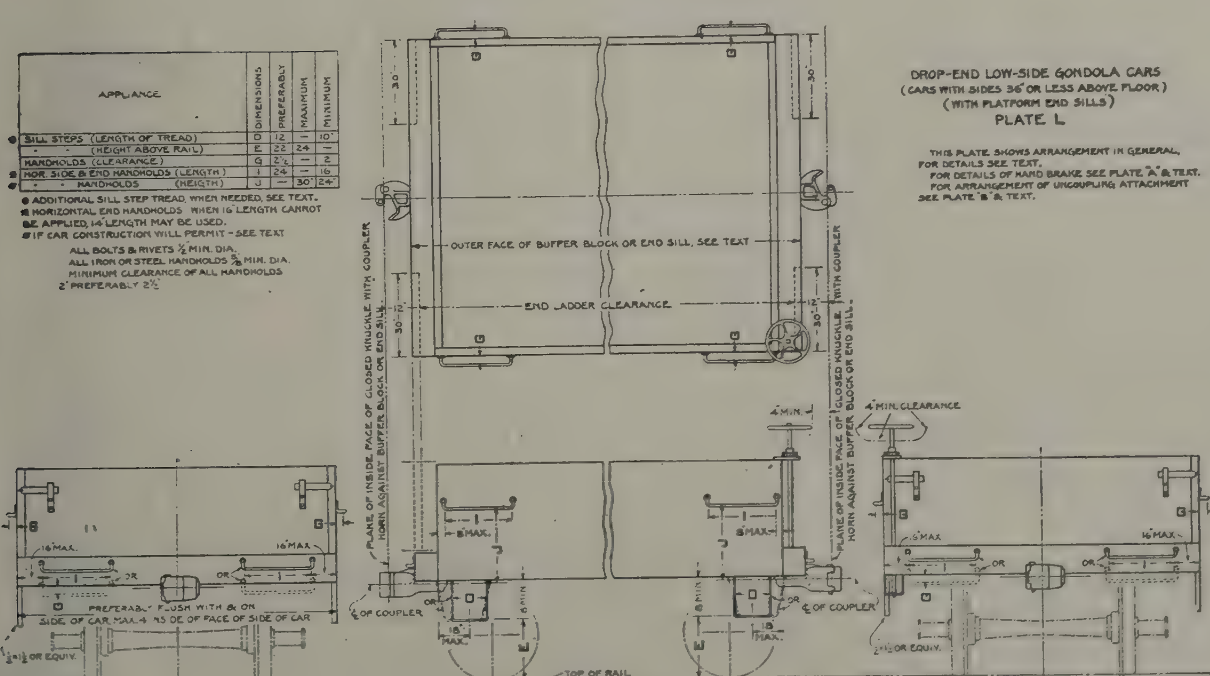


Fig. 2970—Standard Safety Appliances for Fixed End Low Side Gondola and Low Side Hopper Cars. Cars With Sides 36 in. or Less Above Floor. With Platform End Sills. (M. C. B. Sheet 19J.)



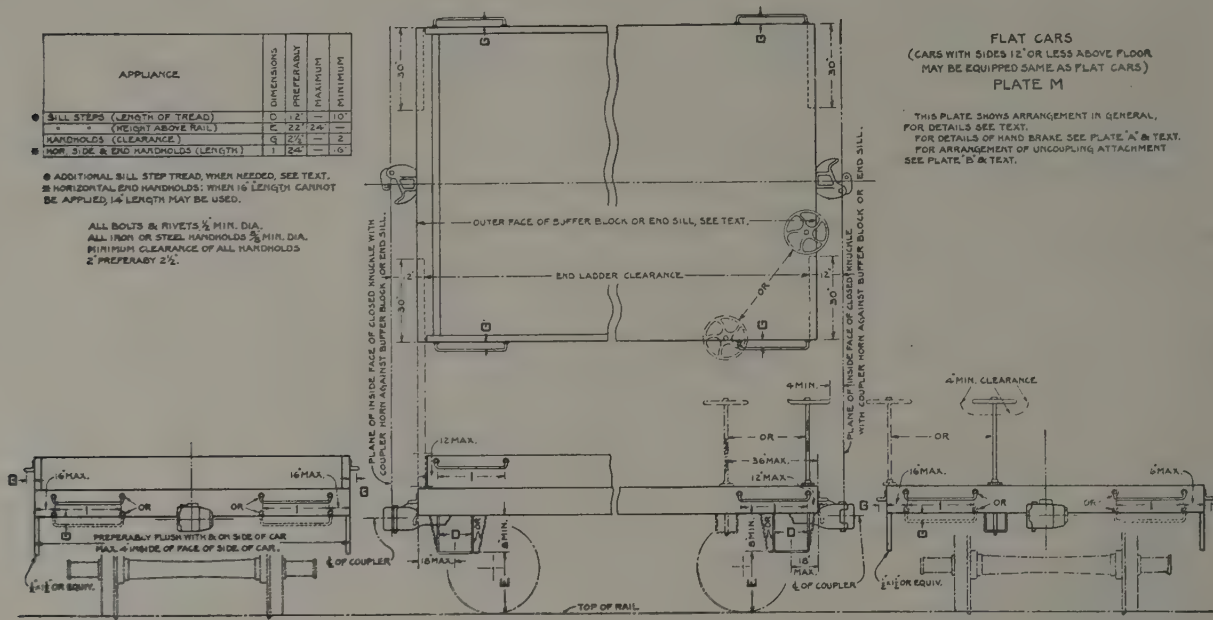
APPLIANCE	DIMENSIONS	PREFERABLY	MAXIMUM	MINIMUM
● SILL STEPS (LENGTH OF TREAD)	D	12"	-	10"
" " (HEIGHT ABOVE RAIL)	E	22"	24"	-
HANDHOLDS (CLEARANCE)	G	2½"	-	2"
● HOR. SIDE & END HANDHOLDS (LENGTH)	I	24"	-	16"
" " HANDHOLDS (HEIGHT)	J	-	30"	24"

Fig. 2971—Standard Safety Appliances for Drop End Low Side Gondola Cars. Cars With Sides 36 in. or Less Above Floor. (M. C. B. Sheet 19K.)



APPLIANCE	DIMENSIONS	PREFERABLY	MAXIMUM	MINIMUM
● SILL STEPS (LENGTH OF TREAD)	D	12	-	10
" " (HEIGHT ABOVE RAIL)	E	22	24	-
HANDHOLDS (CLEARANCE)	G	2½	-	2
HOR. SIDE & END HANDHOLDS (LENGTH)	I	24	-	16
" " HANDHOLDS (HEIGHT)	J	-	30	24

Fig. 2972—Standard Safety Appliances for Drop End Low Side Gondola Cars. Cars With Sides 36 in. or Less Above Floor. With Platform End Sills. (M. C. B. Sheet 19L.)

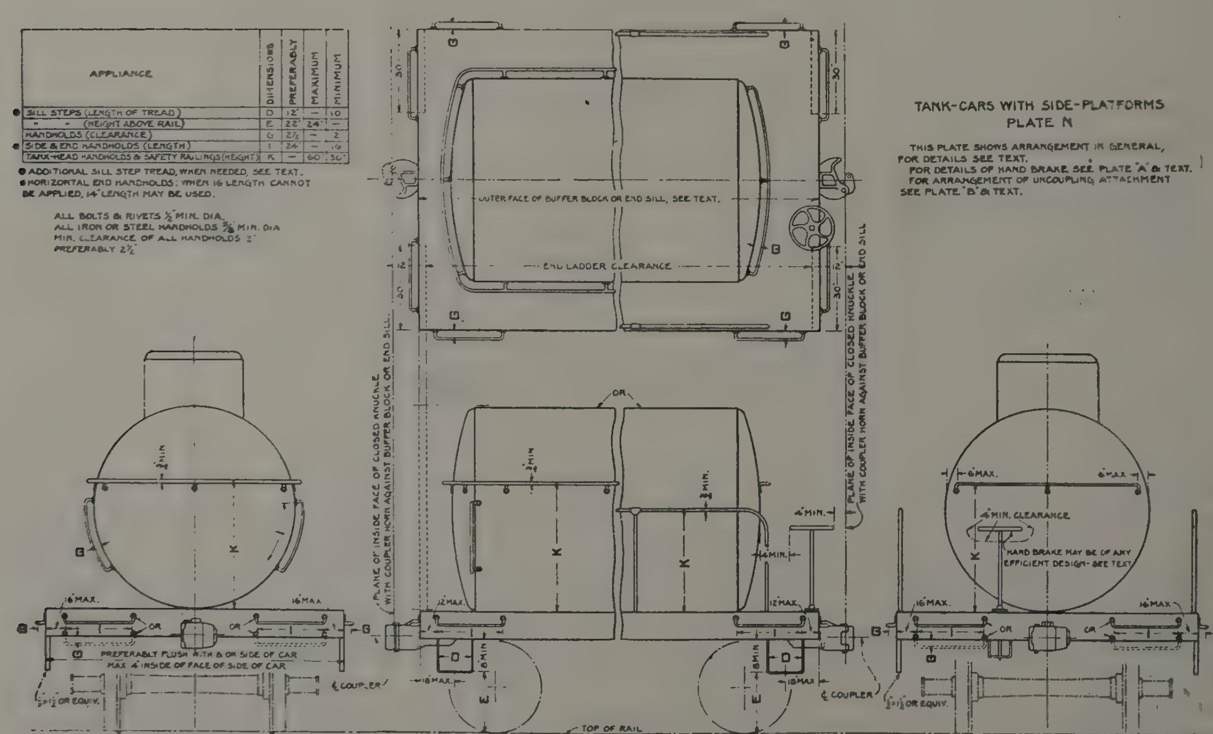


APPLIANCE	DIMENSIONS	PREFERABLY	MAXIMUM	MINIMUM
● SILL STEPS (LENGTH OF TREAD)	D	12"	—	10"
" " (HEIGHT ABOVE RAIL)	E	22"	24"	—
HANDHOLDS (CLEARANCE)	G	2½"	—	2
■ HOR. SIDE & END HANDHOLDS (LENGTH)	I	24"	—	16"

● ADDITIONAL SILL STEP TREAD, WHEN NEEDED, SEE TEXT.
■ HORIZONTAL END HANDHOLDS: WHEN 16" LENGTH CANNOT BE APPLIED, 14" LENGTH MAY BE USED.

ALL BOLTS & RIVETS ½" MIN. DIA.
ALL IRON OR STEEL HANDHOLDS ⅝" MIN. DIA.
MINIMUM CLEARANCE OF ALL HANDHOLDS 2" PREFERABY 2½".

Fig. 2973—Standard Safety Appliances for Flat Cars. Cars With Sides 12 in. or Less Above Floor May Be Equipped Same as Flat Cars. (M. C. B. Sheet 19M.)



APPLIANCE	DIMENSIONS	PREFERABLY	MAXIMUM	MINIMUM
● SILL STEPS (LENGTH OF TREAD)	D	12"	—	10
" " (HEIGHT ABOVE RAIL)	E	22"	24"	—
HANDHOLDS (CLEARANCE)	G	2½	—	2
■ SIDE & END HANDHOLDS (LENGTH)	I	24"	—	16
TANK-HEAD HANDHOLDS & SAFETY RAILINGS (HEIGHT)	K	—	60"	30"

● ADDITIONAL SILL STEP TREAD, WHEN NEEDED, SEE TEXT.
■ HORIZONTAL END HANDHOLDS: WHEN 16 LENGTH CANNOT BE APPLIED, 14" LENGTH MAY BE USED.

ALL BOLTS & RIVETS ½" MIN. DIA.
ALL IRON OR STEEL HANDHOLDS ⅝" MIN. DIA
MIN. CLEARANCE OF ALL HANDHOLDS 2" PREFERABLY 2½"

Fig. 2974—Standard Safety Appliances for Tank Cars With Side Platforms. (M. C. B. Sheet 19N.)

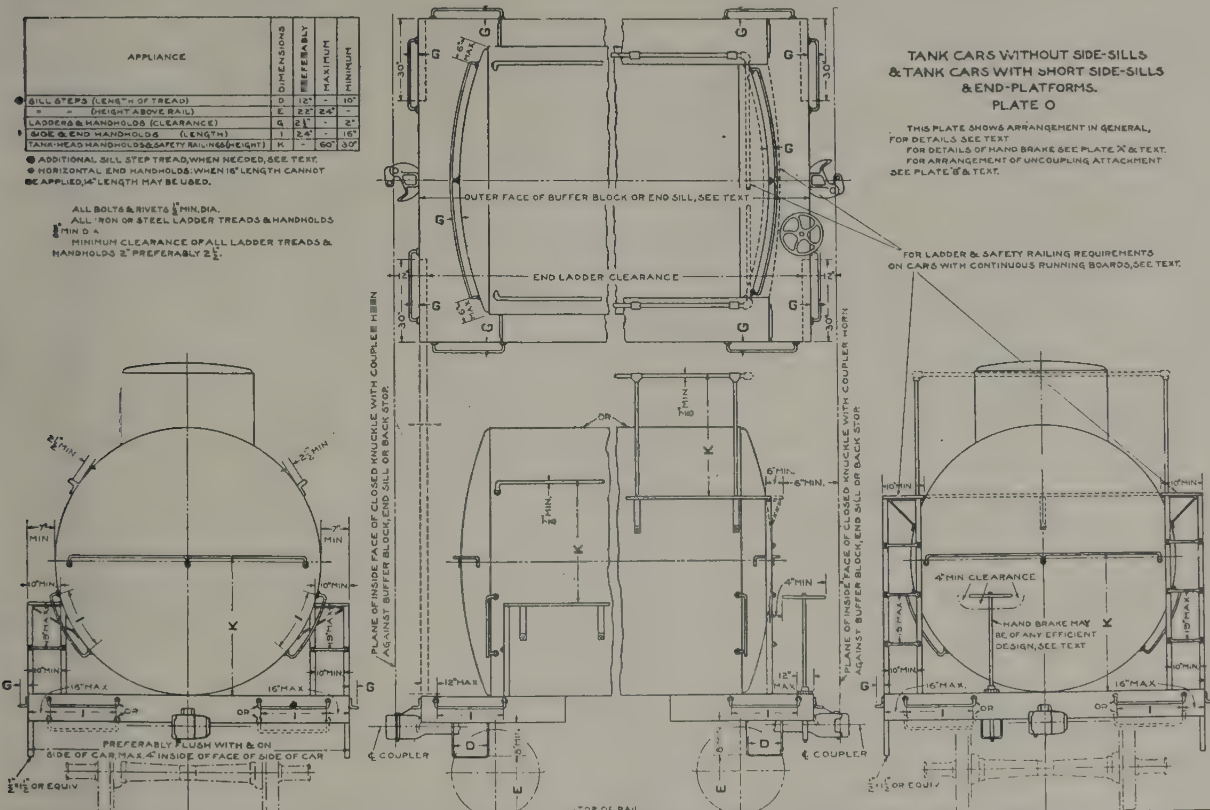


Fig. 2975—Standard Safety Appliances for Tank Cars Without Side Sills and Tank Cars. With Short Side Sills and End Platforms. (M. C. B. Sheet 19-O.)

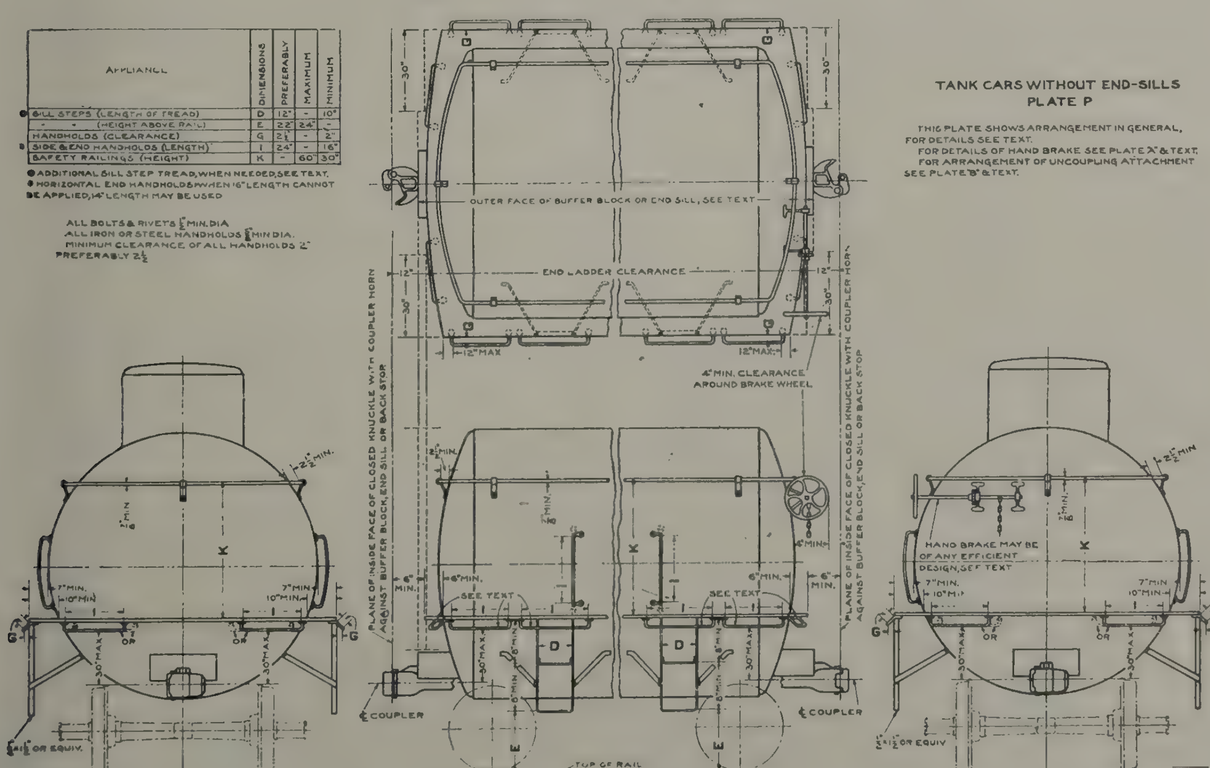


Fig. 2976—Standard Safety Appliances for Tank Cars Without End Sills. (M. C. B. Sheet 19P.)

CABOOSE CARS WITH PLATFORMS
PLATE Q

THIS PLATE SHOWS ARRANGEMENT IN GENERAL, FOR DETAILS SEE TEXT.
FOR DETAILS OF HAND BRAKE SEE PLATE "A" & TEXT.
FOR ARRANGEMENT OF UNCOUPLING ATTACHMENT SEE PLATE "B" & TEXT.

APPLIANCE	DIMENSION	PREFERABLY	MAXIMUM	MINIMUM
RUNNING BOARD (WIDTH)	■	20"	—	18"
" " (CLEARANCE)	C	—	10"	6"
HANDHOLDS (CLEARANCE)	G	2½"	—	2"
ROOF HANDHOLDS (FROM EDGE OF ROOF)	H	—	15"	8"
* HORIZONTAL END HANDHOLDS (LENGTH)	I	24"	—	16"

* HORIZONTAL END HANDHOLDS: WHEN 16" LENGTH CANNOT BE APPLIED, 14" LENGTH MAY BE USED.

ALL BOLTS & RIVETS ½" MIN. DIA.
ALL IRON OR STEEL HANDHOLDS ⅝" MIN. DIA.
MIN. CLEARANCE OF ALL HANDHOLDS 2" PREFERABLY 2½".

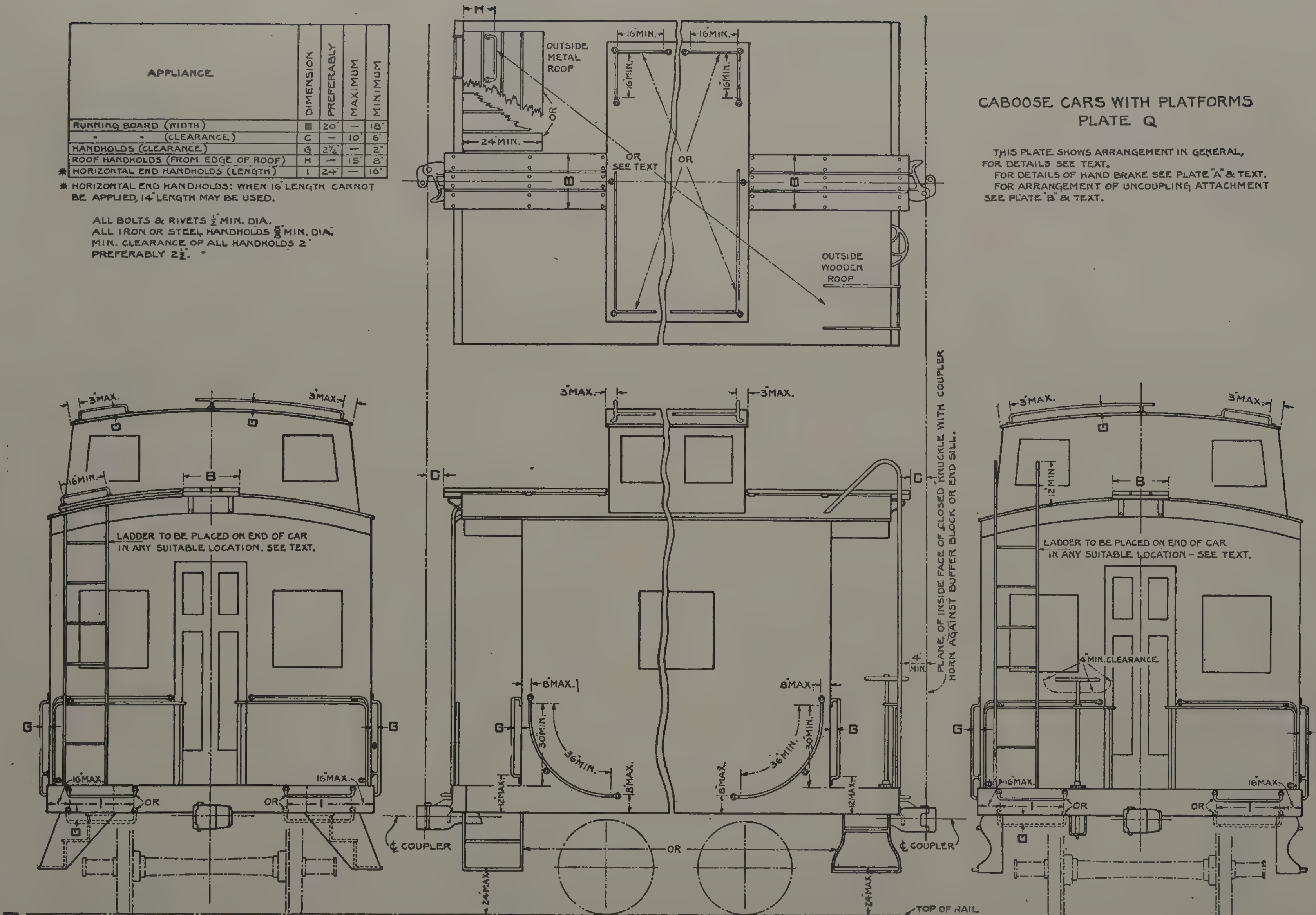
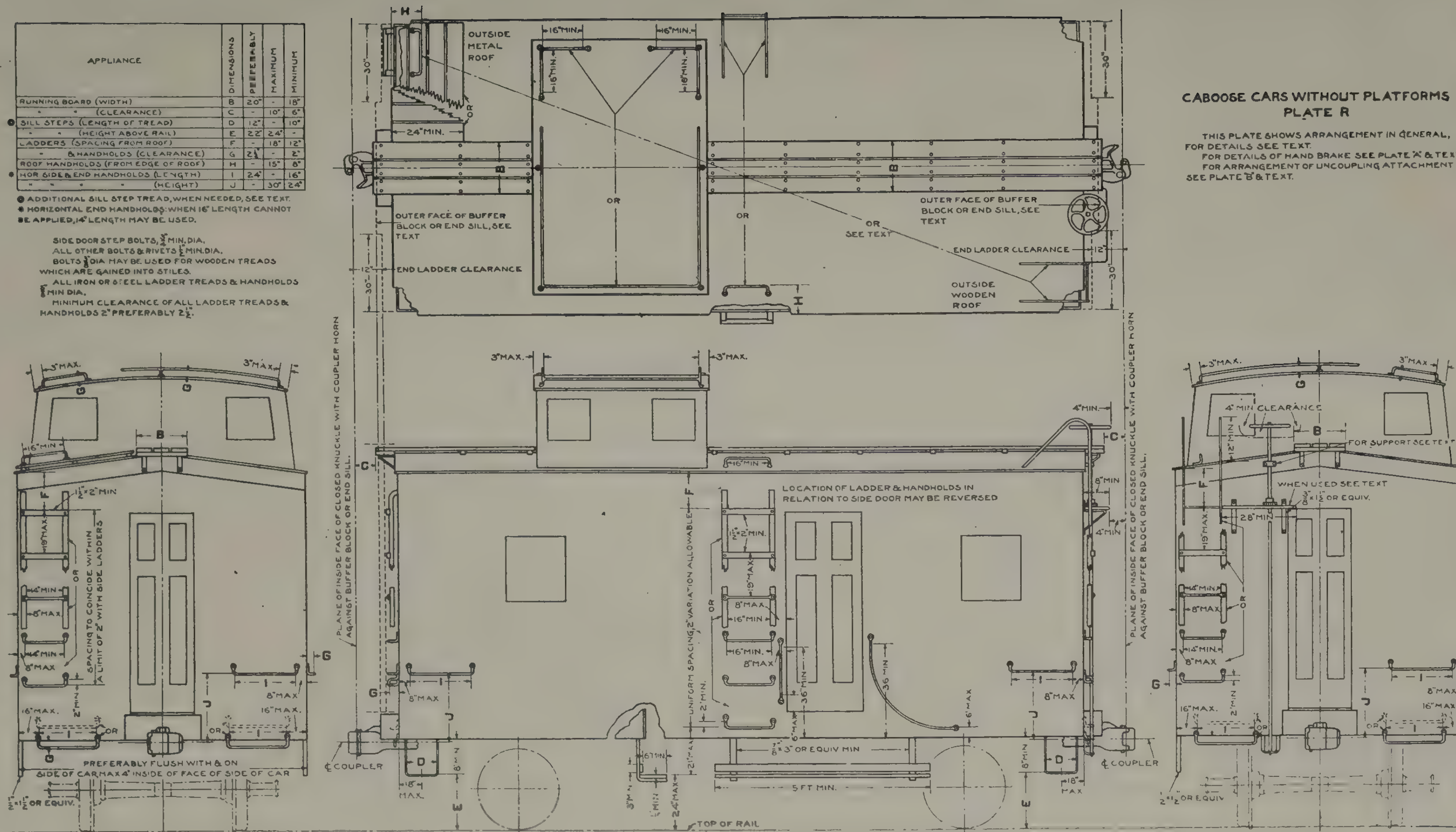


Fig. 2977—Standard Safety Appliances for Caboose Cars With Platforms. (M. C. B. Sheet 19-Q.)



APPLIANCE	DIMENSIONS	PREFERABLY	MAXIMUM	MINIMUM
RUNNING BOARD (WIDTH)	B	20"	-	18"
" " (CLEARANCE)	C	-	10"	6"
● SILL STEPS (LENGTH OF TREAD)	D	12"	-	10"
" " (HEIGHT ABOVE RAIL)	E	22"	24"	-
LADDERS (SPACING FROM ROOF)	F	-	18"	12"
" & HANDHOLDS (CLEARANCE)	G	2½"	-	2"
ROOF HANDHOLDS (FROM EDGE OF ROOF)	H	-	15"	8"
✱ HOR SIDE & END HANDHOLDS (LENGTH)	I	24"	-	16"
" " " " (HEIGHT)	J	-	30"	24"

● ADDITIONAL SILL STEP TREAD, WHEN NEEDED, SEE TEXT.
✱ HORIZONTAL END HANDHOLDS: WHEN 16" LENGTH CANNOT BE APPLIED, 14" LENGTH MAY BE USED.

SIDE DOOR STEP BOLTS, ¾" MIN. DIA.
ALL OTHER BOLTS & RIVETS ½" MIN. DIA.
BOLTS ⅜" DIA MAY BE USED FOR WOODEN TREADS WHICH ARE GAINED INTO STILES.
ALL IRON OR STEEL LADDER TREADS & HANDHOLDS ⅝" MIN DIA.
MINIMUM CLEARANCE OF ALL LADDER TREADS & HANDHOLDS 2" PREFERABLY 2½".

Fig. 2978—Standard Safety Appliances for Caboose Cars Without Platforms. (M. C. B. Sheet 19-R.)

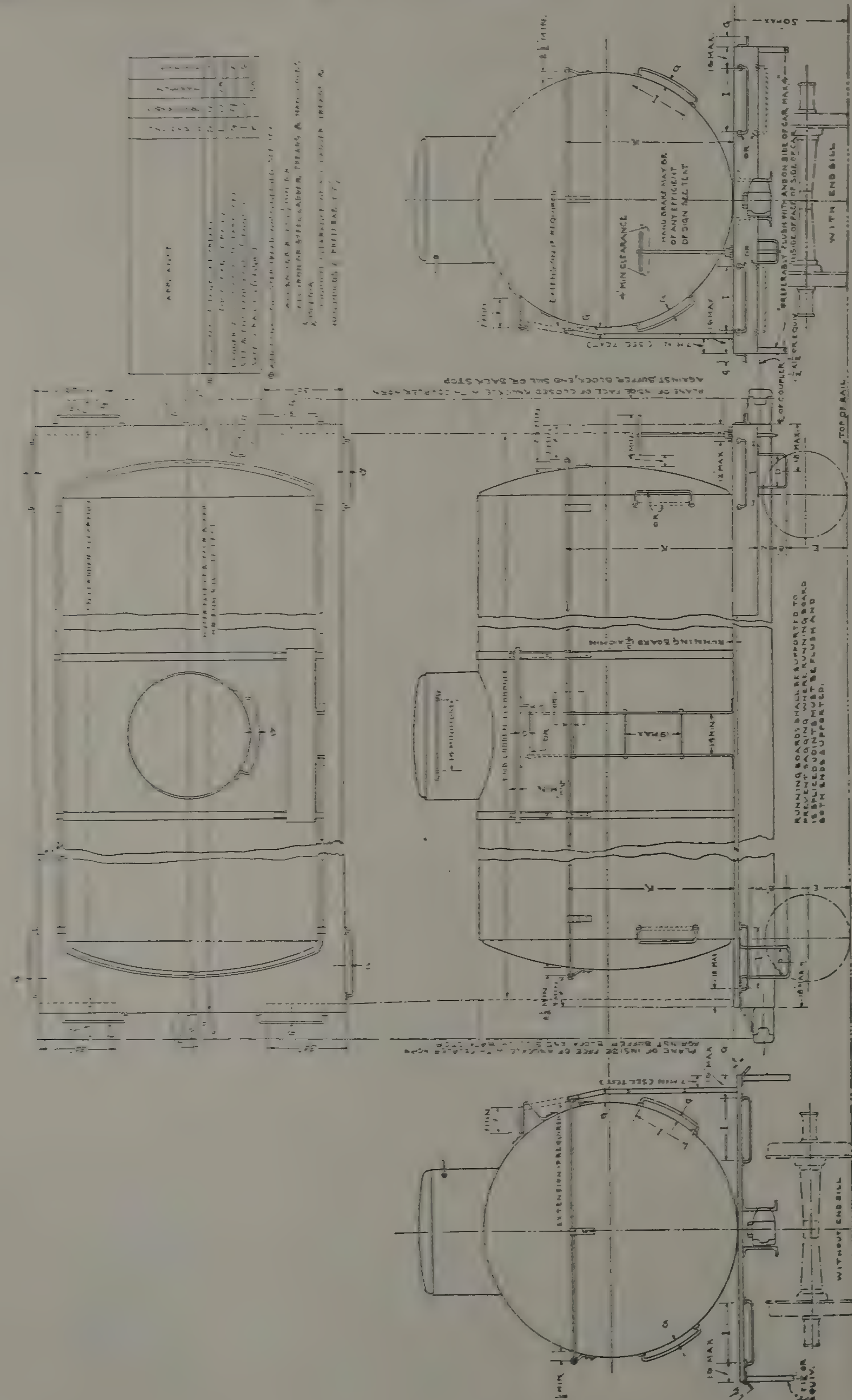
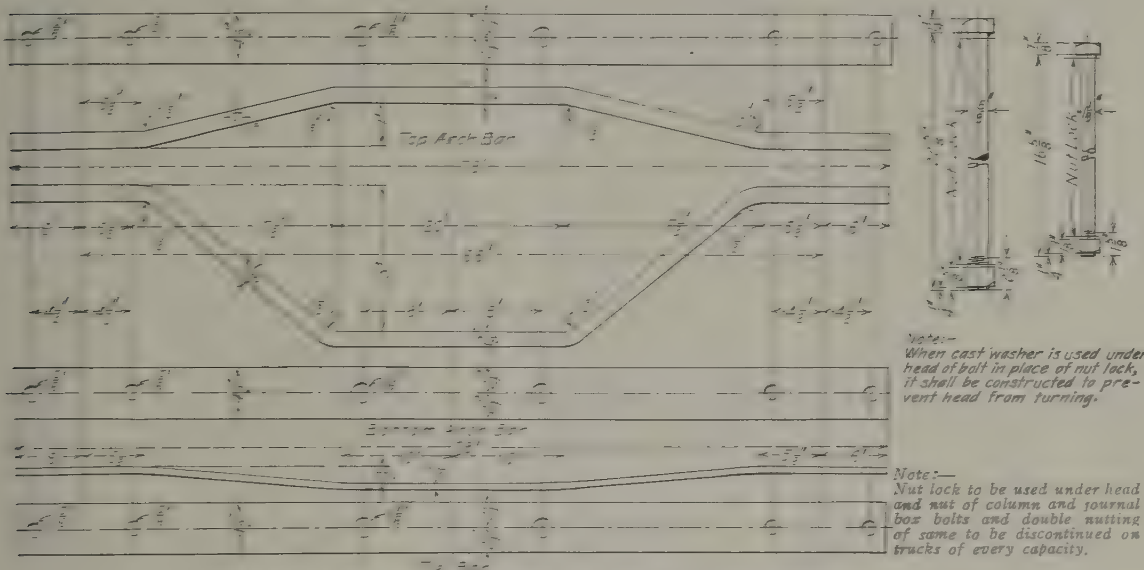
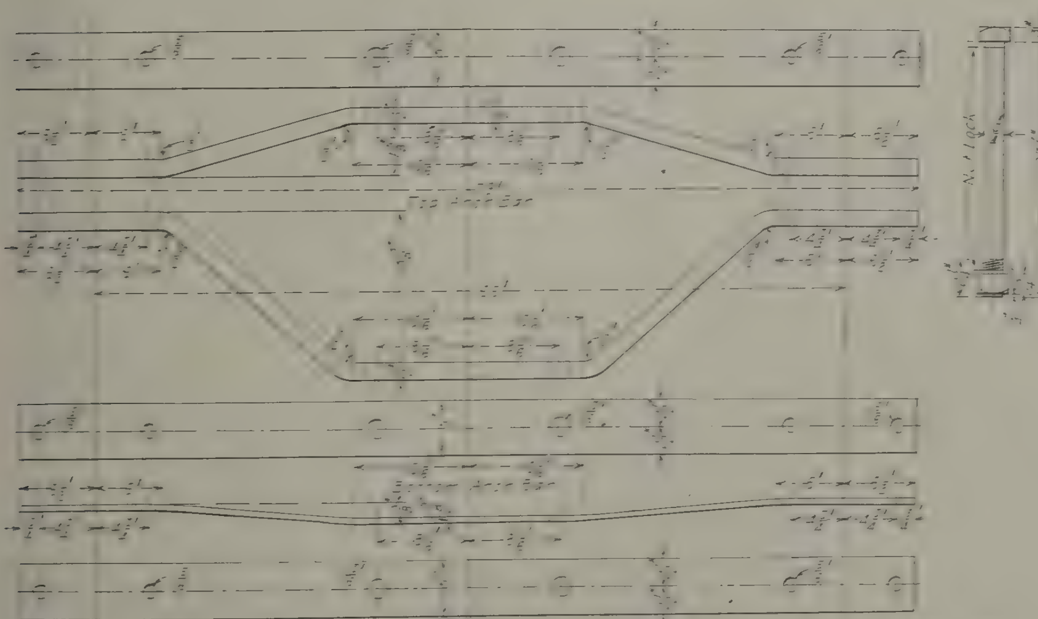


Fig. 2979—Standard Safety Appliances for Tank Cars Built After January 1, 1917. (M. C. B. Sheet 19-S.)



Arch Bars and Column and Journal Box Bolts, for 80,000 lbs, Capacity Cars



Arch Bars and Column and Journal Box bolts, for 100,000 lbs, Capacity Cars.

Fig. 2980—M. C. B. Standard Arch Bars and Column and Journal Box Bolts. (M. C. B. Sheet 20.)

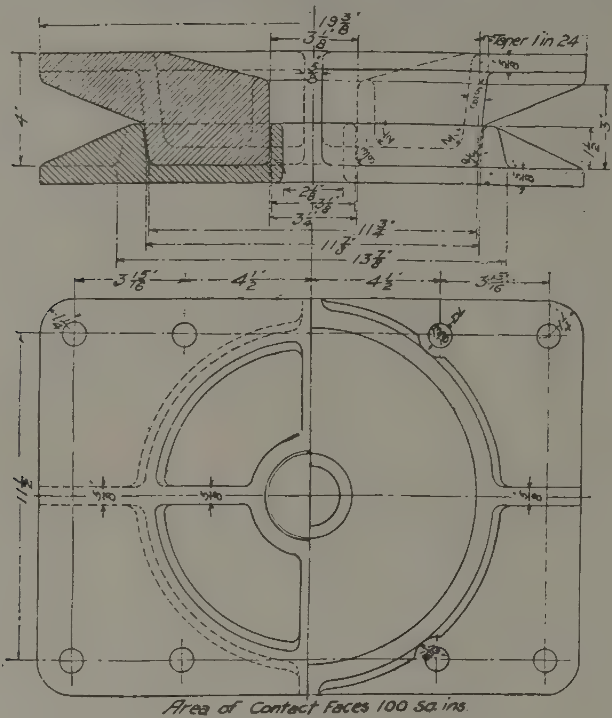


Fig. 2981—Standard Center Plate. (M. C. B. Sheet 20.)

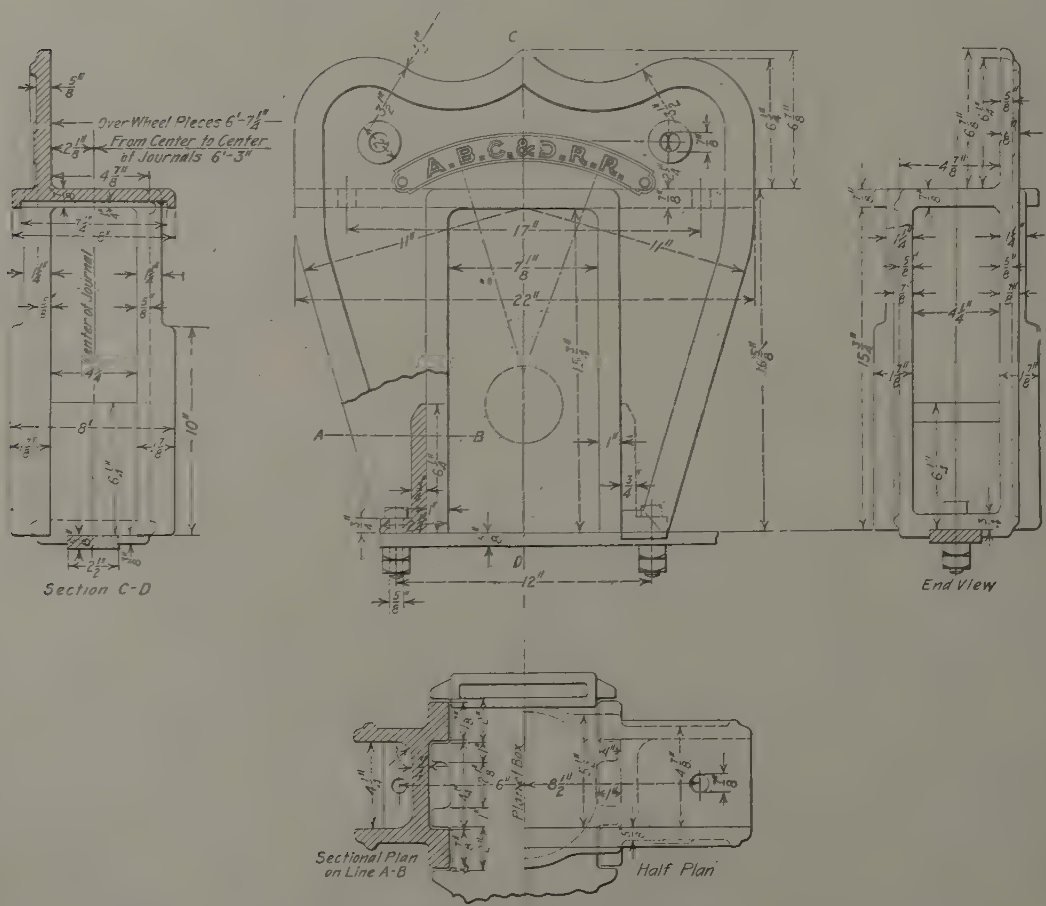


Fig. 2982—M. C. B. Standard Pedestal for 3¼ in. by 7 in. Journal. (M. C. B. Sheet 21.)

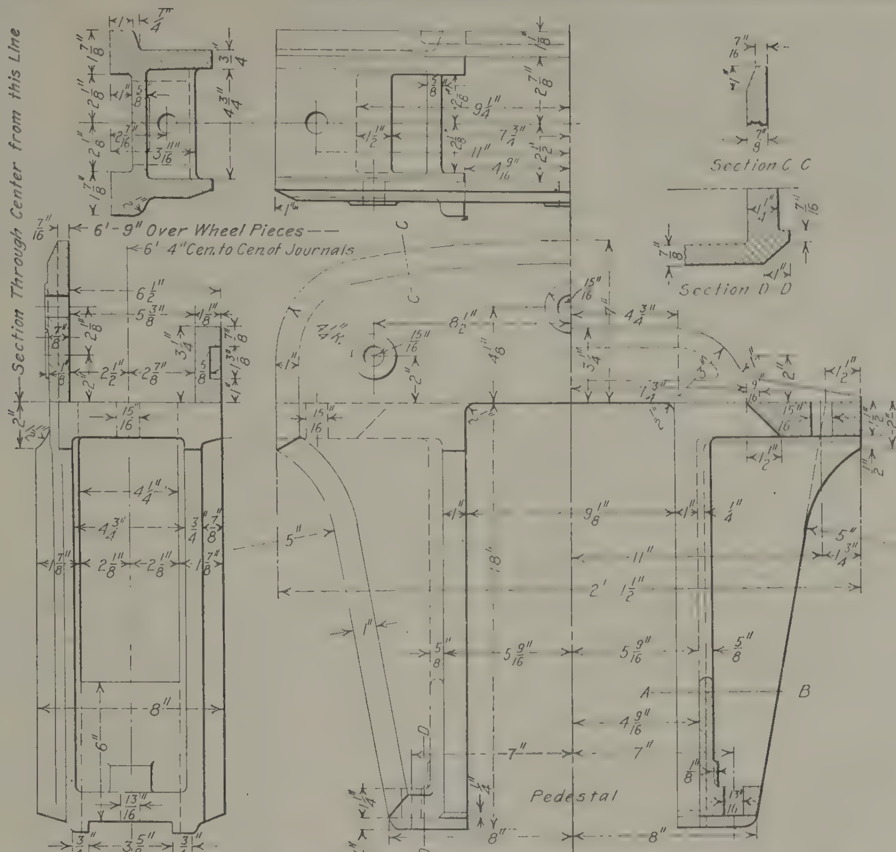


Fig. 2983—M. C. B. Standard Pedestal for 5 in. by 9 in. Journal. (M. C. B. Sheet 22.)

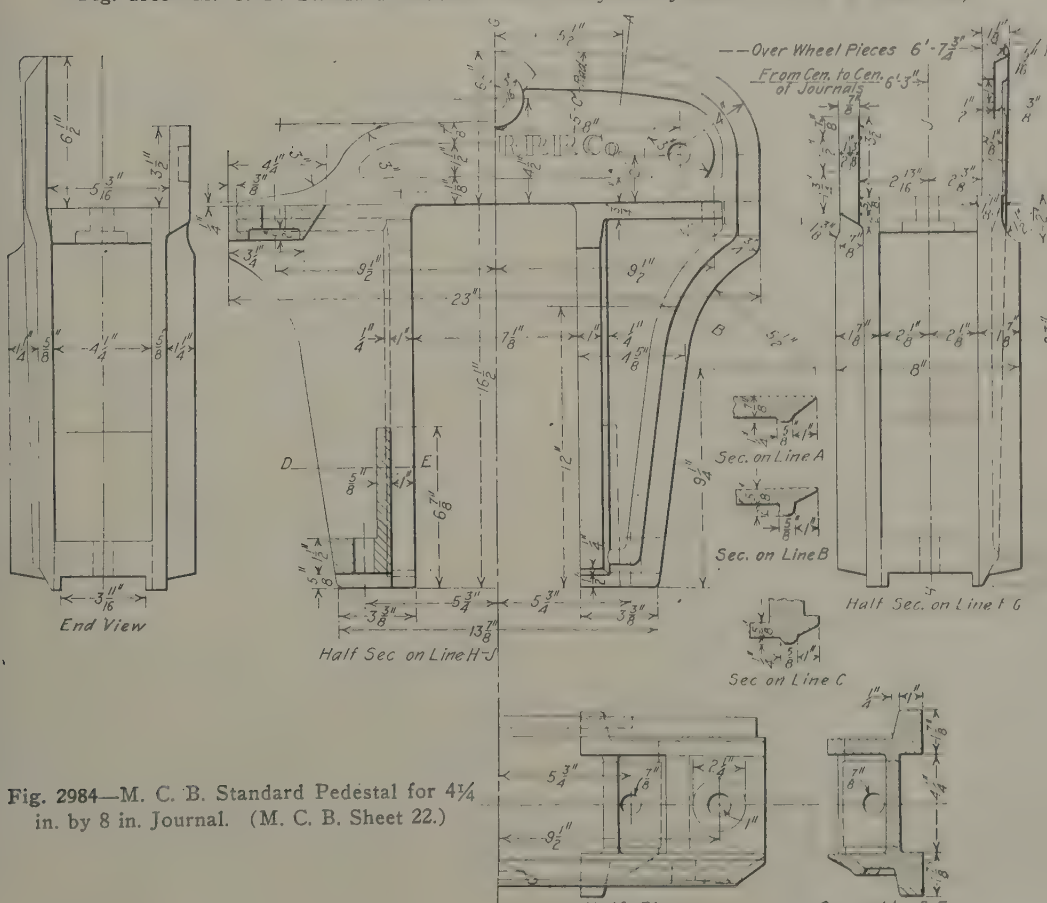


Fig. 2984—M. C. B. Standard Pedestal for 4¼ in. by 8 in. Journal. (M. C. B. Sheet 22.)

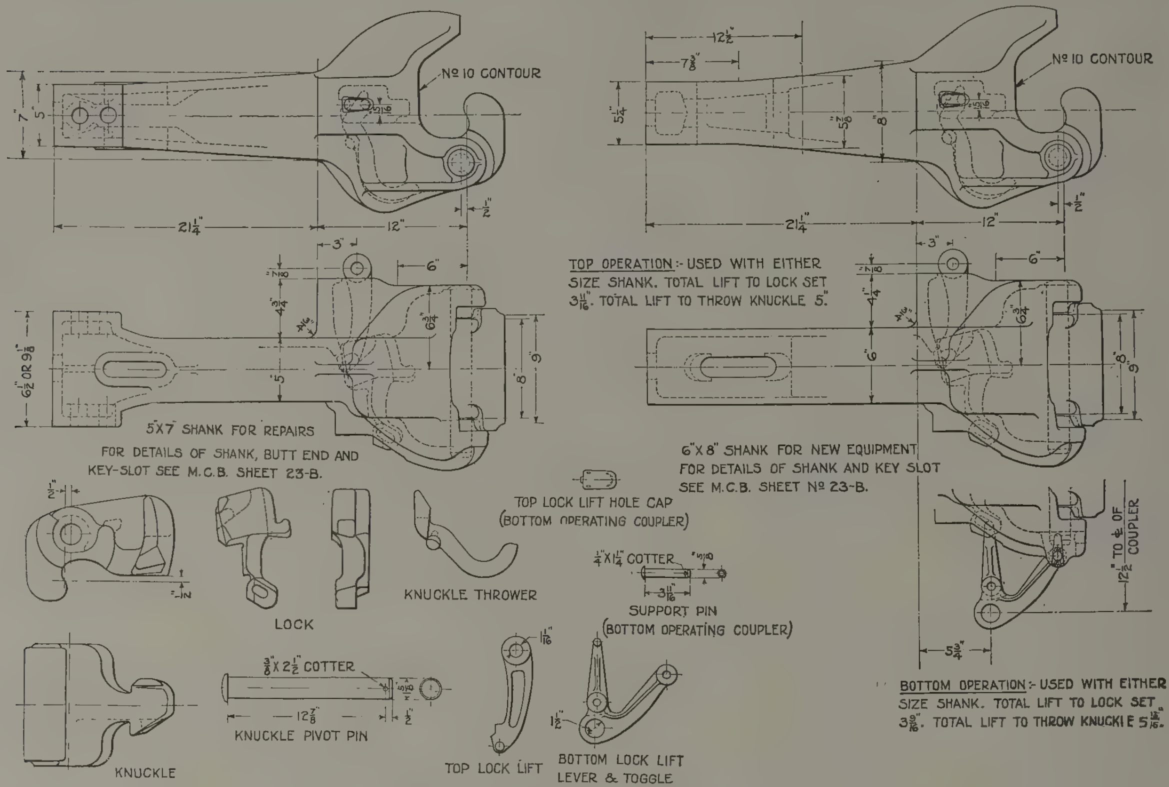


Fig. 2985—M. C. B. Standard "D" Coupler. (M. C. B. Sheet 23.)

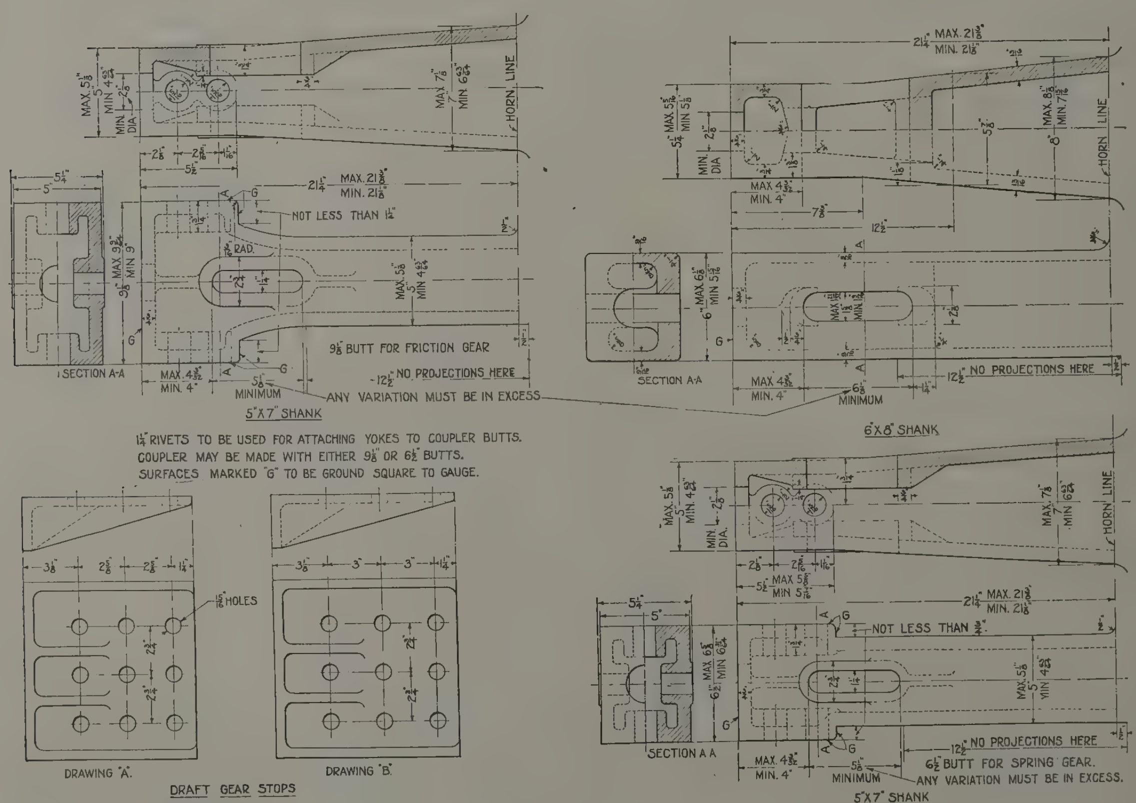


Fig. 2986—Standard 6-in. x 8-in. and 5-in. x 7-in. Coupler Shanks and Draft Gear Shops. (M. C. B. Sheet 23-B.)

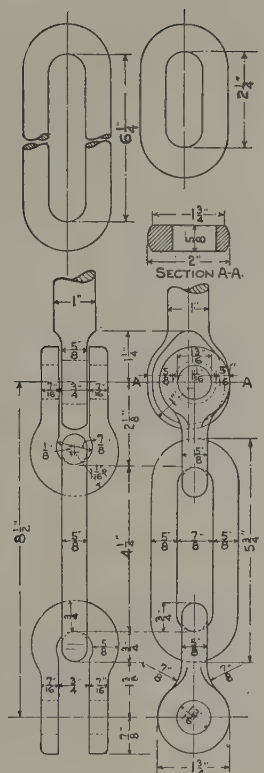


Fig. 2987—M. C. B. Standard Uncoupling Attachments.
(M. C. B. Sheet 23A.)

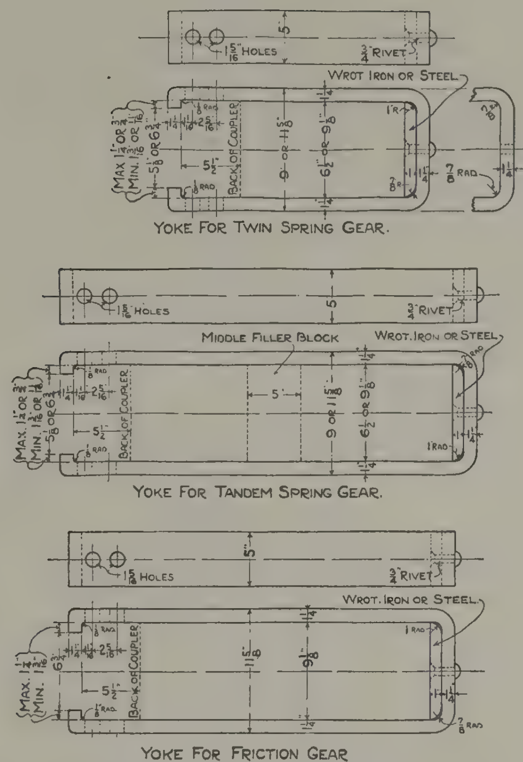
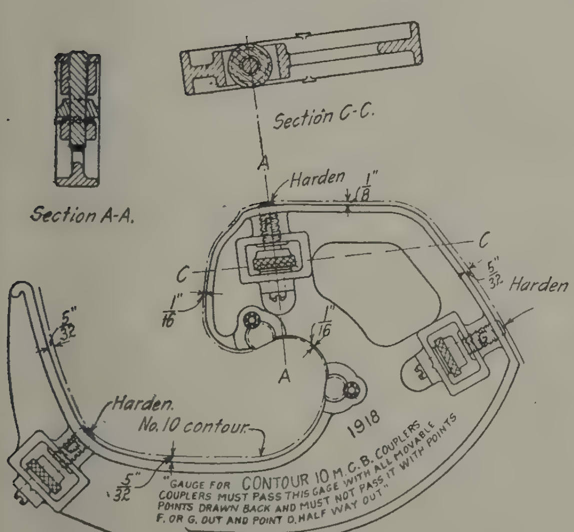


Fig. 2988—Standard Automatic Coupler Yoke.
(M. C. B. Sheet 23A.)



Coupler Limit Gage.

Fig. 2989—Inspector's Coupler Limit Gage.
(M C. B. Sheet 24.)

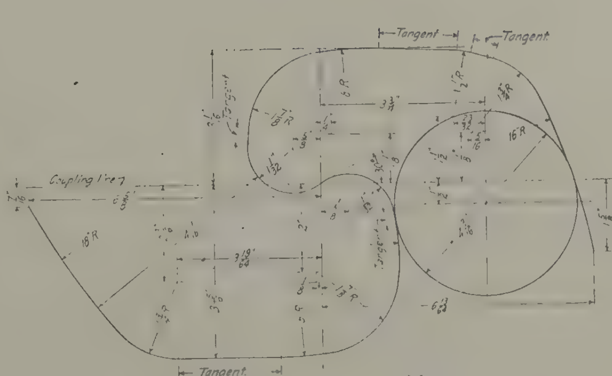


Fig. 2990—Detail of No. 10 Contour.
(M. C. B. Sheet 24.)
(See Figs. 2985 and 2989.)

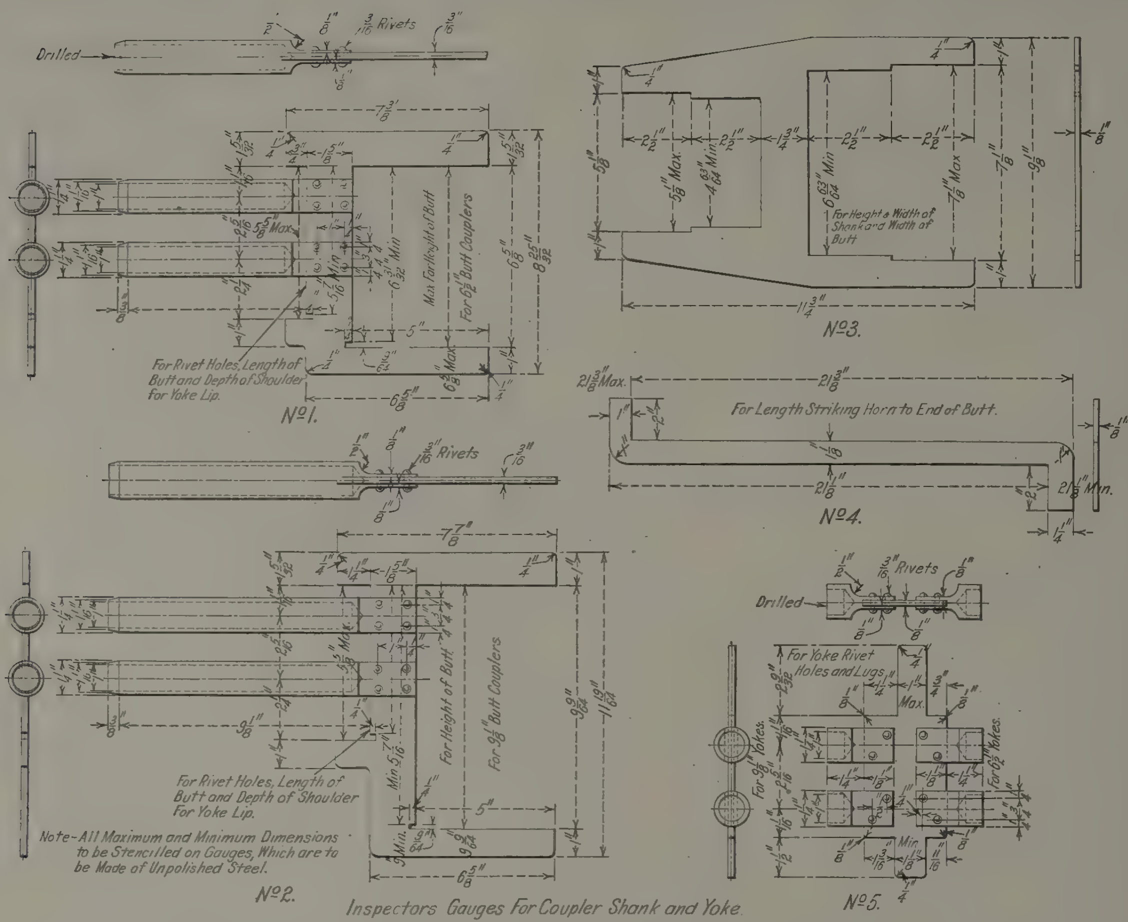


Fig. 2991—M. C. B. Standard Inspector's Gages for Coupler Shank and Yoke. (M. C. B. Sheet 24.)

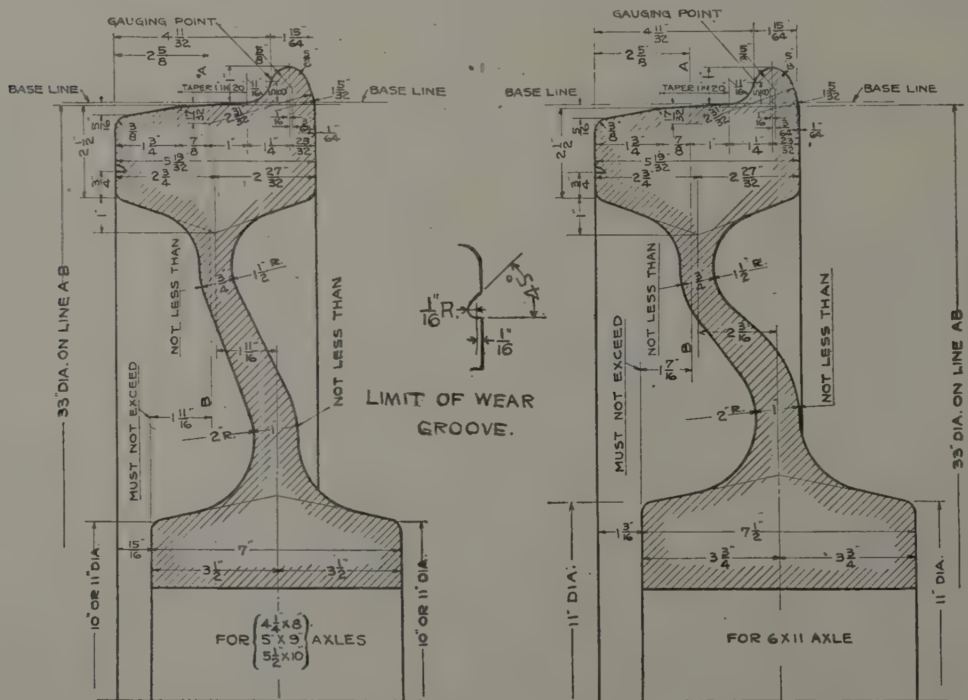


Fig. 2992—Standard 33 in. Wrought Steel Wheel. (M. C. B. Sheet 25.)

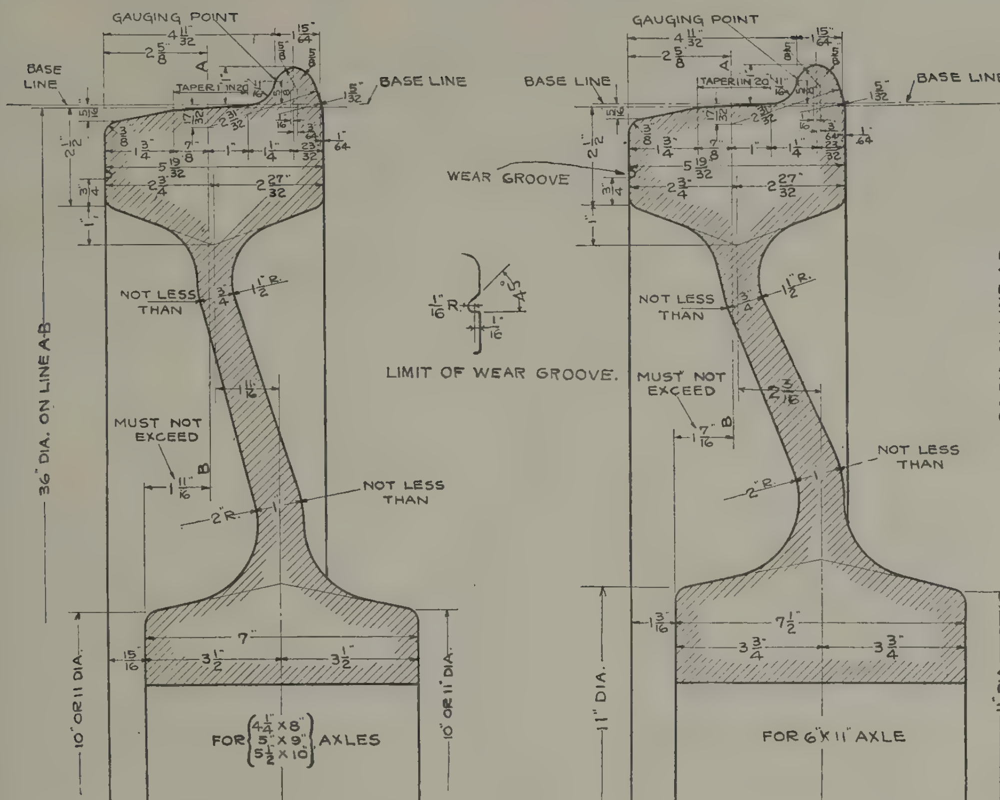


Fig. 2993—Standard 36 in. Wrought Steel Wheel. (M. C. B. Sheet 25A.)

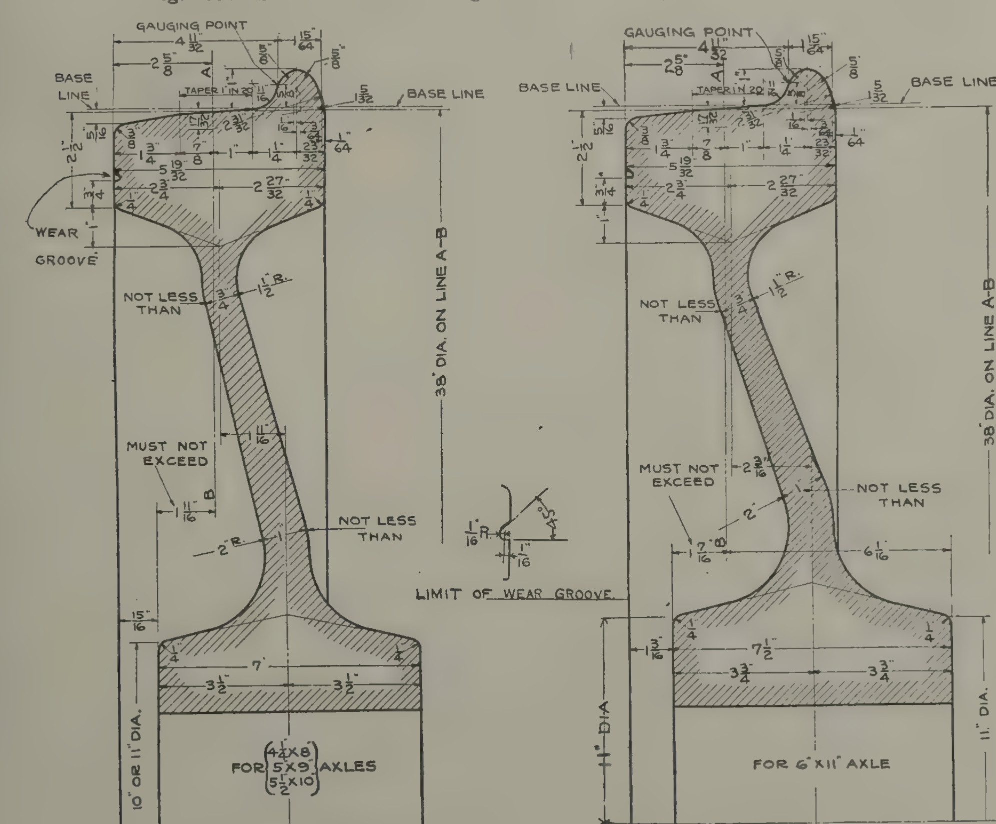
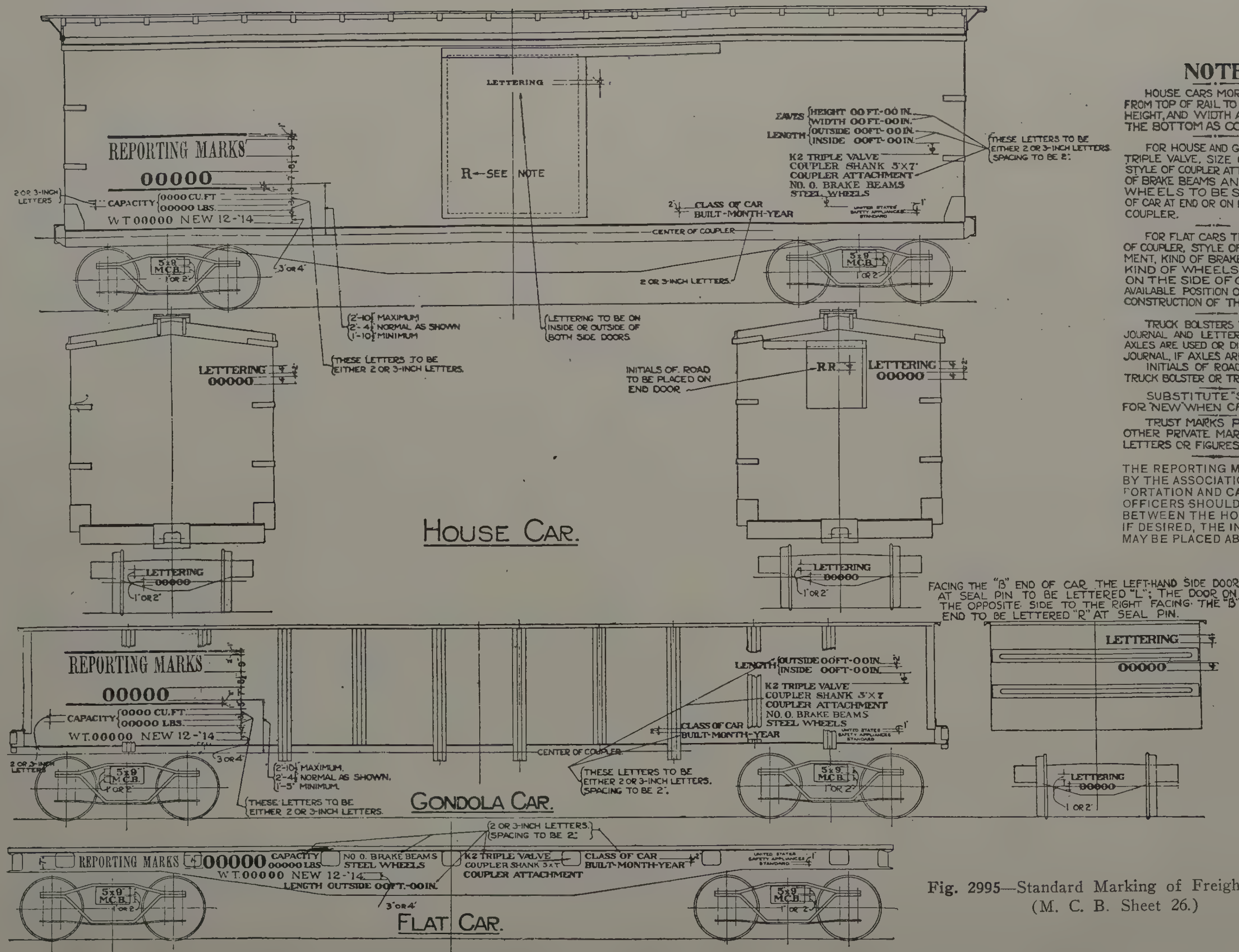


Fig. 2994—Standard 38 in. Wrought Steel Wheel. (M. C. B. Sheet 25B.)



NOTES

HOUSE CARS MORE THAN 12 FEET FROM TOP OF RAIL TO EAVES TO SHOW HEIGHT, AND WIDTH AT EAVES AS NEAR THE BOTTOM AS CONVENIENT.

FOR HOUSE AND GONDOLA CARS TRIPLE VALVE, SIZE OF COUPLER, STYLE OF COUPLER ATTACHMENT, KIND OF BRAKE BEAMS AND KIND OF WHEELS TO BE SHOWN ON SIDE OF CAR AT END OR ON END OF CAR ABOVE COUPLER.

FOR FLAT CARS TRIPLE VALVE, SIZE OF COUPLER, STYLE OF COUPLER ATTACHMENT, KIND OF BRAKE BEAMS AND KIND OF WHEELS TO BE SHOWN ON THE SIDE OF CAR IN THE BEST AVAILABLE POSITION OFFERED BY THE CONSTRUCTION OF THE CAR.

TRUCK BOLSTERS TO SHOW SIZE OF JOURNAL AND LETTERS "M.C.B." IF M.C.B. AXLES ARE USED OR DISTANCE C TO C OF JOURNAL, IF AXLES ARE NOT M.C.B.

INITIALS OF ROAD ON ONE SIDE OF TRUCK BOLSTER OR TRUCK TRANSOM.

SUBSTITUTE "STATION SYMBOL" FOR "NEW" WHEN CAR IS REWEIGHED.

TRUST MARKS, PATENT MARKS AND OTHER PRIVATE MARKS SHOULD BE 1" LETTERS OR FIGURES.

THE REPORTING MARKS ASSIGNED BY THE ASSOCIATION OF TRANSPORTATION AND CAR ACCOUNTING OFFICERS SHOULD BE PLACED BETWEEN THE HORIZONTAL BARS. IF DESIRED, THE INITIALS OF OWNER MAY BE PLACED ABOVE THE BARS.

Fig. 2995—Standard Marking of Freight Cars. (M. C. B. Sheet 26.)

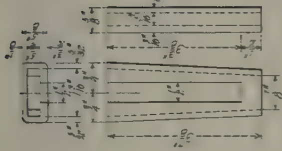


Fig. 2998—M. C. B. Standard Signal Lamp Socket. (M. C. B. Sheet 27.)

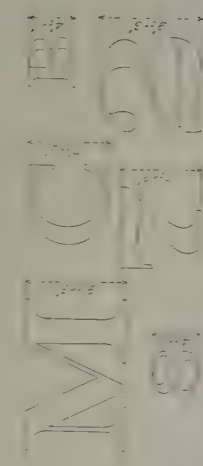


Fig. 2999 Standard Letters and Figures for Freight Car Marking. (M. C. B. Sheet 26B.)

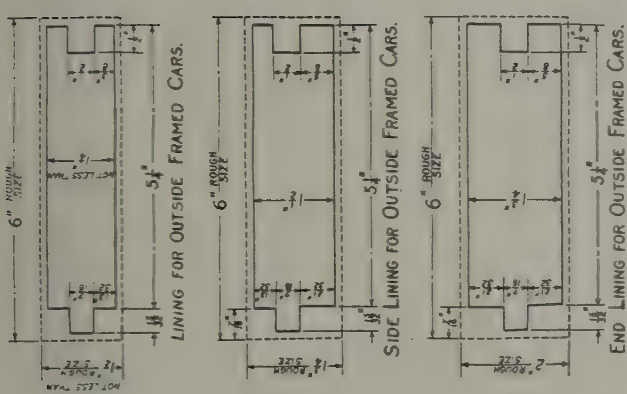


Fig. 2997 Recommended Practice for Lining for Outside Framed Cars. (M. C. B. Sheet 27.)

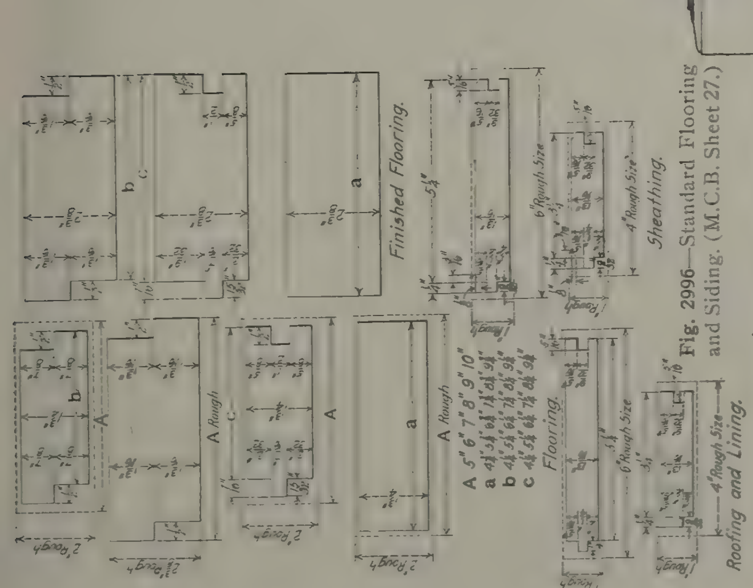


Fig. 2996—Standard Flooring and Siding. (M.C.B. Sheet 27.)

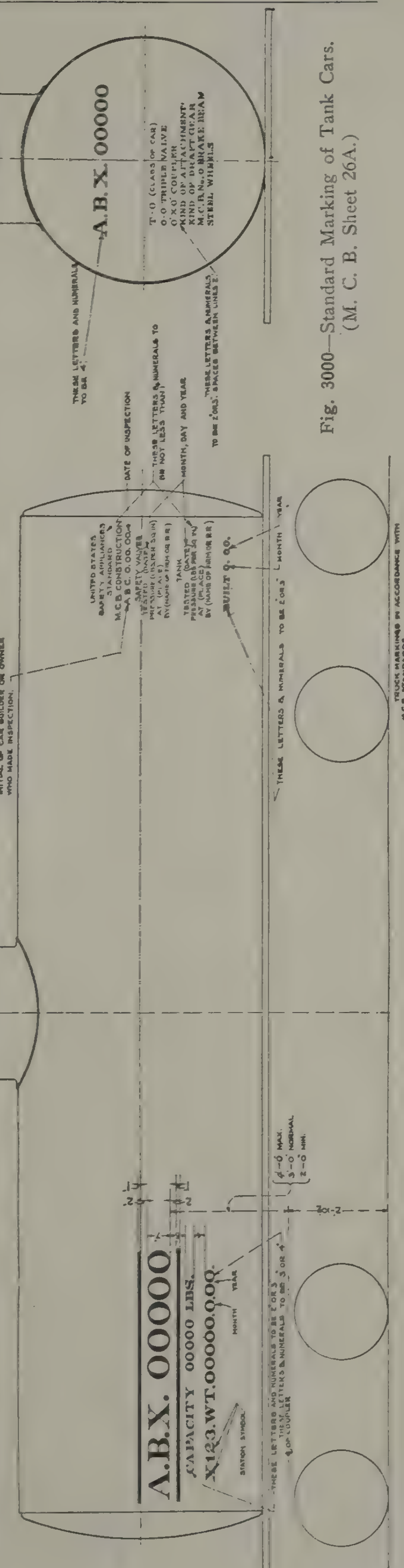


Fig. 3000—Standard Marking of Tank Cars. (M. C. B. Sheet 26A.)

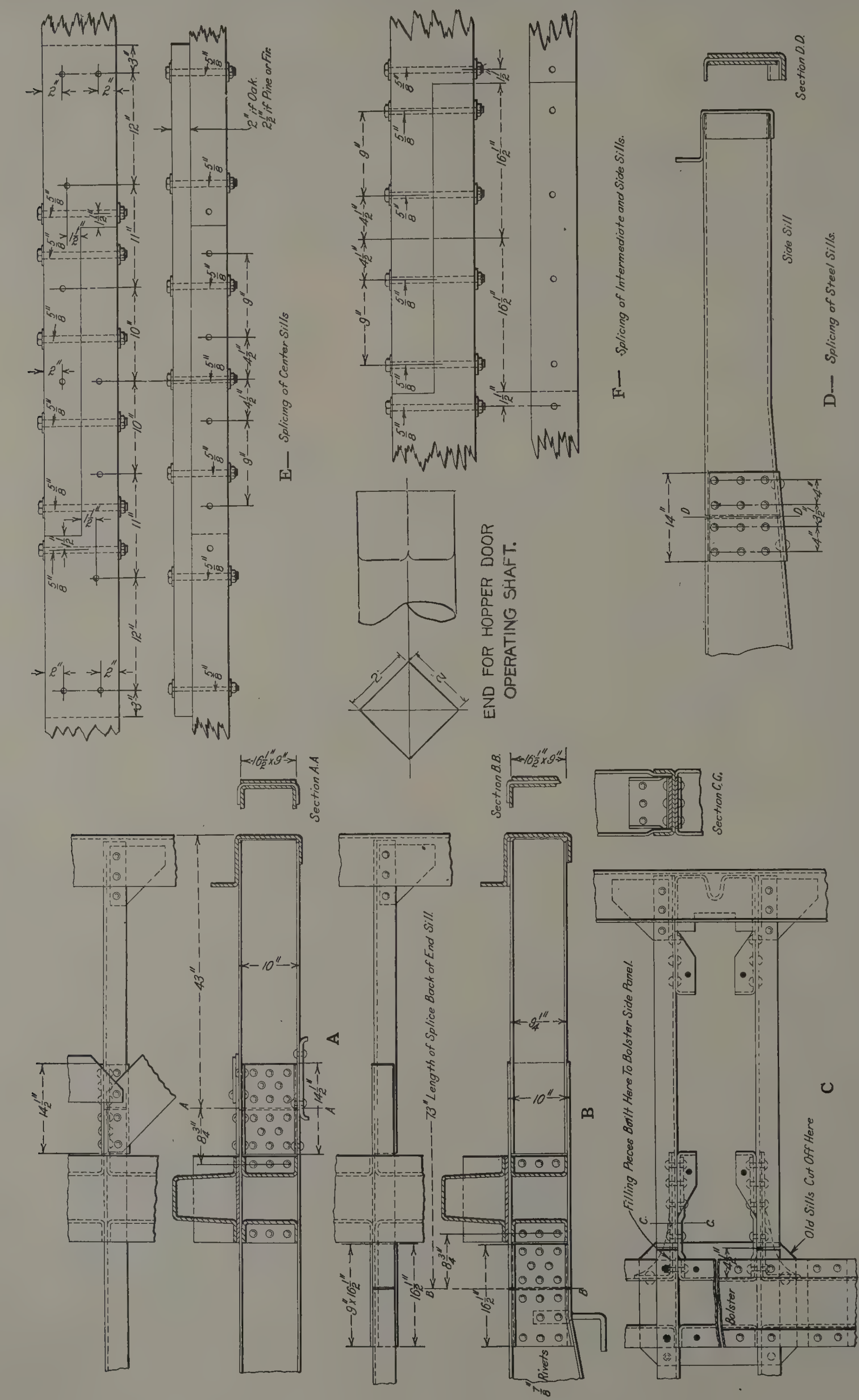
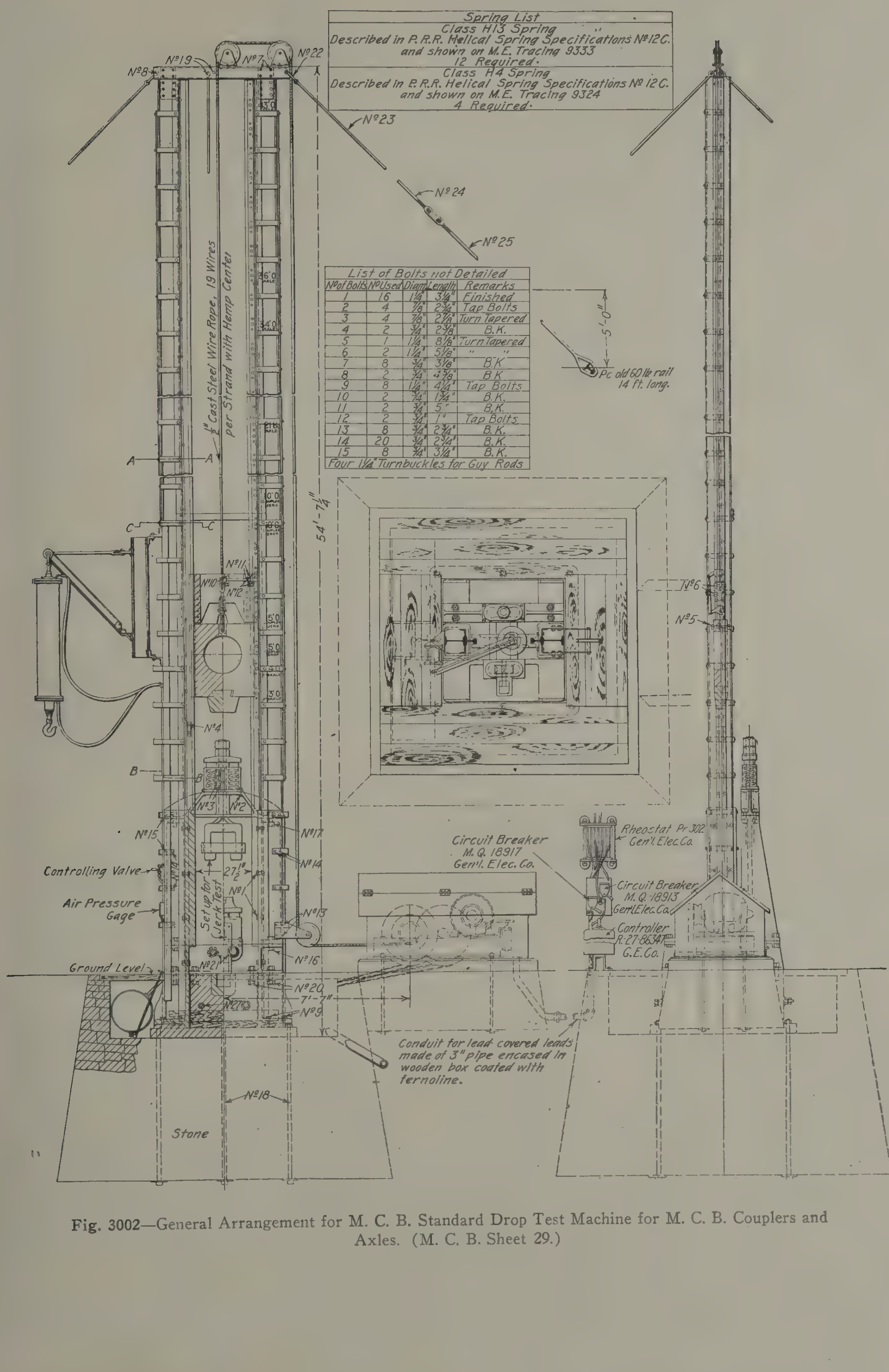


Fig. 3001—Splicing for Steel and Wooden Sills; End for Hopper Door Operating Shaft. (M. C. B. Sheet 28.)

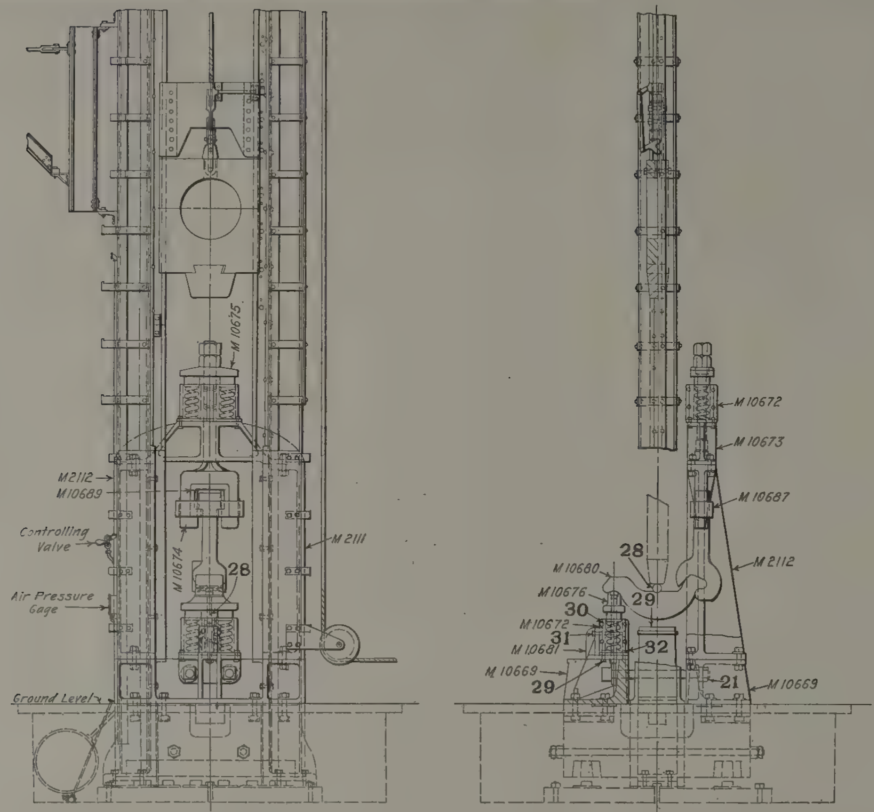


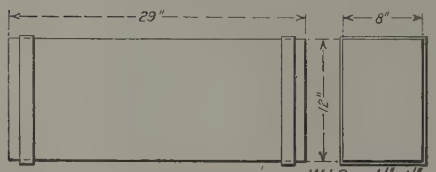
Spring List
Class H13 Spring
Described in P.R.R. Helical Spring Specifications No 12 C. and shown on M.E. Tracing 9333
12 Required.
Class H4 Spring
Described in P.R.R. Helical Spring Specifications No 12 C. and shown on M.E. Tracing 9324
4 Required.

List of Bolts not Detailed

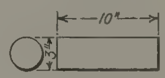
No of Bolts	No Used	Diam	Length	Remarks
1	16	1 1/4"	3 1/4"	Finished
2	4	7/8"	2 3/4"	Tap Bolts
3	4	7/8"	2 7/8"	Turn Tapered
4	2	3/4"	2 3/8"	B.K.
5	1	1 1/4"	8 1/8"	Turn Tapered
6	2	1 1/4"	5 1/8"	" "
7	8	3/4"	3 1/8"	B.K
8	2	3/4"	4 5/8"	B.K
9	8	1 1/4"	4 1/4"	Tap Bolts
10	2	3/4"	1 3/4"	B.K.
11	2	3/4"	5"	B.K.
12	2	3/4"	1"	Tap Bolts
13	8	3/4"	2 3/4"	B.K.
14	20	3/4"	2 3/4"	B.K.
15	8	3/4"	3 1/4"	B.K.
Four 1 1/4" Turnbuckles for Guy Rods				

Fig. 3002—General Arrangement for M. C. B. Standard Drop Test Machine for M. C. B. Couplers and Axles. (M. C. B. Sheet 29.)





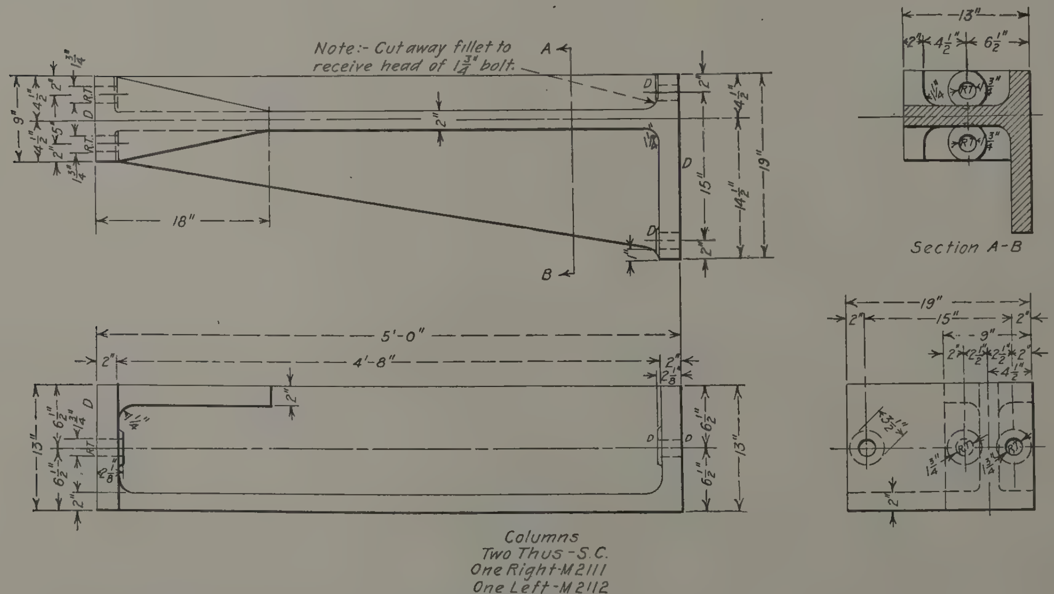
Oak Block
One Thus
No 29



One Thus - A.S.
Oil Hardened
No 28

List of Bolts for Jerk Test

No. of Bolt	No. Used	Diam.	Length	Remarks
28	1	1 1/2"	22 1/4"	Sq. Hd. 2 7/16 Across Flats
29	2	7/8"	3 1/8"	
30	4	7/8"	3"	Turn Tapered
31	2	15/16	9 1/2"	
32	2	7/8"	3 1/2"	Tap Bolts



Columns
Two Thus - S.C.
One Right - M 2111
One Left - M 2112

Fig. 3003—Details for Standard Jerk Test for M. C. B. Couplers. (M. C. B. Sheet 29A.)

(See Figs. 3004-3005.)

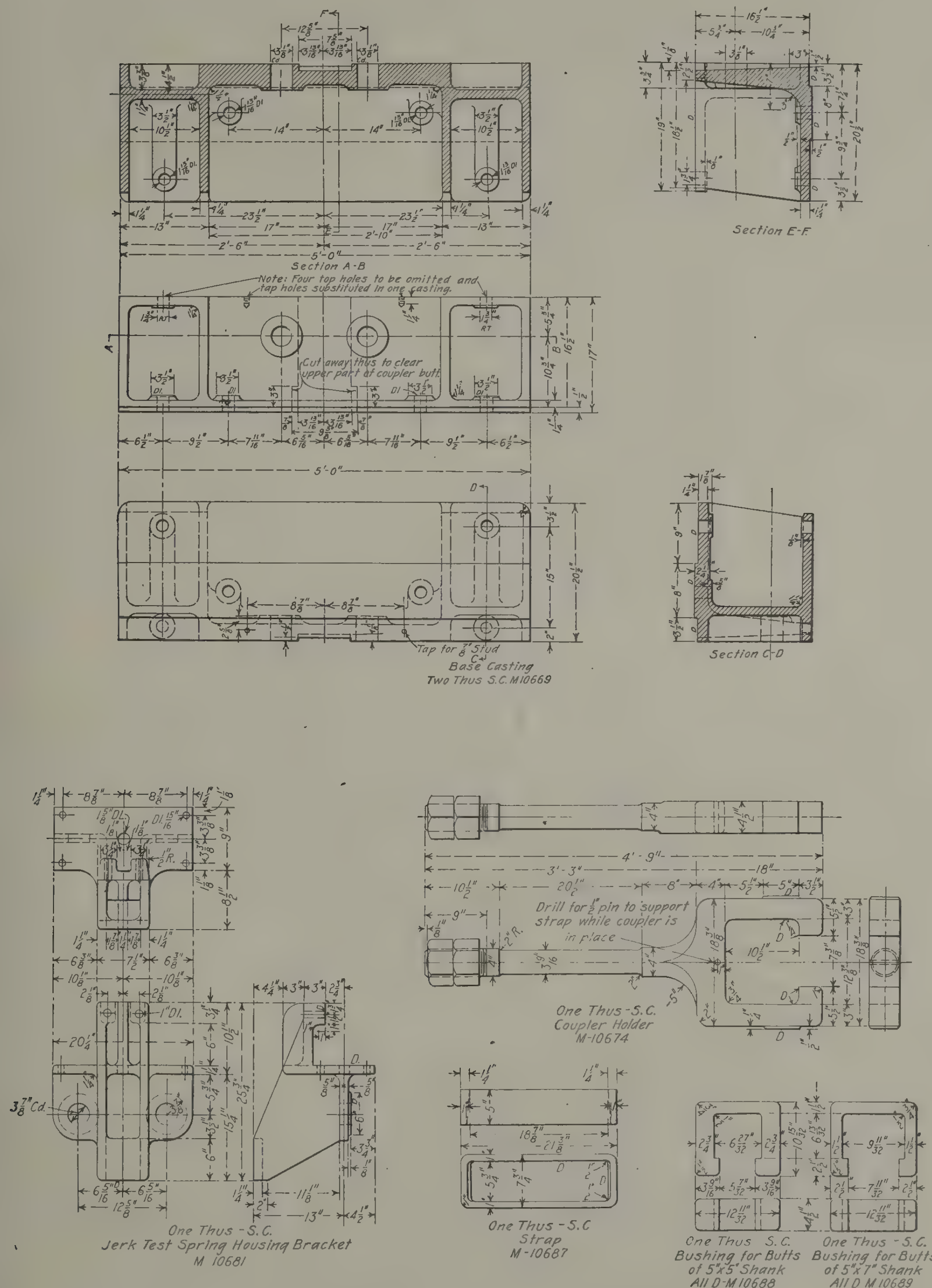


Fig. 3004—Details for Standard **Jerk** Test for M. C. B. Couplers. (M. C. B. Sheets 29A and 29B.)

(*See Figs.* 3003 *and* 3005.)

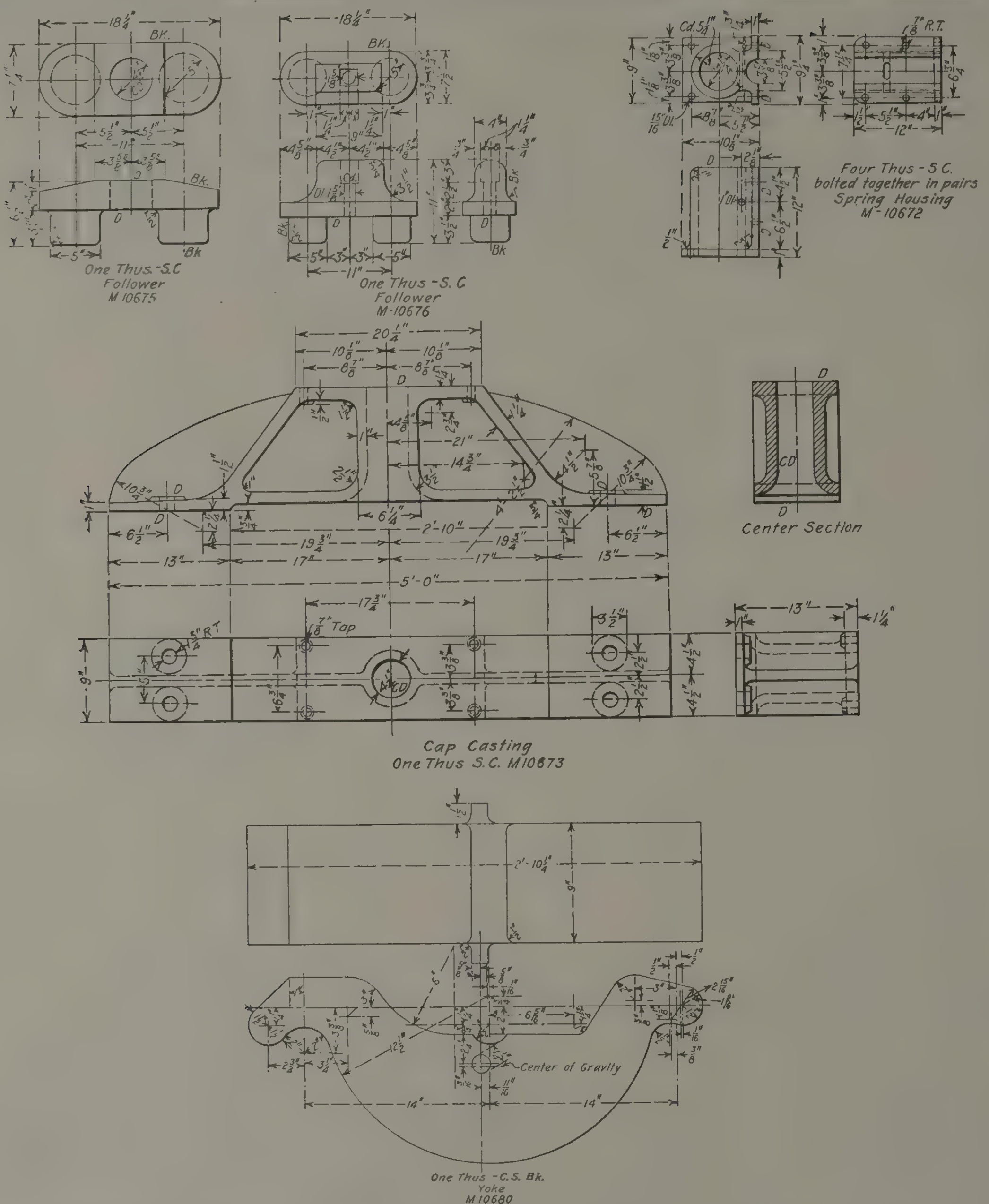


Fig. 3005—Details for Standard Jerk Test for M. C. B. Couplers. M. C. B. Sheets 29A and 29B.)

(*See Figs.* 3003-3004.)

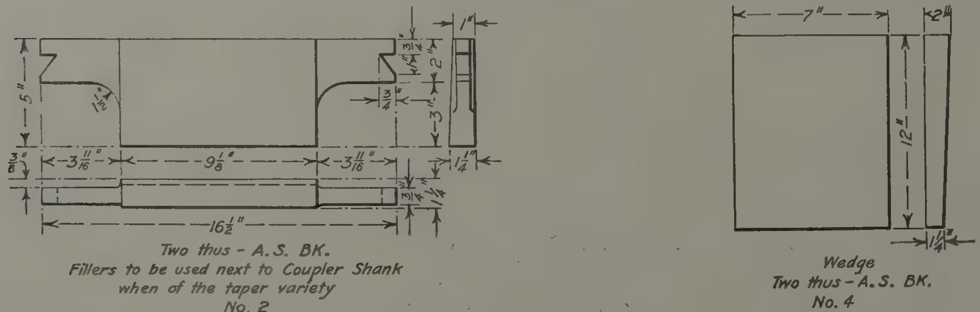
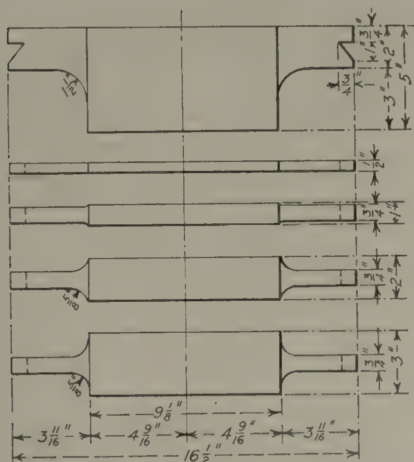
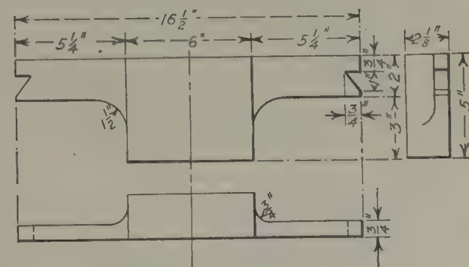


Fig. 3006—Details for Standard Striking Test for M. C. B. Couplers. (M. C. B. Sheet 29B.)

(*See Also Fig.* 3007.)

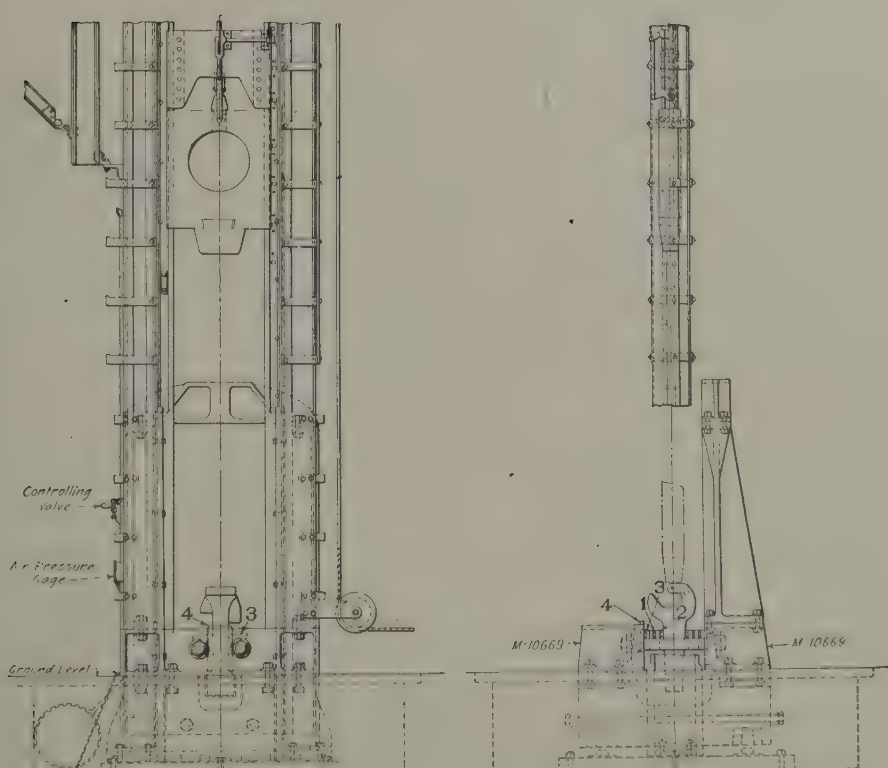


Coupler Wedging Blocks-A. S. BK.
Three of each
No. 1



One thus - A. S. BK.
Filler to be used next to Wedge
No. 3

Note. For detail of Casting
M. 10669 see



Striking Test

Fig. 3007—Details for Standard Striking Test for M. C. B. Couplers. (M. C. B. Sheet 29B.)

(*See Also Fig.* 3006.)

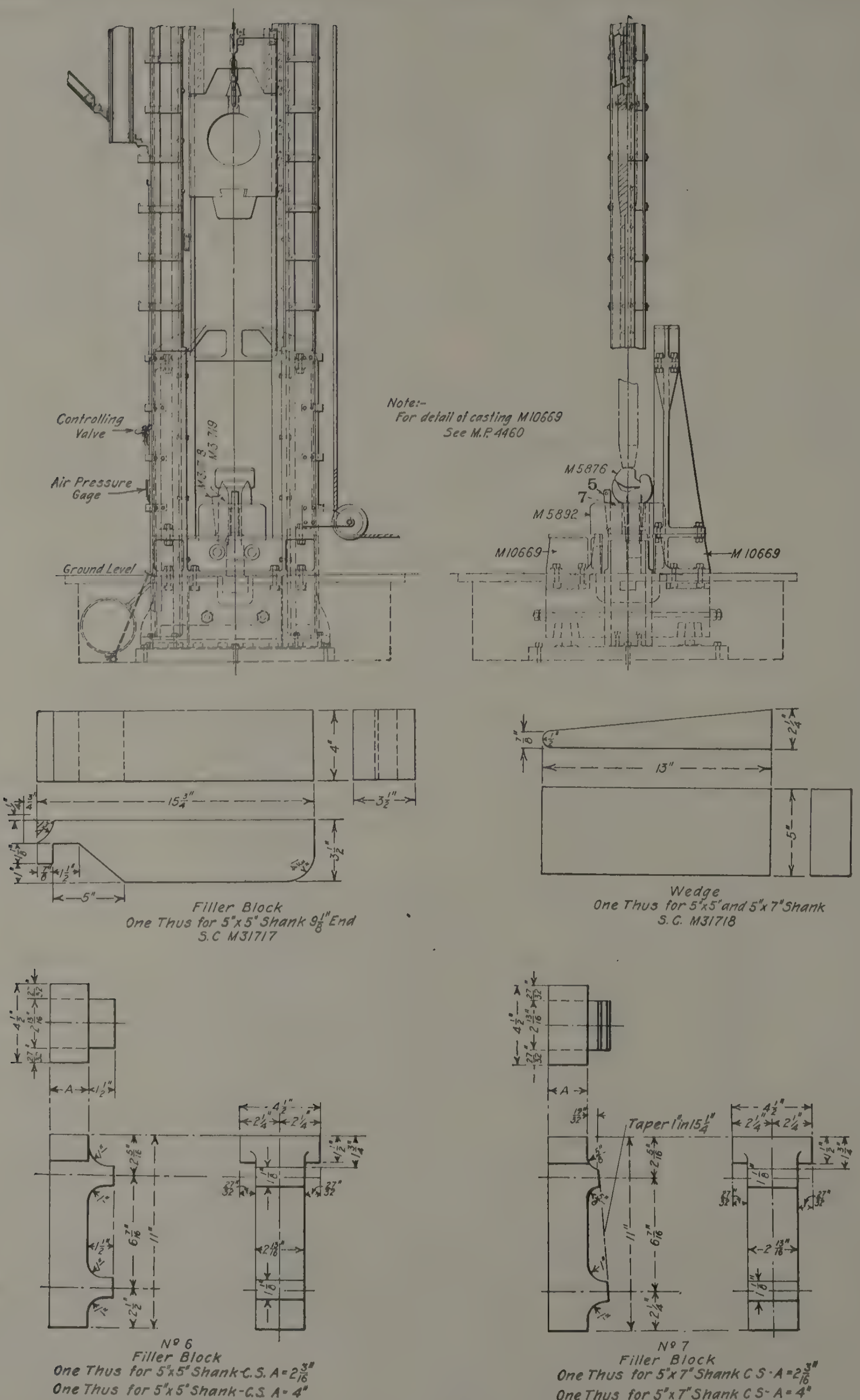


Fig. 3008—Details for Standard Face Test for M. C. B. Couplers. (M. C. B. Sheet 29C.)

(*See Also Fig.* 3009.)

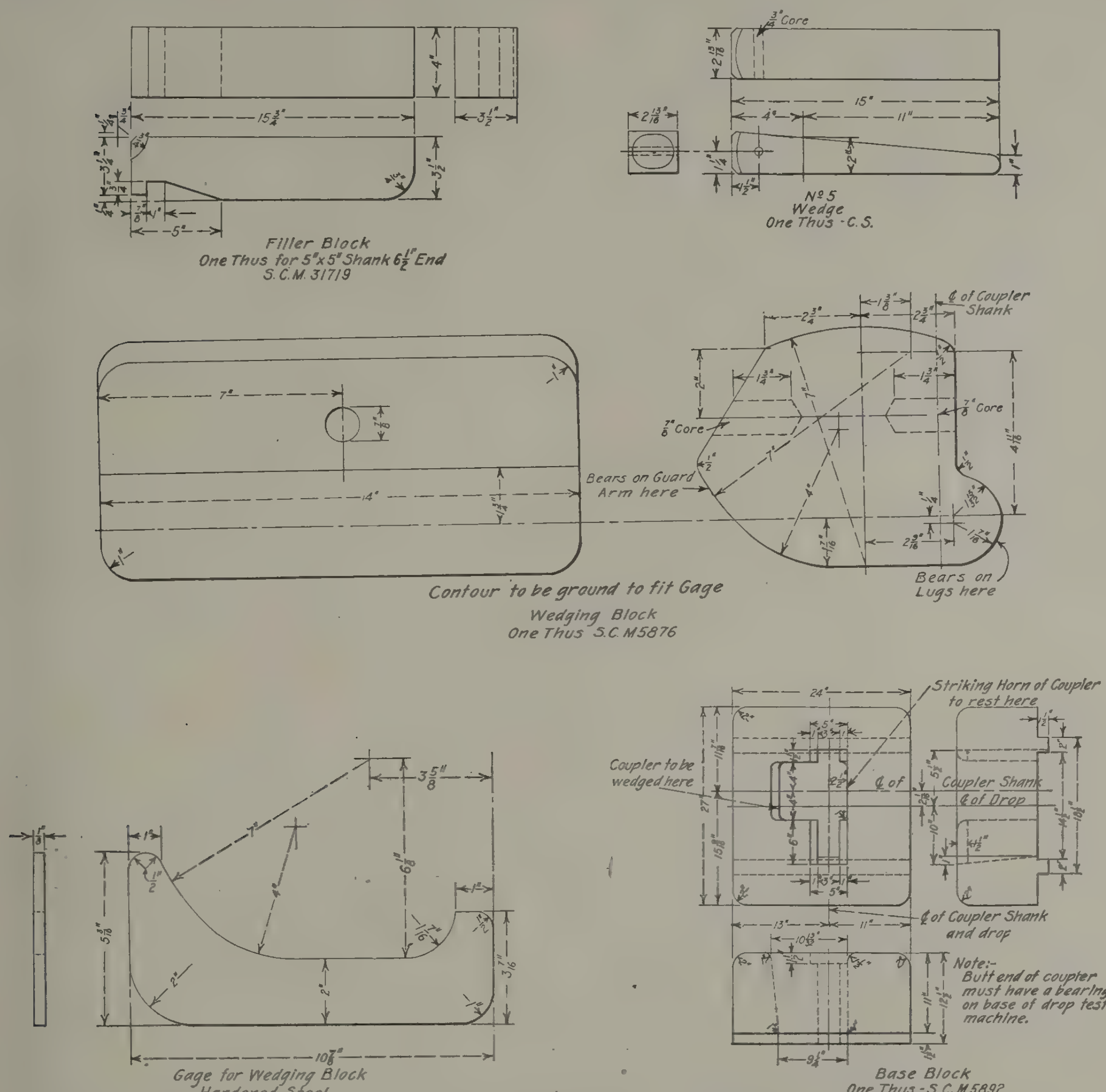


Fig. 3009—Details for Standard Face Test for M. C. B. Couplers. (M. C. B. Sheet 29 C.)

(*See Also Fig.* 3008.)

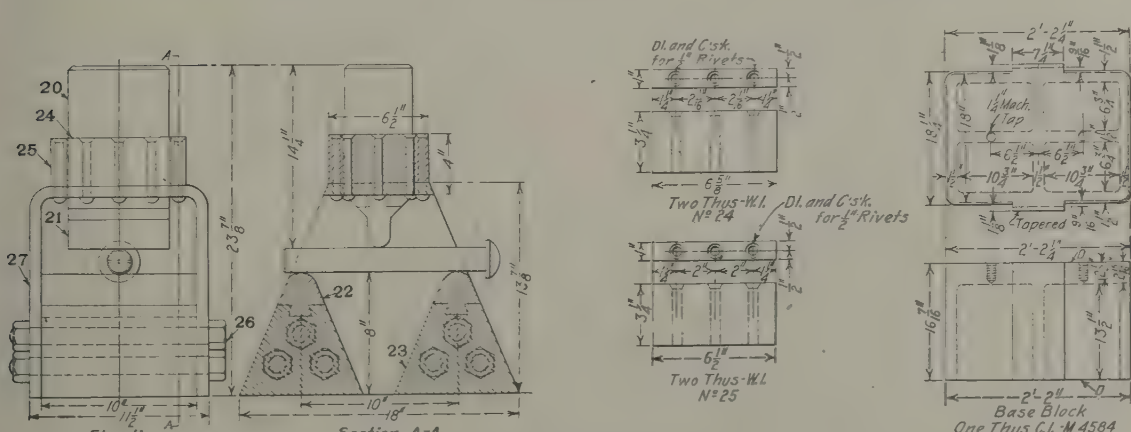


Fig. 3010—Details for Standard M. C. B. Knuckle Pin Test. (M. C. B. Sheet 29D.)

(*See Also Figs.* 3011, 3012.)

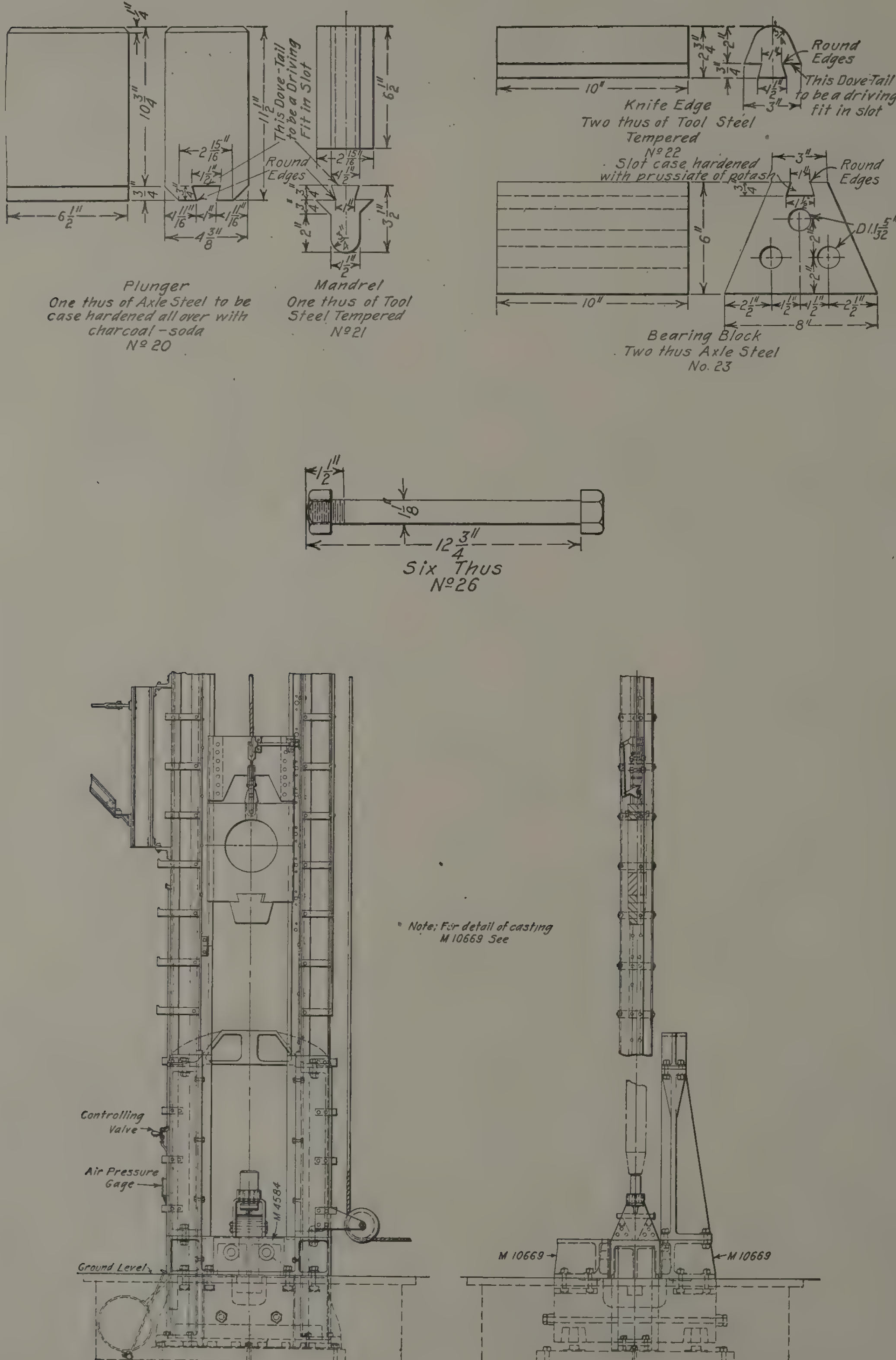


Fig. 3011—Details for Standard M. C. B. Knuckle Pin Test. (M. C. B. Sheet 29D.)

(*See Also Figs.* 3010, 3012.)

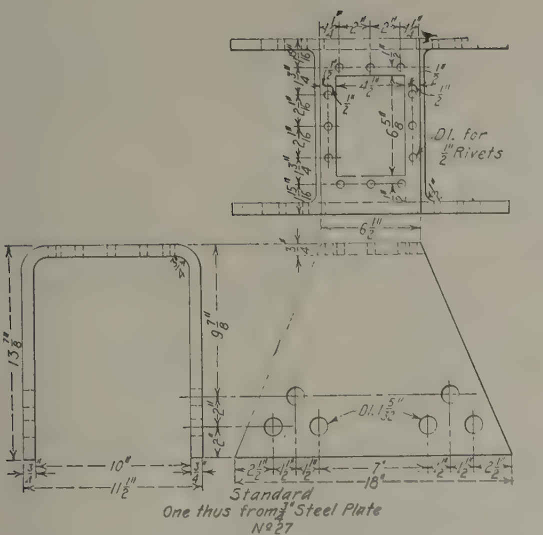


Fig. 3012—Details for Standard M. C. B. Knuckle Pin Test. (M. C. B. Sheet 29D.)

(*See Also Figs.* 3010, 3011.)

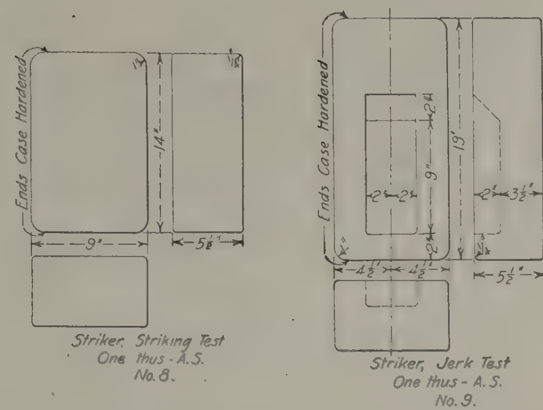


Fig. 3013—Details for M. C. B. Standard Separate Knuckle Test. (M. C. B. Sheet 29E.)

(*See Also Figs.* 3014, 3015.)

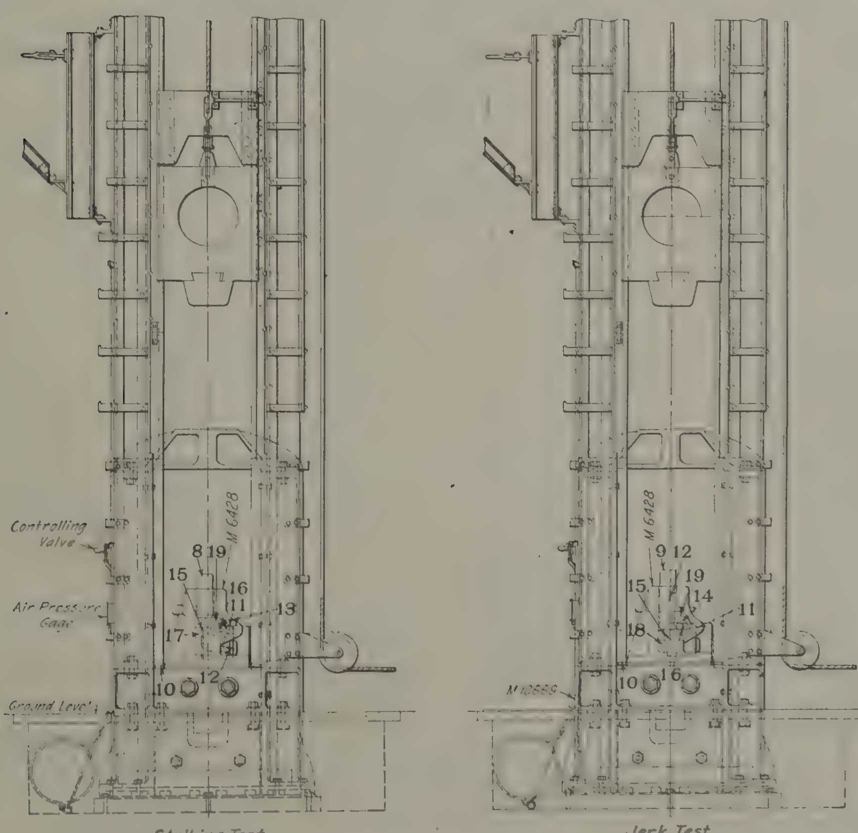


Fig. 3014—Details for M. C. B. Standard Separate Knuckle Test. (M. C. B. Sheet 29E.)

(*See Also Figs.* 3013, 3015.)

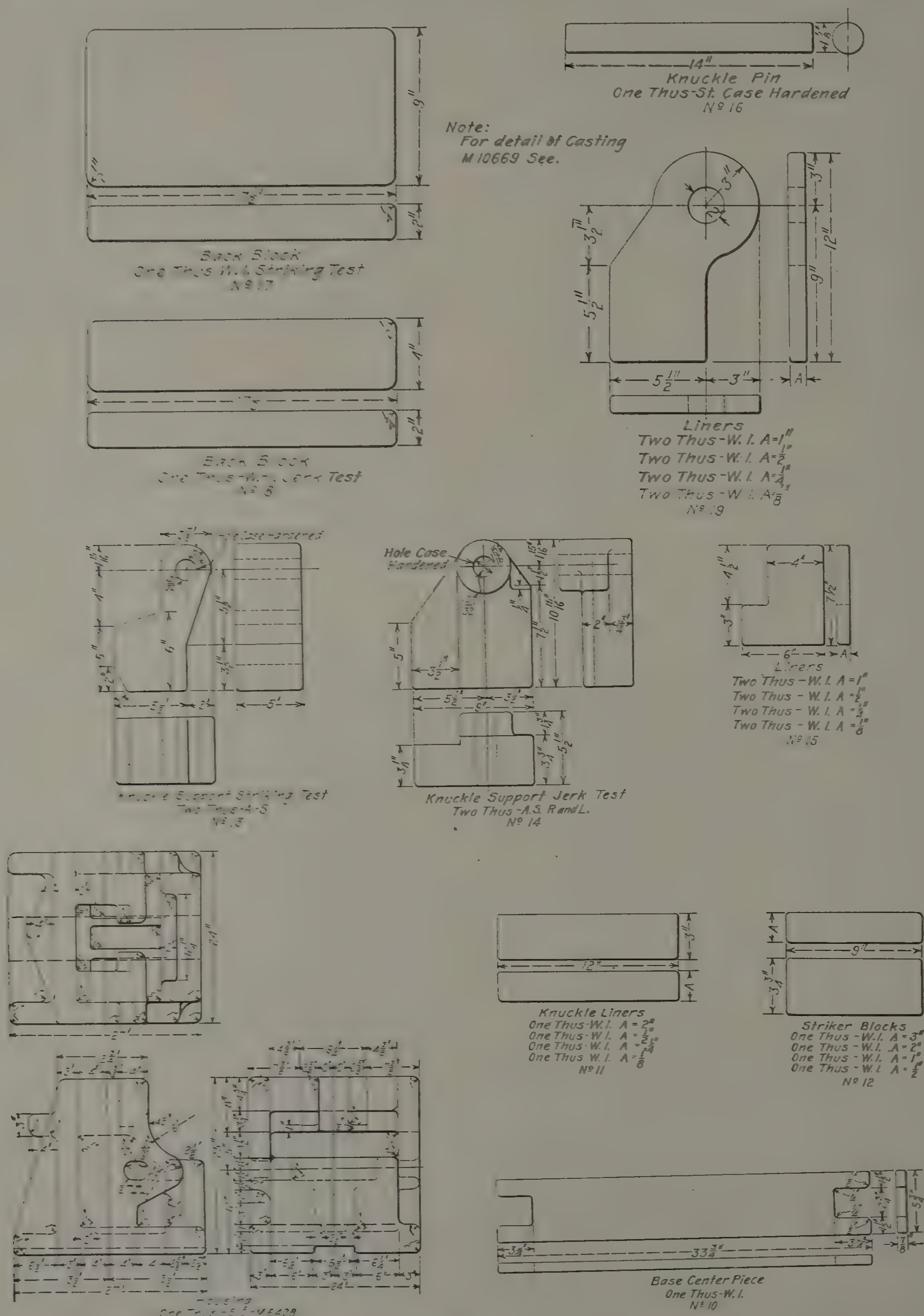


Fig. 3015—Details for M. C. B. Standard Separate Knuckle Test. (M. C. B. Sheet 29E.)

(See Also Figs. 3013, 3014.)

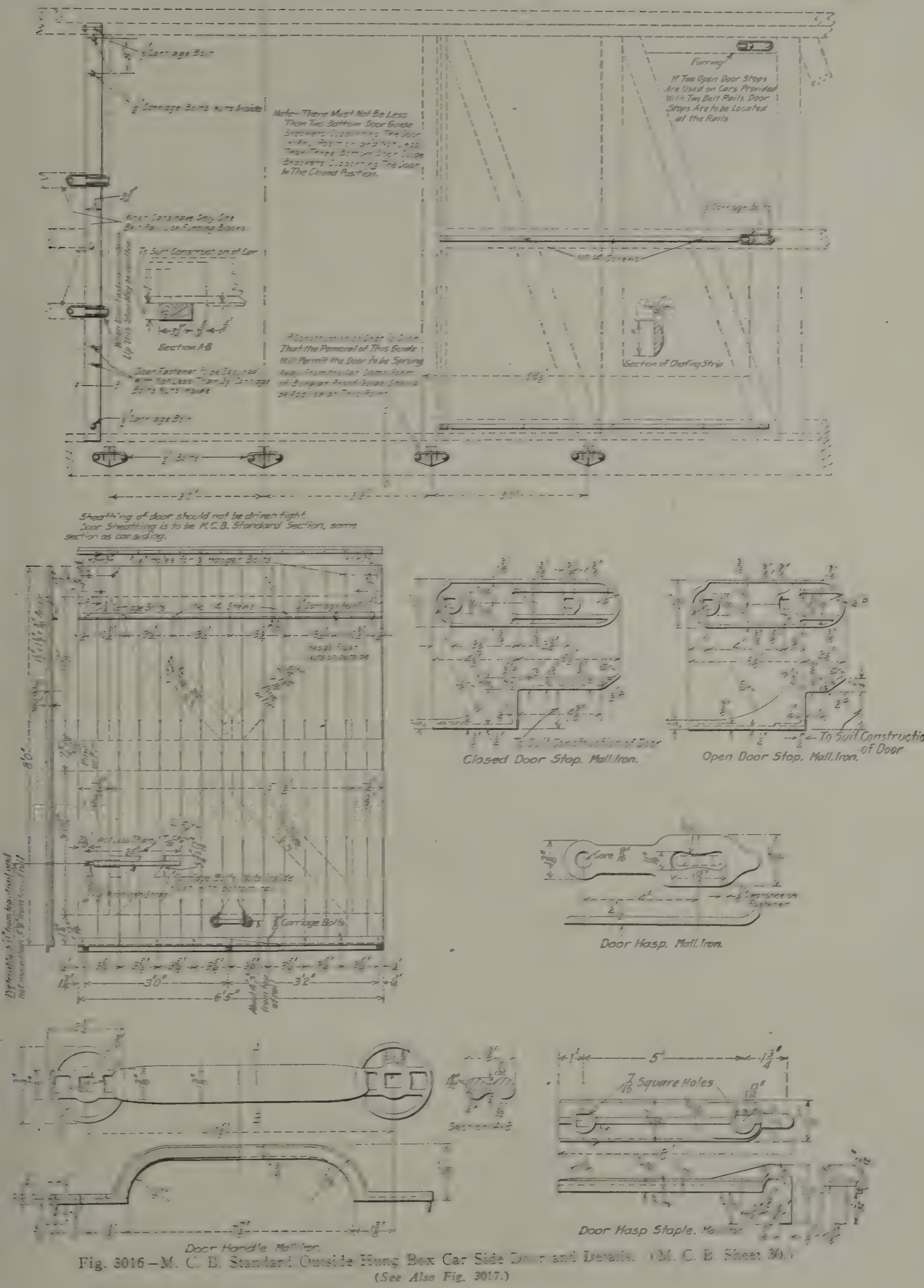


Fig. 3016—M. C. B. Standard Outside Hung Box Car Side Door and Details. (M. C. B. Sheet 30.)

(See Also Fig. 3017.)

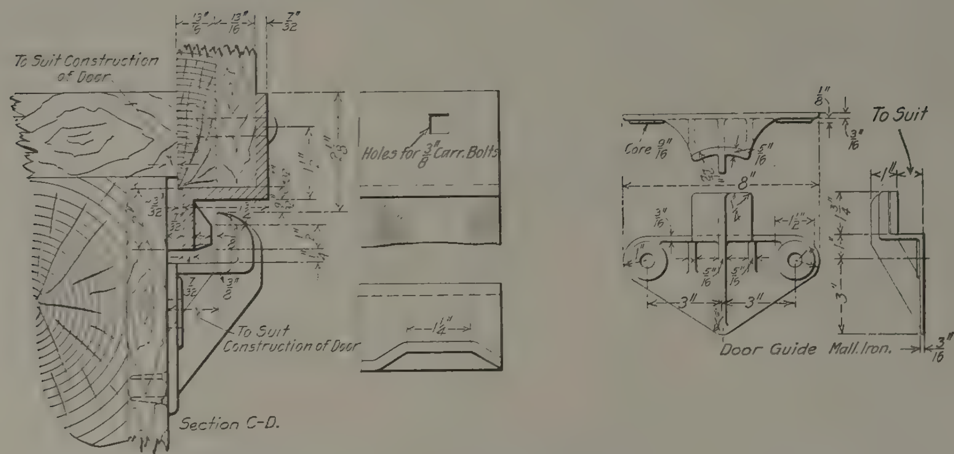


Fig. 3017—Details for M. C. B. Standard Outside Hung Box Car Side Door. (M. C. B. Sheet 30.)
(See Also Fig. 3016.)

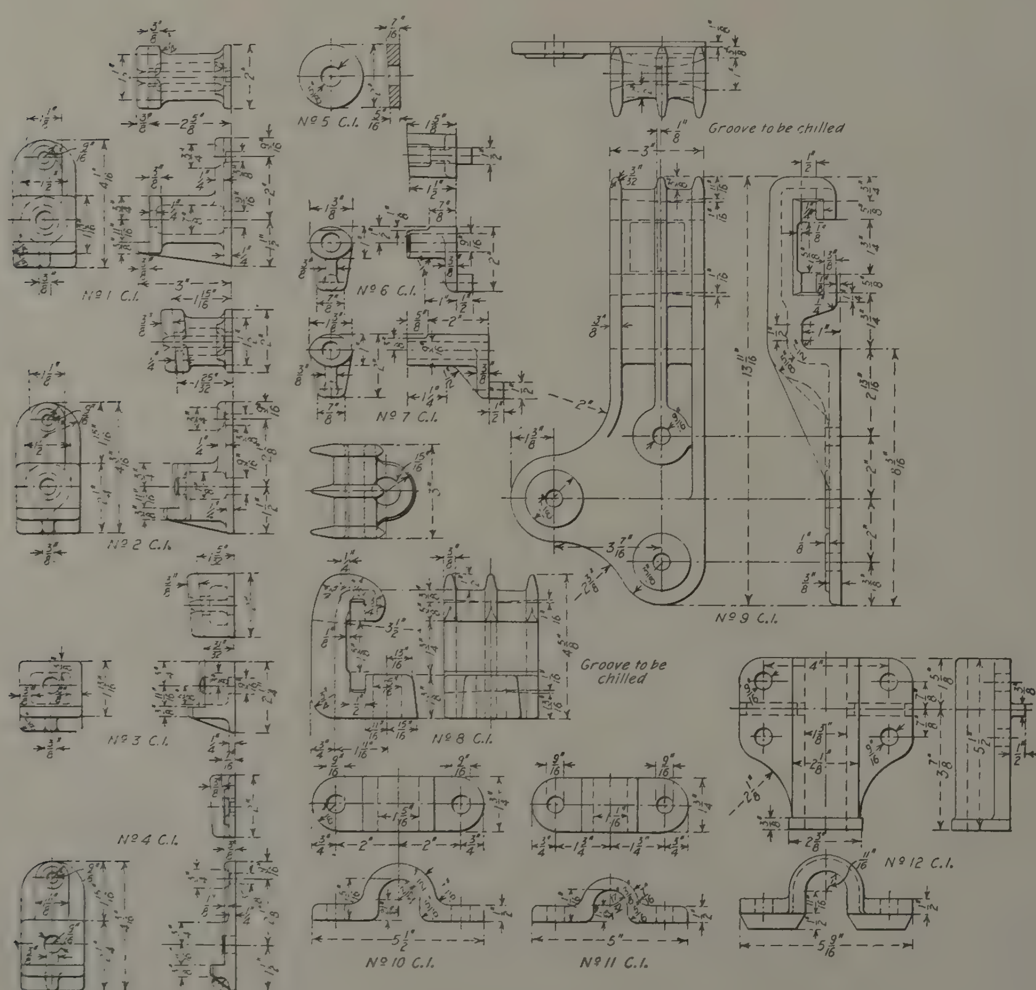


Fig. 3018—Details for M. C. B. Standard Flush Side Door for Box Cars. (M. C. B. Sheet 30A.)
(See Also Figs. 3019, 3020.)

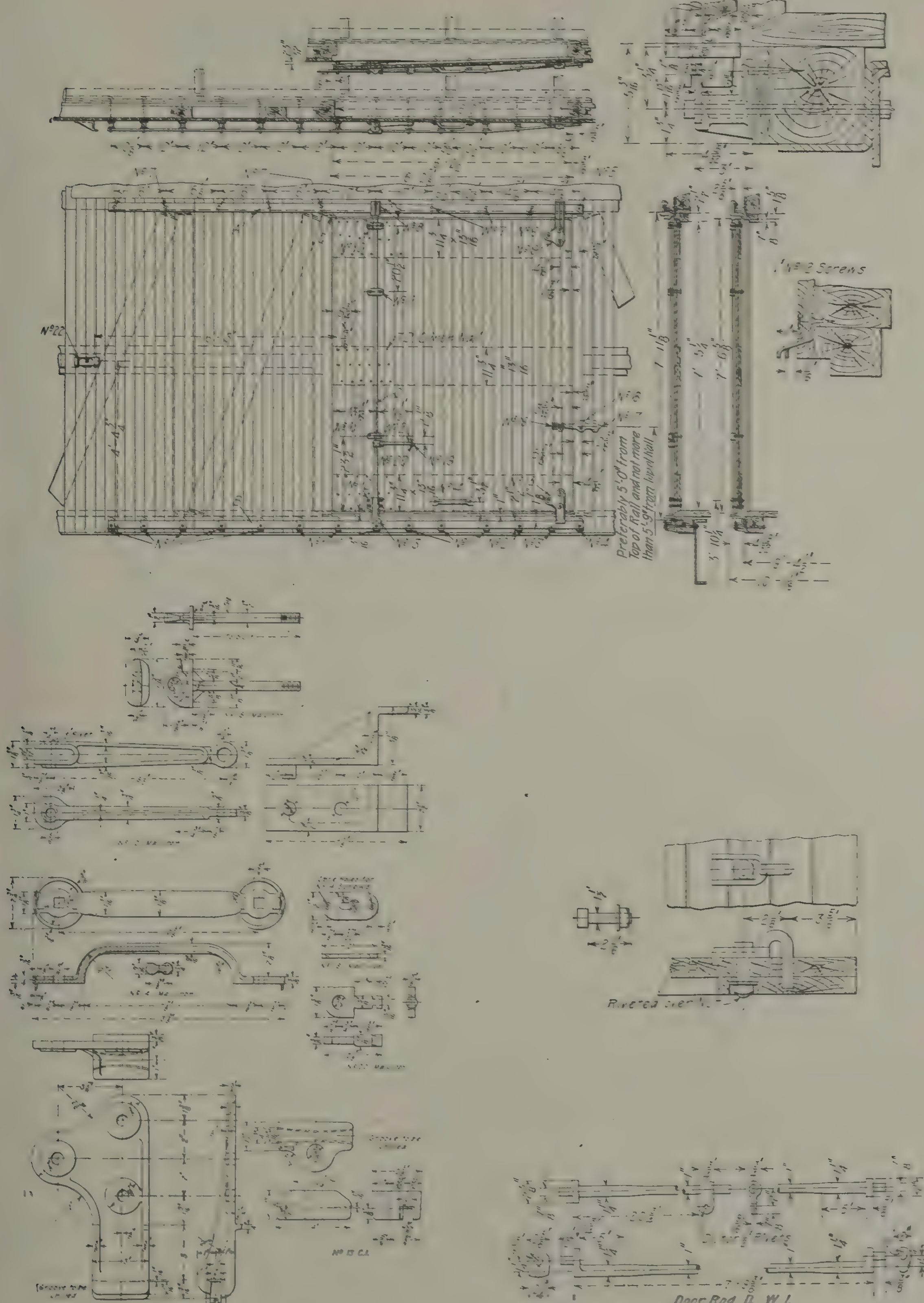


Fig. 3019—M. C. B. Standard Flush Side Door and Details for Box Cars. (M. C. B. Sheet 30A.)

(See Also Figs. 3018, 3020.)

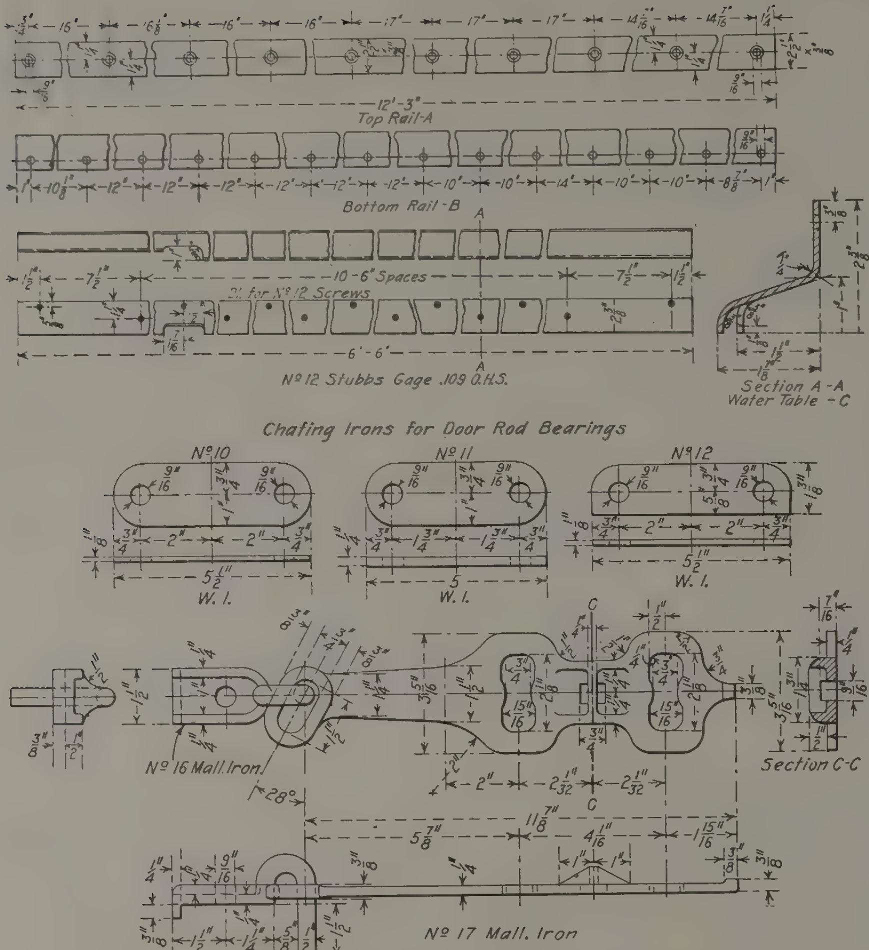


Fig. 3020—Details for M. C. B. Standard Flush Side Door for Box Cars. (M. C. B. Sheet 30A.)
(See Also Figs. 3018, 3019.)

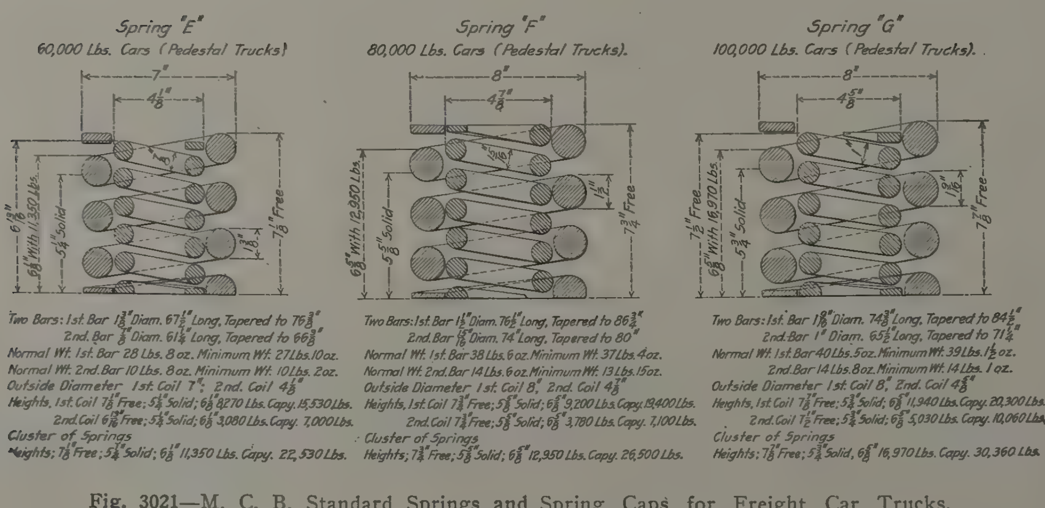
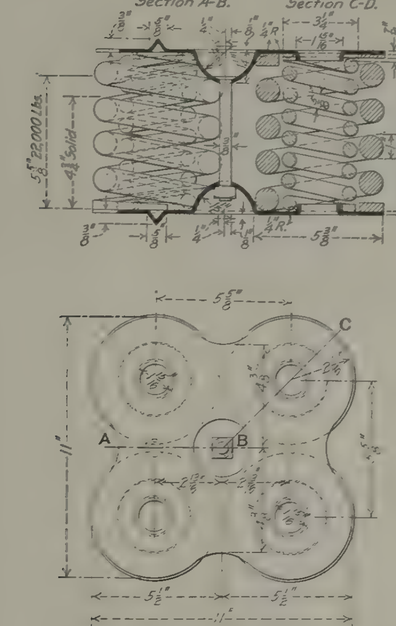


Fig. 3021—M. C. B. Standard Springs and Spring Caps for Freight Car Trucks.
(M. C. B. Sheet 31.)
(See Also Fig. 3022.)

Spring "A"

60,000 Lbs. Cars. (Arch Bar Trucks)

Section A-B. Section C-D.

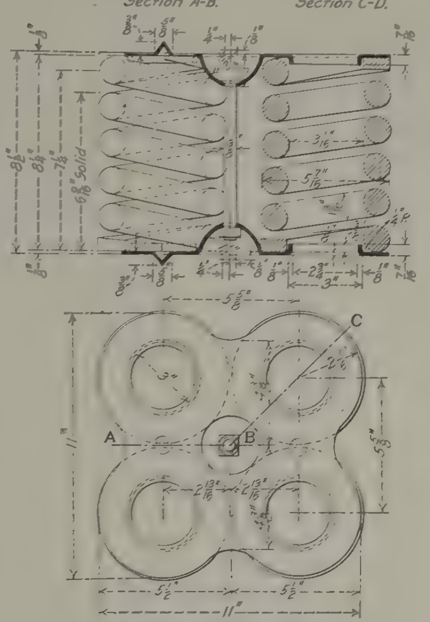


Eight Bars: Four Bars 1" Diam $65\frac{1}{4}$" Long, Tapered to $72\frac{1}{4}$"
Four Bars $\frac{5}{8}$" Diam. $62\frac{1}{2}$" Long, Tapered to $66\frac{3}{4}$"
Normal Wt. of each 1st. Four Bars 14 Lbs. 12 oz. Minimum Wt. 14 Lbs. 5 oz.
Normal Wt. of each 2nd. Four Bars 5 Lbs 6 oz. Minimum Wt. 5 Lbs. 3 oz.
Outside Diam 1st. Four Coils $5\frac{3}{8}$", 2nd Four Coils $3\frac{1}{4}$"
Heights, 1st Four Coils $5\frac{5}{8}$" Free, $4\frac{3}{4}$" Solid, $5\frac{5}{8}$" 3,970 Lbs. Capy 7,440 Lbs.
2nd. Four Coils $6\frac{1}{2}$" Free, $4\frac{3}{4}$" Solid, $5\frac{5}{8}$" 1,530 Lbs. Capy. 3,060 Lbs.
Cluster of Springs
Heights Exclusive of Caps $6\frac{5}{8}$" Free, $4\frac{3}{4}$" Solid, $5\frac{5}{8}$" 22,000 Lbs. Capy. 42,000 Lbs.

Spring "B"

70,000 Lbs Cars. (Arch Bar Trucks)

Section A-B. Section C-D.

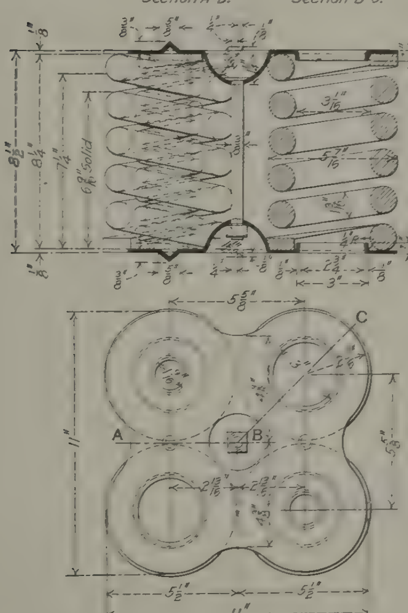


4 Bars $1\frac{3}{16}$" Diam. $73\frac{3}{4}$" Long, Tapered to $80\frac{3}{8}$"
Normal Wt. of each Bar 23 Lbs Minimum Wt. 22 Lbs 5 oz
Outside Diam. $5\frac{7}{16}$"
Heights $8\frac{1}{4}$" Free, $6\frac{9}{16}$" Solid, $7\frac{1}{4}$" 7,400 Lbs. Capy. 12,500 Lbs.
Cluster of Springs
Heights $8\frac{1}{4}$" Free, $6\frac{9}{16}$" Solid, $7\frac{1}{4}$" 29,000 Lbs. Capy. 50,000 Lbs.

Spring "C"

80,000 Lbs. Cars. (Arch Bar Trucks)

Section A-B. Section B-C.

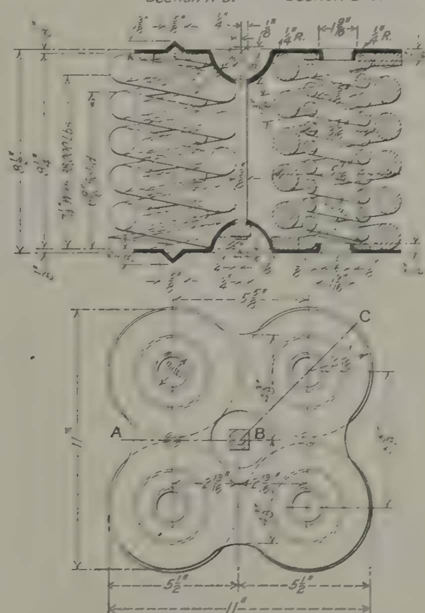


6 Bars:
4 Bars, $1\frac{3}{16}$" Diam. $73\frac{3}{4}$" Long, Tapered to $80\frac{3}{8}$"
2 Bars, $\frac{5}{8}$" Diam. $74\frac{1}{4}$" Long, Tapered to $77\frac{3}{4}$"
Normal Wt. of each 1st. four bars 23 Lbs. Minimum Wt. 22 Lbs. 5 oz
Normal Wt. of each 2nd. two bars 6 Lbs. 7 oz " " 6 Lbs. 4 oz.
Outside Diam. of 1st. four Coils $5\frac{7}{16}$", 2nd. two Coils $2\frac{7}{8}$"
Heights 1st. four Coils $8\frac{1}{4}$" Free; $6\frac{9}{16}$" Solid; $7\frac{1}{4}$" 7,400 Lbs. Capy. 12,500 Lbs
Heights 2nd. two Coils $8\frac{1}{4}$" Free, $6\frac{9}{16}$" Solid, $7\frac{1}{4}$" 2,100 Lbs. Capy. 3,500 Lbs.
Cluster of Springs
Heights without Caps: $8\frac{1}{4}$" Free, $6\frac{9}{16}$" Solid, $7\frac{1}{4}$" 33,800 Lbs. Capy. 57,000 Lbs.

Spring "D"

100,000 Lbs Cars. (Arch Bar Trucks)

Section A-B. Section B-C.



Eight Bars: 4 Bars $1\frac{3}{16}$" Diam. $73\frac{3}{4}$" Long, Tapered to $80\frac{3}{8}$"
4 Bars $\frac{5}{8}$" Diam. $74\frac{1}{4}$" Long, Tapered to $77\frac{3}{4}$"
Normal Wt. of each 1st. Four Bars 23 Lbs. Minimum Wt 22 Lbs 5 oz.
Normal Wt. of each 2nd Four Bars 6 Lbs. 7 oz. " Wt 6 Lbs. 4 oz
Outside Diam. of 1st. Four Coils $5\frac{7}{16}$", 2nd. Four $2\frac{7}{8}$"
Heights, 1st Four Coils $8\frac{1}{4}$" Free, $6\frac{9}{16}$" Solid, $7\frac{1}{4}$" 7,400 Lbs. Capy. 12,500 Lbs.
Heights, 2nd. Four Coils $8\frac{1}{4}$" Free, $6\frac{9}{16}$" Solid, $7\frac{1}{4}$" 2,100 Lbs. Capy. 3,500 Lbs.
Cluster of Springs
Heights Without Caps $8\frac{1}{4}$" Free, $6\frac{9}{16}$" Solid, $7\frac{1}{4}$" 38,000 Lbs Capy 64,000 Lbs

Fig. 3022—M. C. B. Standard Springs and Spring Caps for Freight Car Trucks. (M. C. B. Sheet 31.)

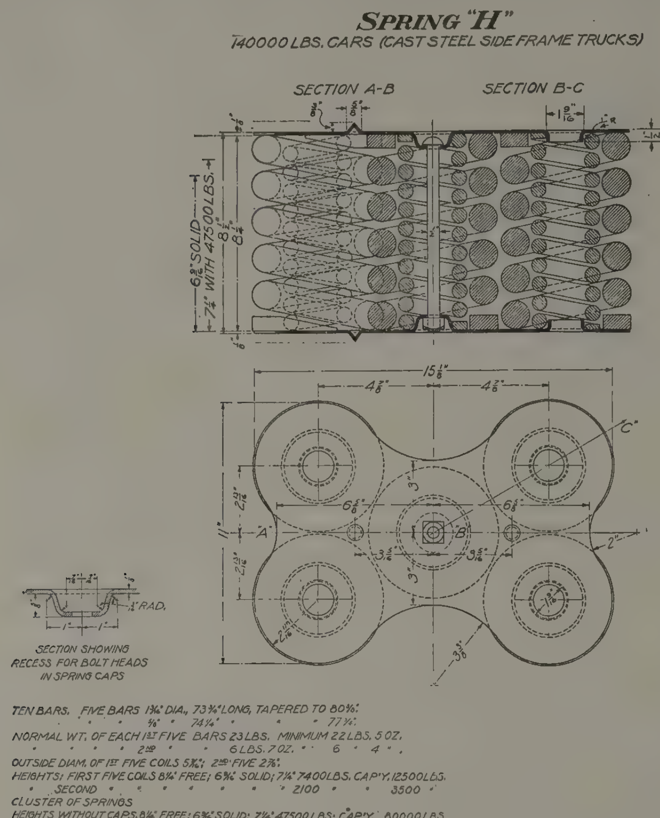


Fig. 3023—Spring for 140,000 lb. Cars with Cast Steel Side Frame Trucks. (M. C. B. Sheet 31A.)

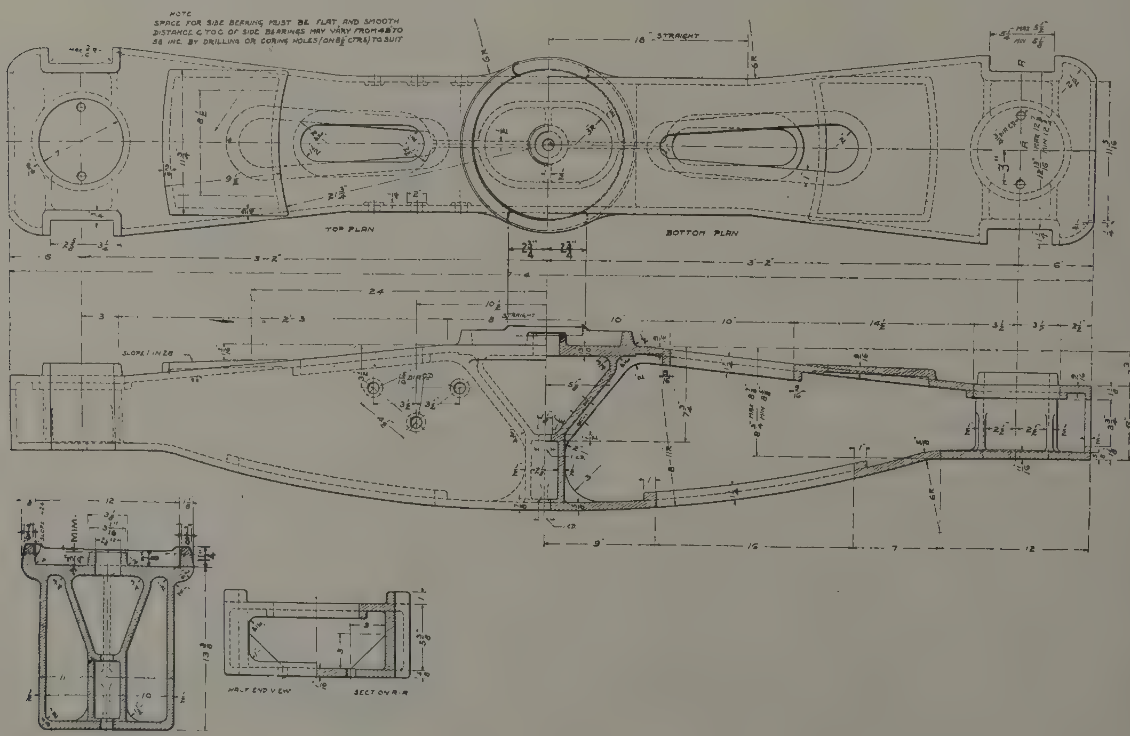


Fig. 3024—Recommended Practice for Cast Steel Truck Bolster for 80,000 lb. Capacity Car, With Center Plate Integral. (M. C. B. Sheet A.)

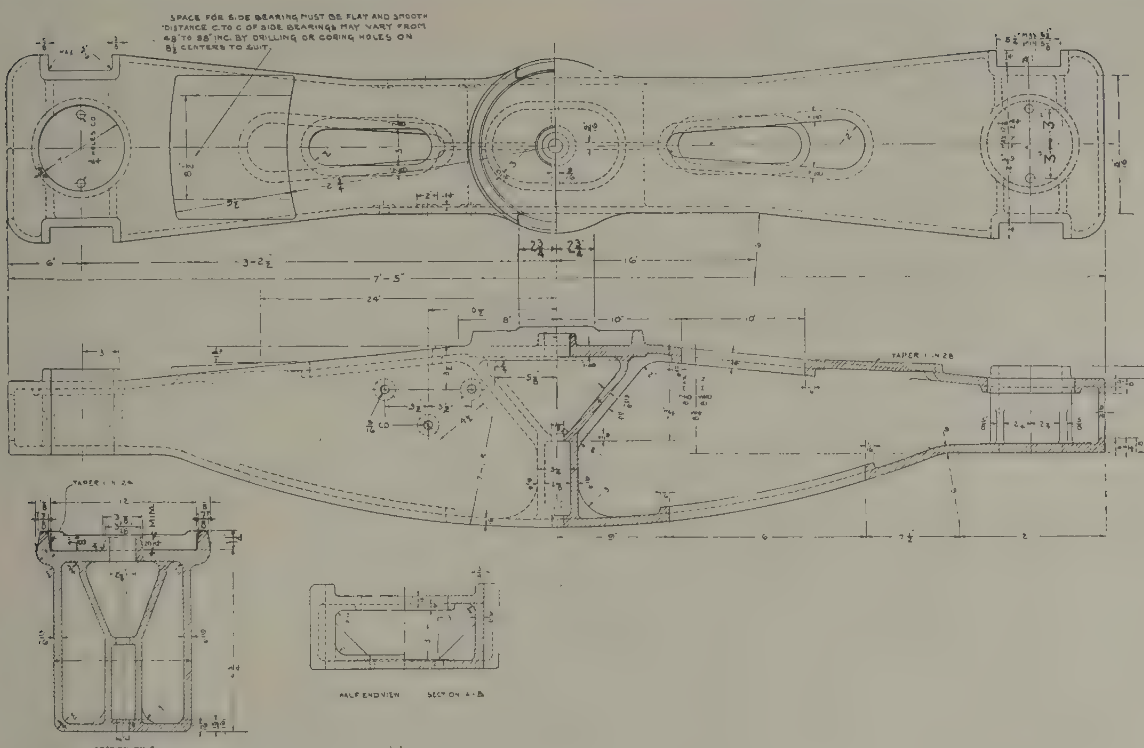


Fig. 3025—Recommended Practice for Cast Steel Truck Bolster for 100,000 lb. Capacity Car, With Center Plate Cast Integral. (M. C. B. Sheet A-1.)

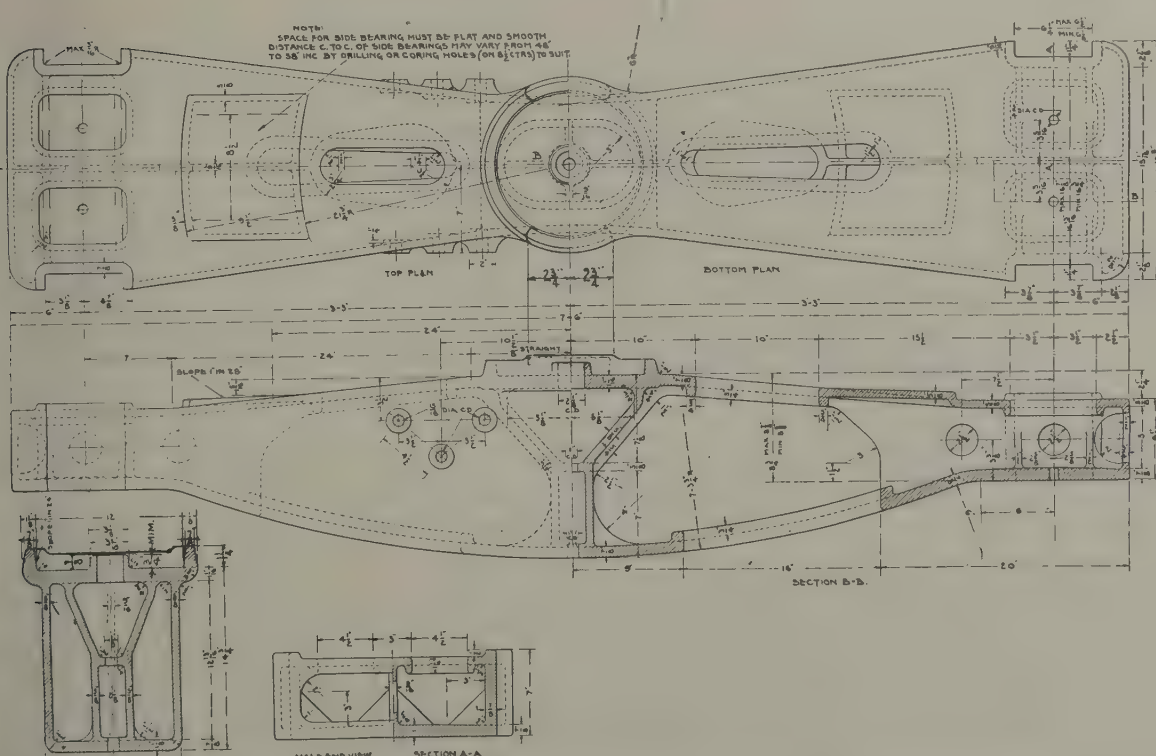


Fig. 3026—Recommended Practice for Cast Steel Truck Bolster for 140,000 lb. Capacity Car, With Center Plate Cast Integral. (M. C. B. Sheet A-2.)

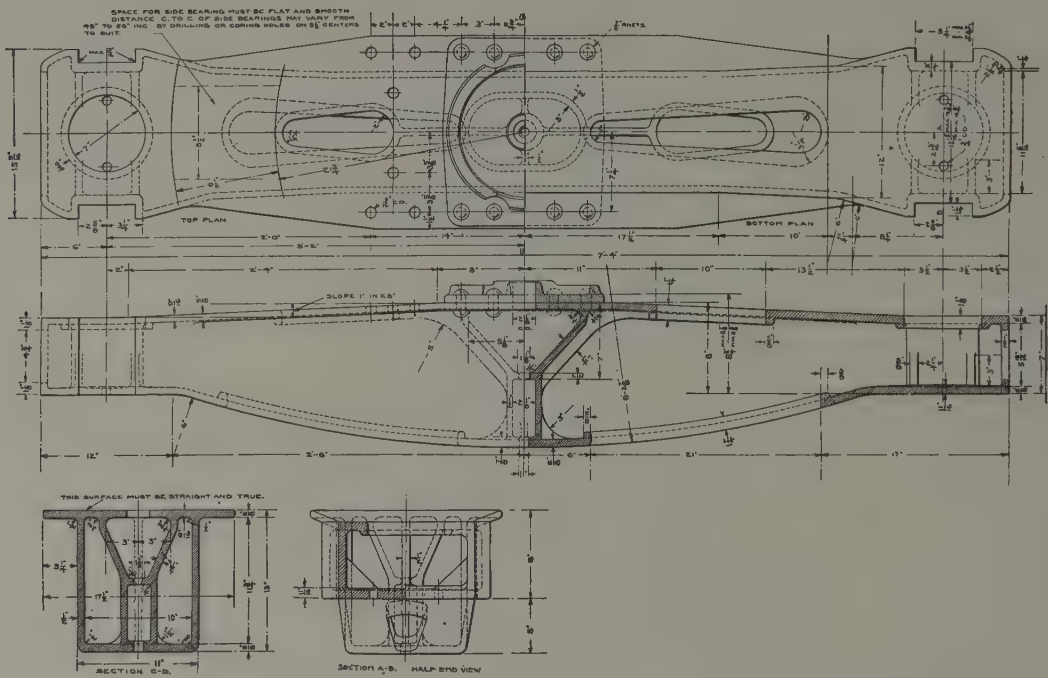


Fig. 3027—Recommended Practice for Cast Steel Truck Bolster for 80,000 lb. Capacity Car, With Separate Center Plate. (M. C. B. Sheet A-3.)

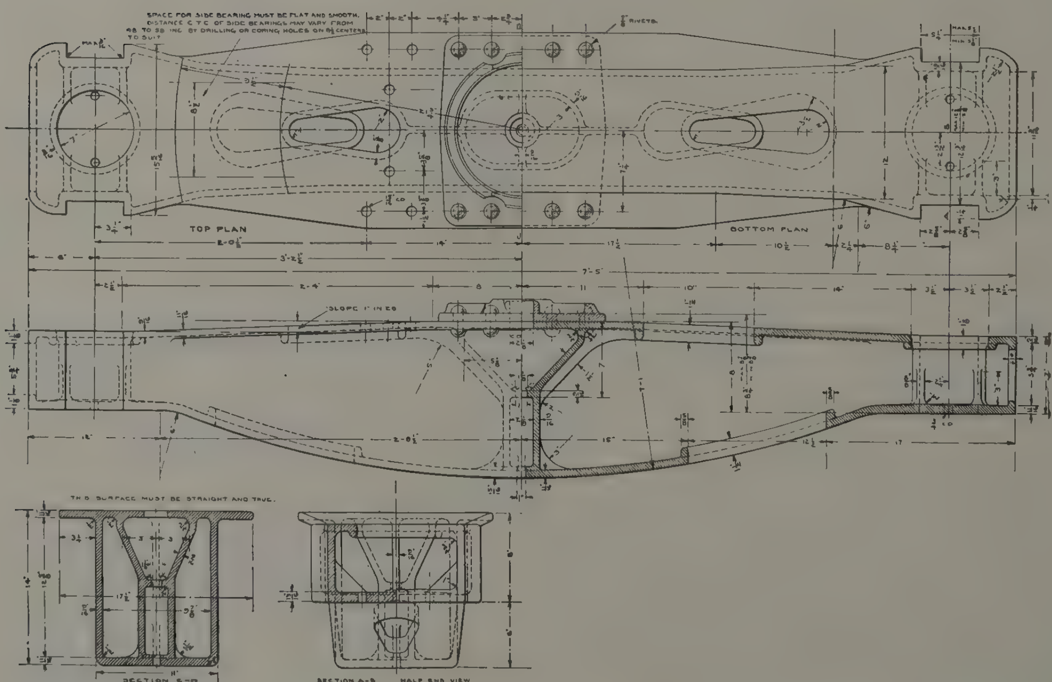


Fig. 3028—Recommended Practice for Cast Steel Truck Bolster for 100,000 lb. Capacity Car, With Separate Center Plate. (M. C. B. Sheet A-4.)

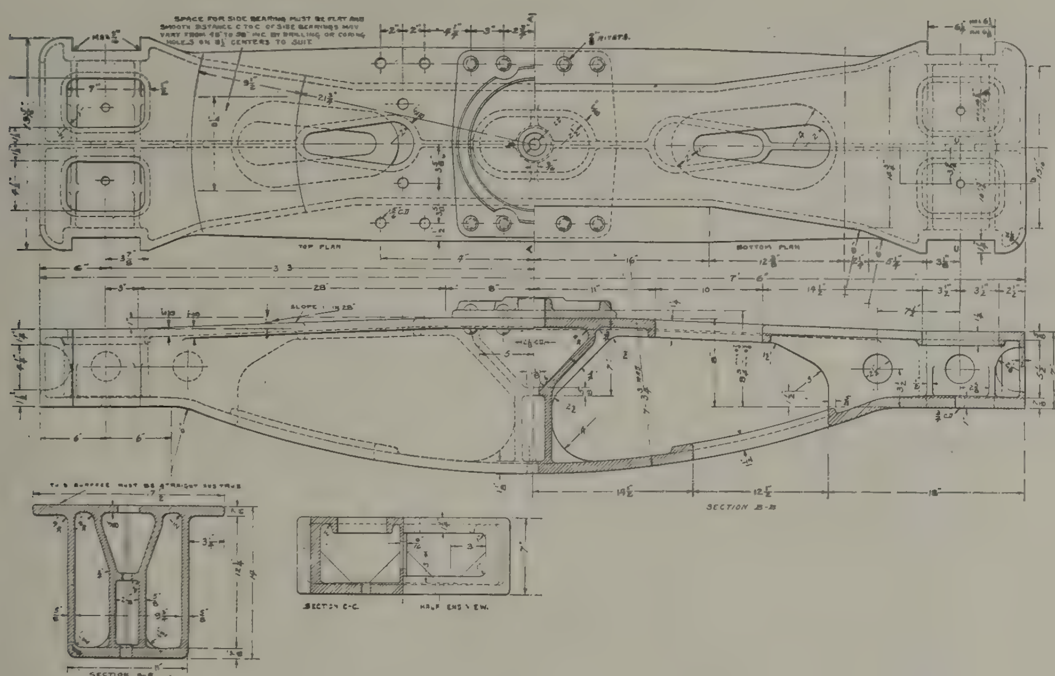


Fig. 3029—Recommended Practice for Cast Steel Truck Bolster for 140,000 lb. Capacity Car, With Separate Center Plate. (M. C. B. Sheet A-5.)

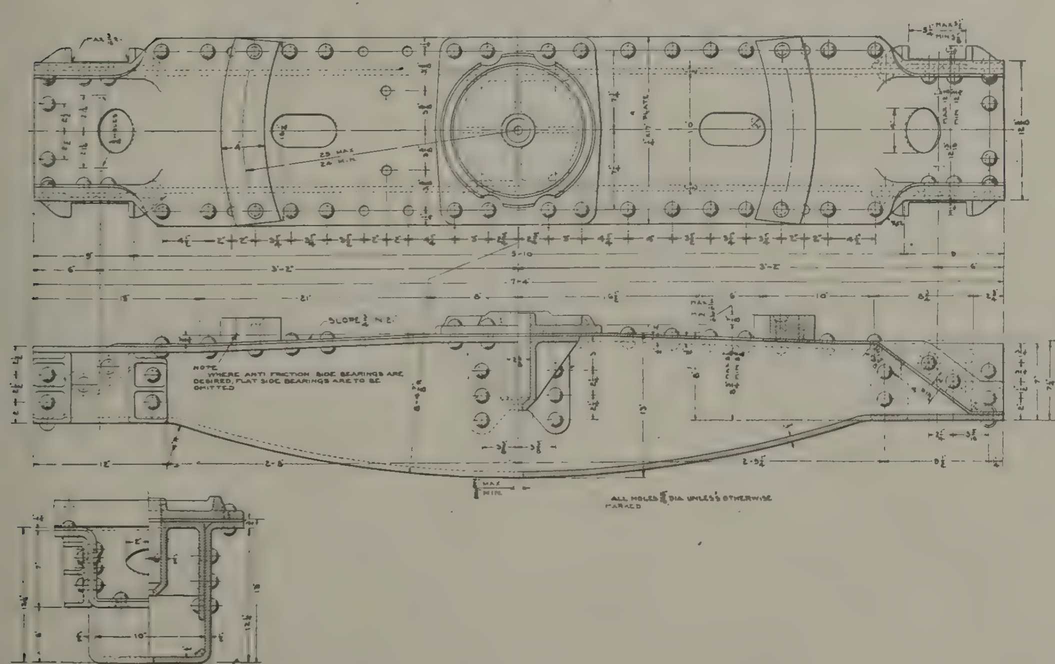


Fig. 3030—Recommended Practice for Pressed Steel Truck Bolster for 80,000 lb. Capacity Car (M. C. B. Sheet A-6.)

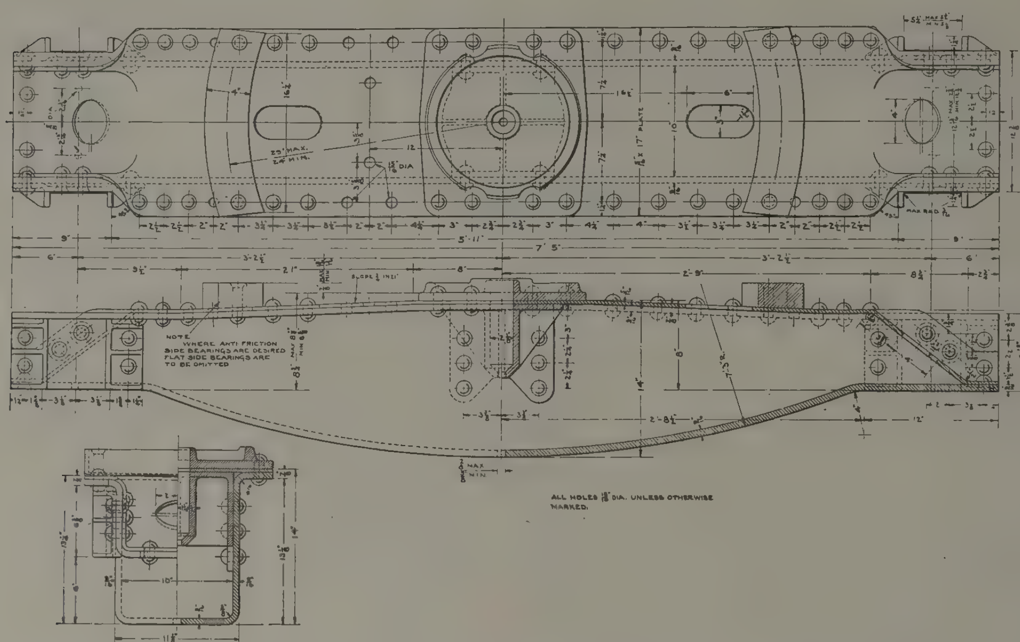


Fig. 3031—Recommended Practice for Pressed Steel Truck Bolster for 100,000 lb. Capacity Car. (M. C. B. Sheet A-7.)

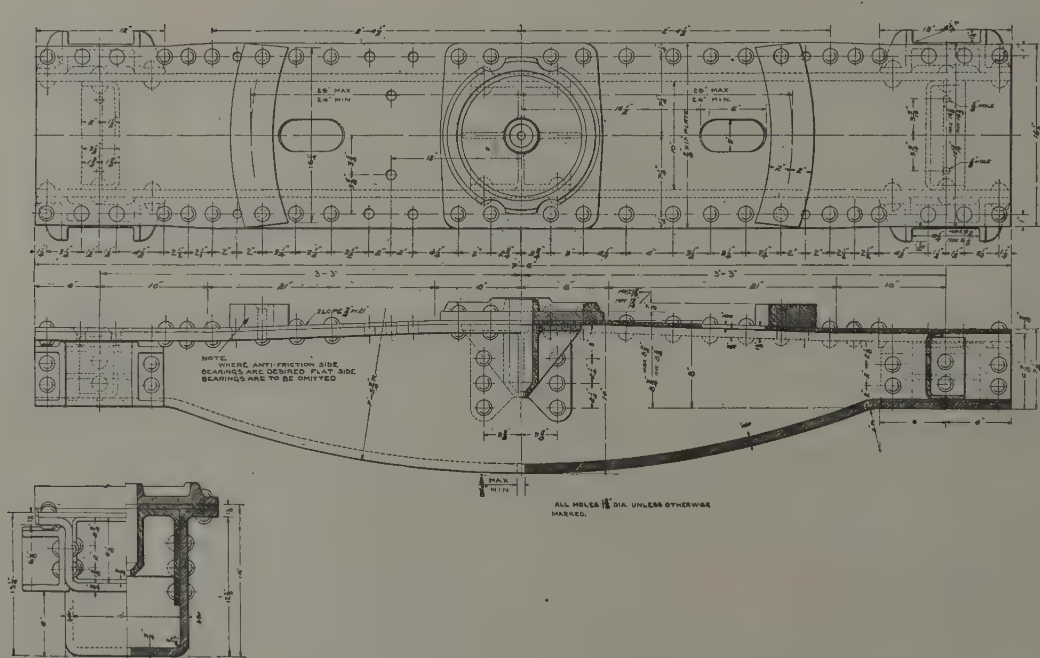
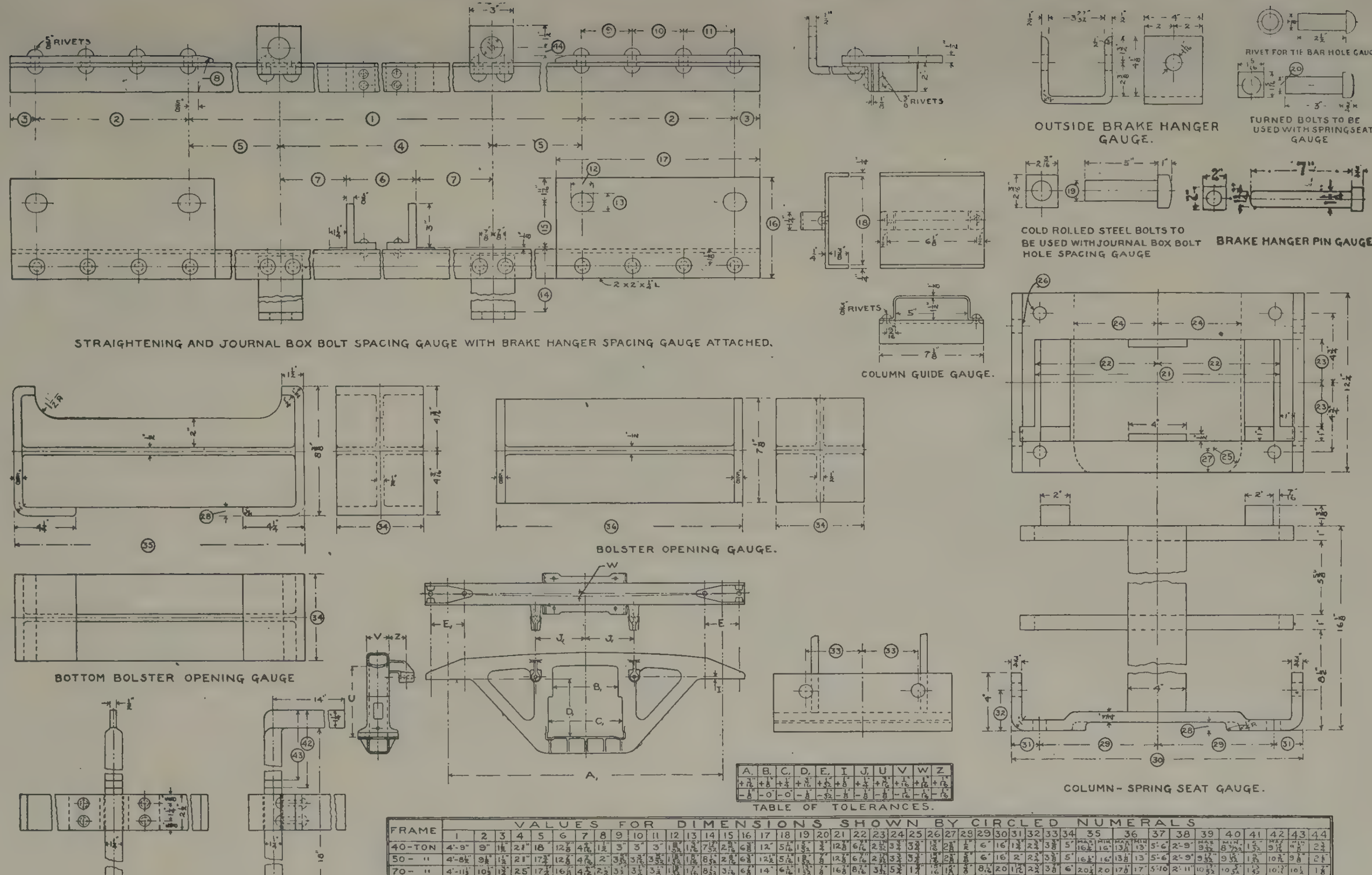


Fig. 3032—Recommended Practice for Pressed Steel Truck Bolster for 140,000 lb. Capacity Car. (M. C. B. Sheet A-8.)



A,	B,	C,	D,	E,	I	J,	U	V	W	Z
+7/16"	+1/8"	+1/4"	+3/16"	+1/32"	+1/8"	+1/4"	+5/16"	+1/16"	+1/16"	+1/16"
-1/8"	-0"	-0"	-1/8"	-1/32"	-1/8"	-1/8"	-1/8"	-1/16"	-1/16"	-1/16"

TABLE OF TOLERANCES.

VALUES FOR DIMENSIONS SHOWN BY CIRCLED NUMERALS

FRAME	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
40-TON	4'-9"	9"	1 1/2"	21"	18"	12 7/8"	4 5/16"	1 1/2"	3"	3"	3"	1 13/32"	1 3/16"	7 17/32"	2 5/16"	6 3/8"	12"	5 1/16"	1 5/32"	3/4"	12 7/8"	6 7/16"
50- "	4'-8 1/2"	9 1/2"	1 1/2"	21"	17 3/4"	12 7/8"	4 7/16"	2"	3 5/32"	3 3/16"	3 5/32"	1 13/32"	1 5/16"	8 1/32"	2 9/16"	6 3/8"	12 1/2"	5 1/16"	1 9/32"	7/8"	12 7/8"	6 7/16"
70- "	4'-11 1/2"	10 1/2"	1 3/4"	25"	17 3/4"	16 7/8"	4 5/16"	2 1/2"	3 1/2"	3 1/2"	3 1/2"	1 19/32"	1 7/16"	8 1/32"	3 1/16"	6 7/8"	14"	6 1/16"	1 13/32"	7/8"	16 7/8"	8 7/16"

FRAME	23	24	25	26	27	28	29	30	31	32	33	34	35 MAX	35 MIN	36 MAX	36 MIN	37	38	39 MAX	40 MIN	41	42 MAX	43 MIN	44
40-TON	2 11/32"	3 3/4"	3 3/4"	13/16"	2 3/8"	1/2"	6"	16"	1 3/4"	2 3/4"	3 3/8"	5"	16 1/4"	16"	13 1/8"	13"	5'-6"	2'-9"	9 5/32"	8 31/32"	1 5/32"	9 1/2"	9 1/8"	2 3/4"
50- "	2 11/32"	3 3/4"	3 3/4"	13/16"	2 3/8"	5/8"	6"	16"	2"	2 3/4"	3 3/8"	5"	16 1/4"	16"	13 1/8"	13"	5'-6"	2'-9"	9 17/32"	9 15/32"	1 9/32"	10 3/16"	9 7/8"	2 1/8"
70- "	3 5/32"	5 3/4"	1 3/4"	15/16"	1 5/8"	5/8"	8 1/2"	20"	1 1/2"	2 3/4"	3 7/8"	6"	20 1/4"	20	17 1/8"	17"	5'-10"	2'-11"	10 17/32"	10 5/32"	1 13/32"	10 1/2"	10 1/2"	1 7/8"

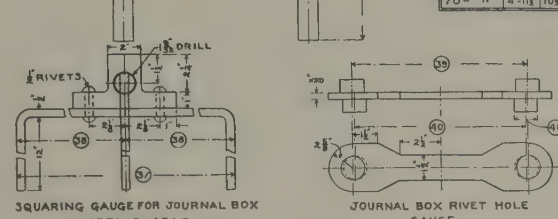
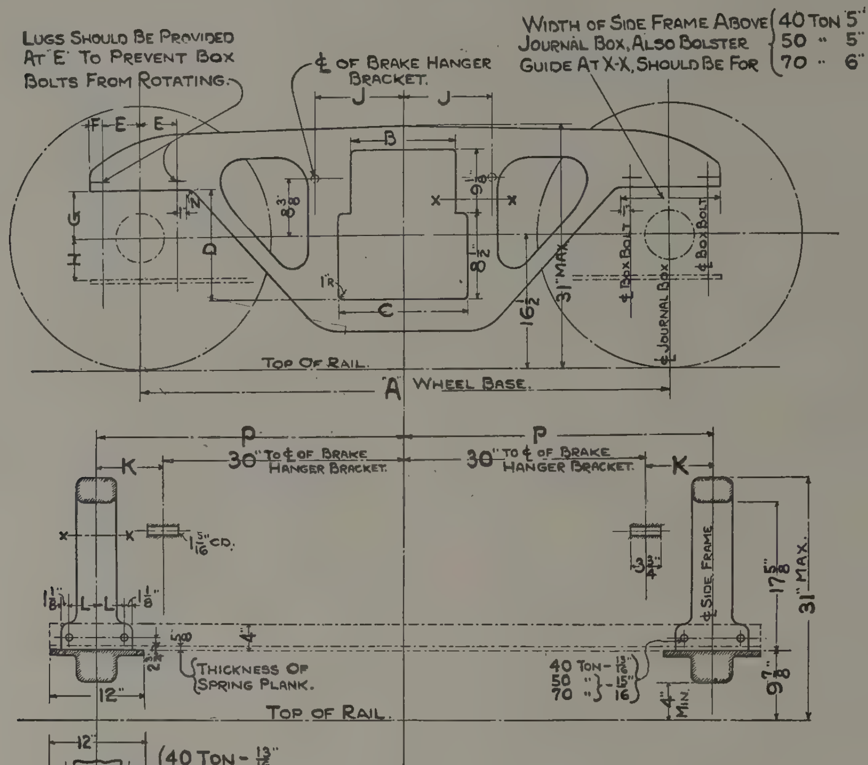
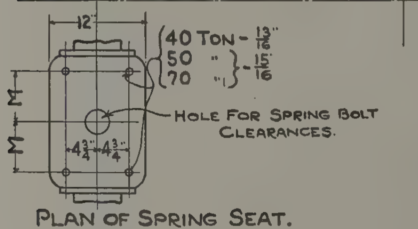


Fig. 3033—Recommended Practice for Gages for Cast Steel Truck Sides for 80,000, 100,000 and 140,000 lb. Capacity Freight Cars. (M. C. B. Sheet B-1.)





SIDE FRAME

Capacity	A	B	C	D	E	F	G	H	J	K	L	M	N	Box Bolts
40 Ton	5'-6"	13"	16"	12¼"	4½"	1½"	5⅝"	5⅞"	10½"	8"	3⅜"	6"	1½"	1⅛"
50 "	5'-6"	13"	16"	12½"	4¾"	1½"	5⅞"	6⅛"	10½"	8½"	3⅜"	6"	2"	1¼"
70 "	5'-10"	17"	20"	13⅛"	5¼"	1¾"	6½"	6½"	12½"	9"	3⅞"	8 1/16"	2½"	1⅜"

Dimensions "E", "G", & "H" Conform To M.C.B. Standard For Journal Boxes.
"F" Is A Minimum Dimension.

Fig. 3034—Recommended Practice for Truck Sides, Cast Steel, Limiting Dimensions for 80,000, 100,000 and 140,000 lb. Capacity Cars. (M. C. B. Sheet B.)

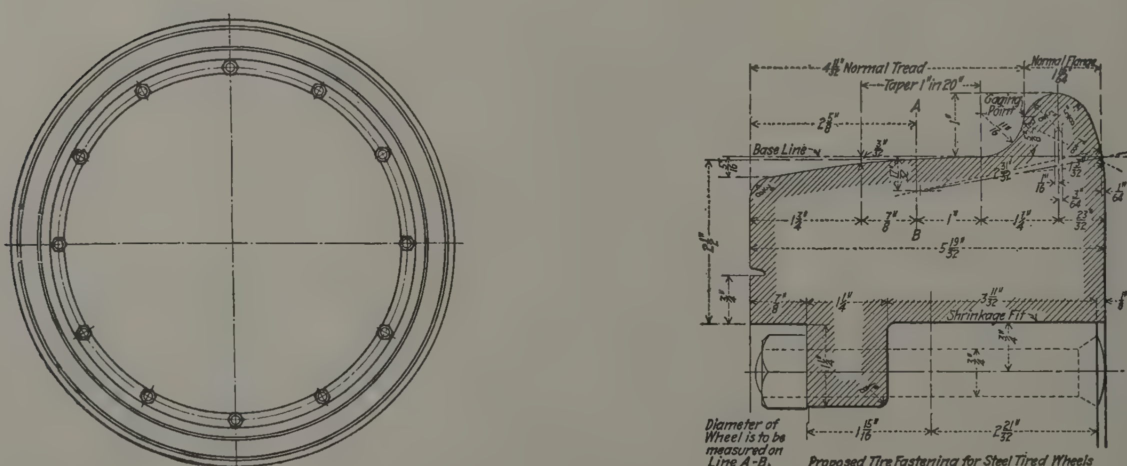


Fig. 3035—M. C. B. Recommended Practice for Tire Fastening for Steel Tired Wheels. (M. C. B. Sheet C.)

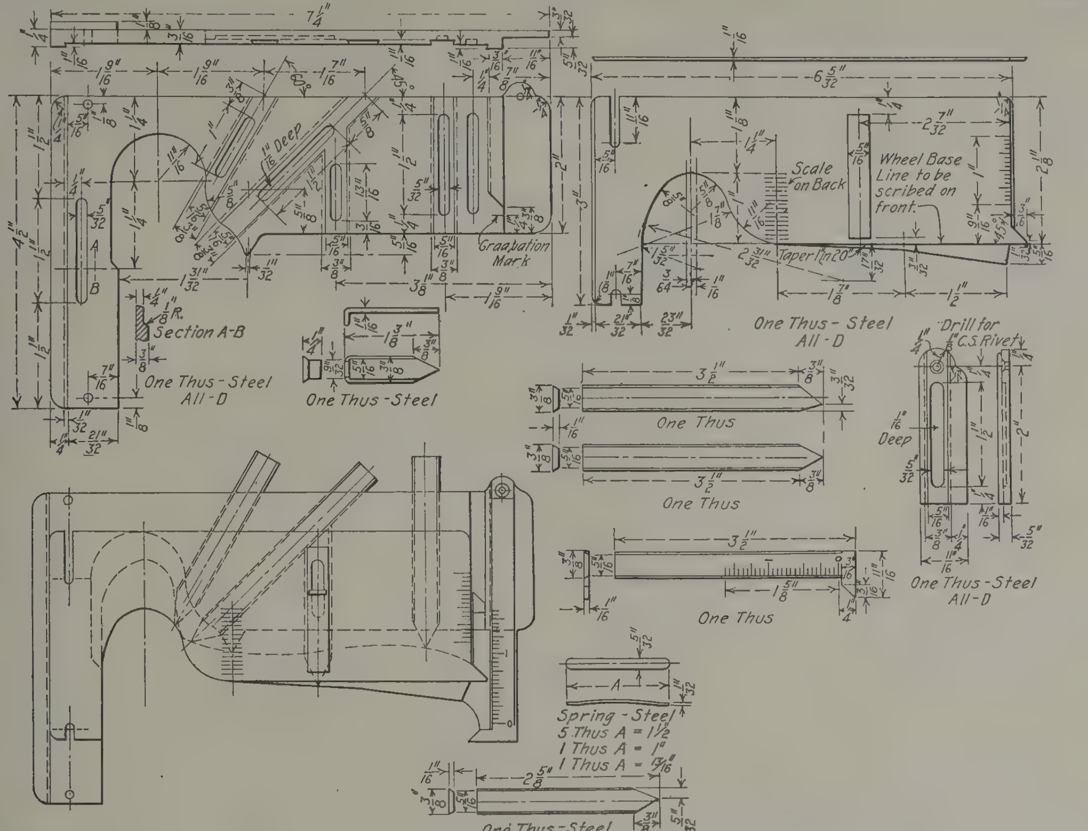


Fig. 3036—M. C. B. Recommended Practice for Gage for Measuring Steel Wheels to Restore Contour. (M. C. B. Sheet C1.)

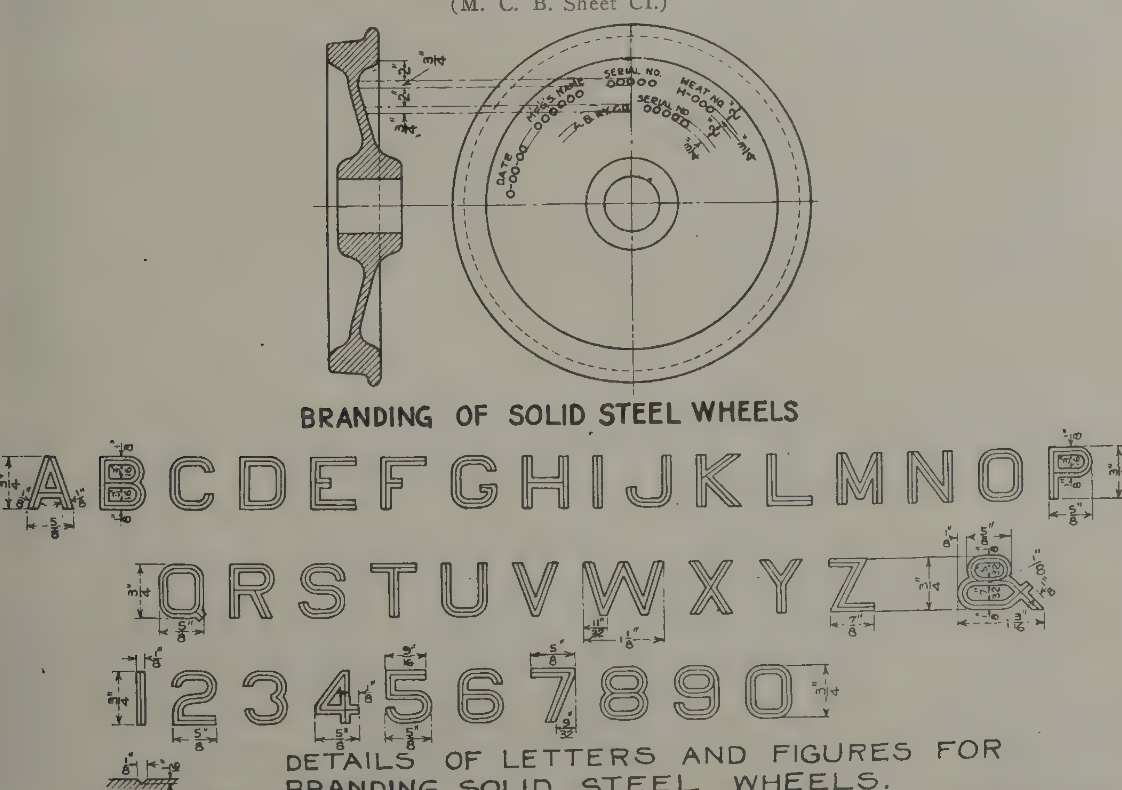
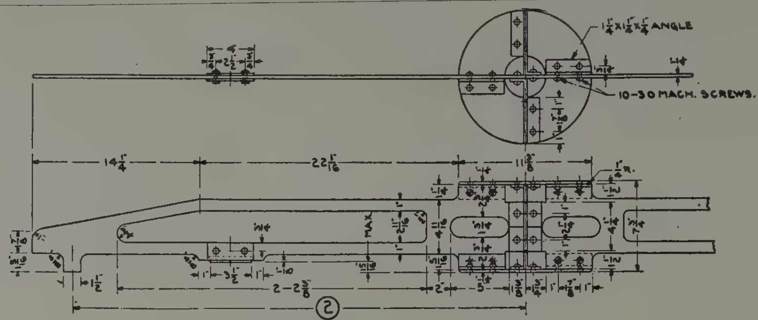
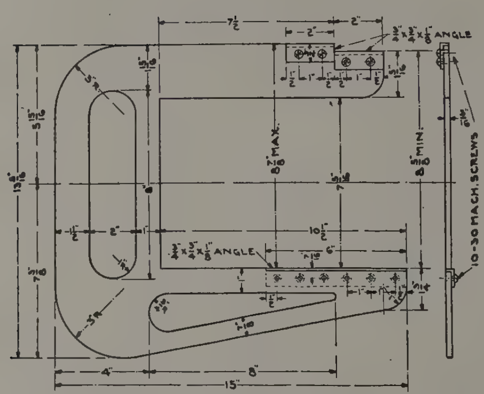


Fig. 3037—M. C. B. Recommended Practice for Branding Solid Steel Wheels and Details of Letters and Figures. (M. C. B. Sheet C-2.)

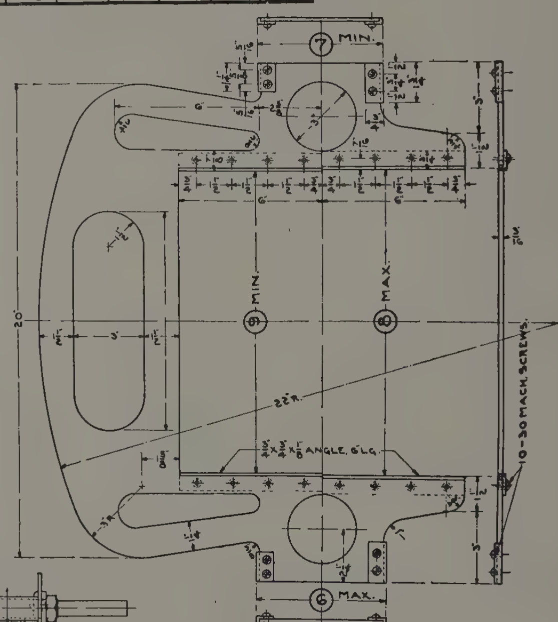


CENTER PLATE AND STRAIGHT EDGE GAUGE.

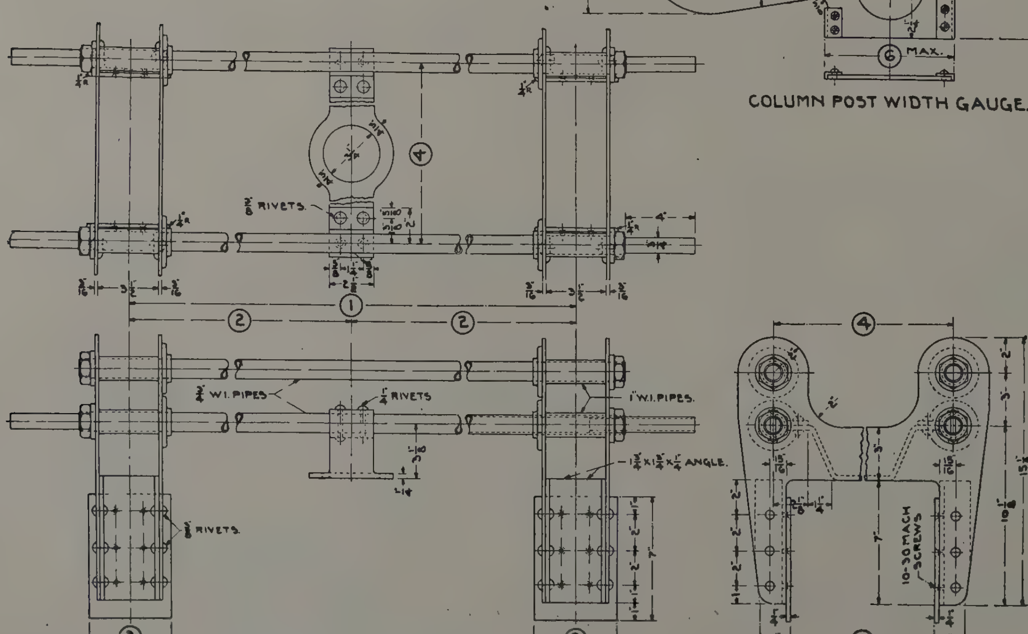
BOLSTER.	VALUES FOR DIMENSIONS SHOWN BY CIRCLED NUMERALS.								
	1	2	3	4	5	6	7	8	9
80000 LBS.	6'-4"	3'-2"	5 1/8"	14 7/8"	12 7/8"	MAX. 5 1/2"	MIN. 5 1/8"	MAX. 12 7/8"	MIN. 12 3/4"
100000 "	6'-5"	3'-2 1/2"	5 1/8"	14 7/8"	12 7/8"	5 1/2"	5 1/8"	12 7/8"	12 3/4"
140000 "	6'-6"	3'-3"	6 1/8"	18 7/8"	16 7/8"	6 1/2"	6 1/8"	16 7/8"	16 3/4"



SPRING SEAT TO SIDE BEARING GAUGE.



COLUMN POST WIDTH GAUGE.



COLUMN POST LENGTH GAUGE.

Fig. 3038—Recommended Practice for Gages for Truck Bolsters for 80,000, 100,000 and 140,000 lb. Capacity Freight Cars. (M. C. B. Sheet D.)

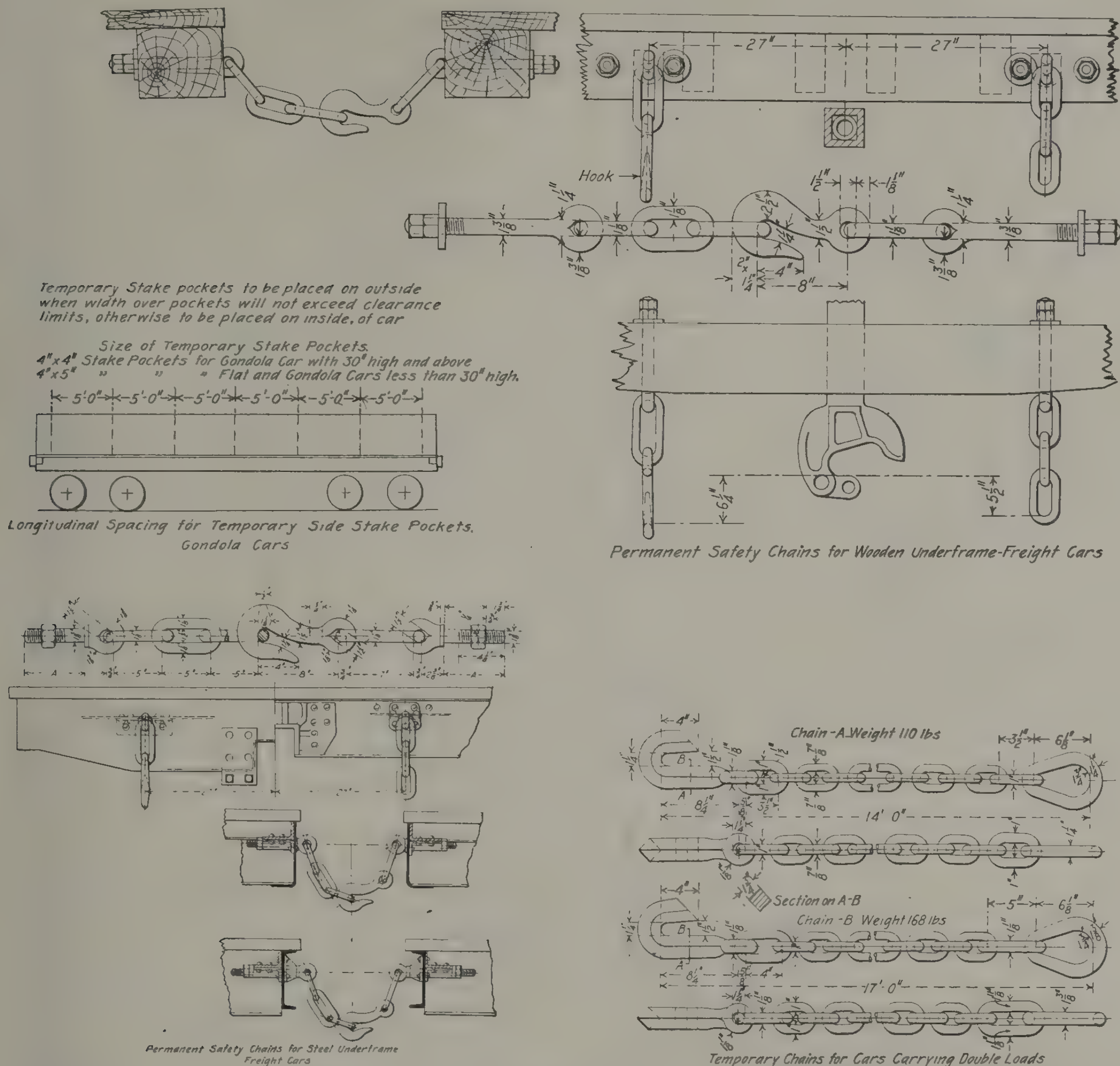


Fig. 3039--M. C. B. Recommended Practice for Safety Chains and Stake Pockets. (M. C. B. Sheet E.)

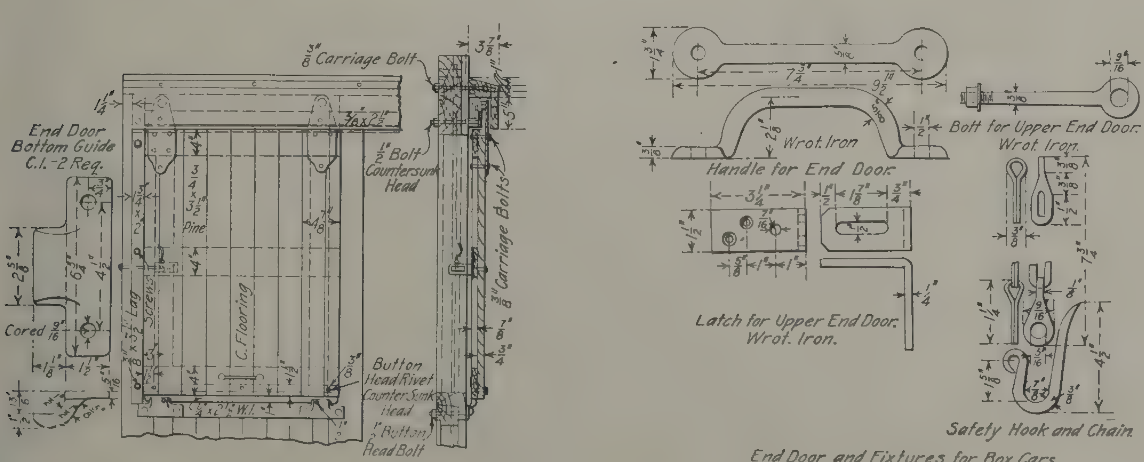


Fig. 3040--M. C. B. Recommended Practice for Box Car End Door and Fixtures. (M. C. B. Sheet F.)

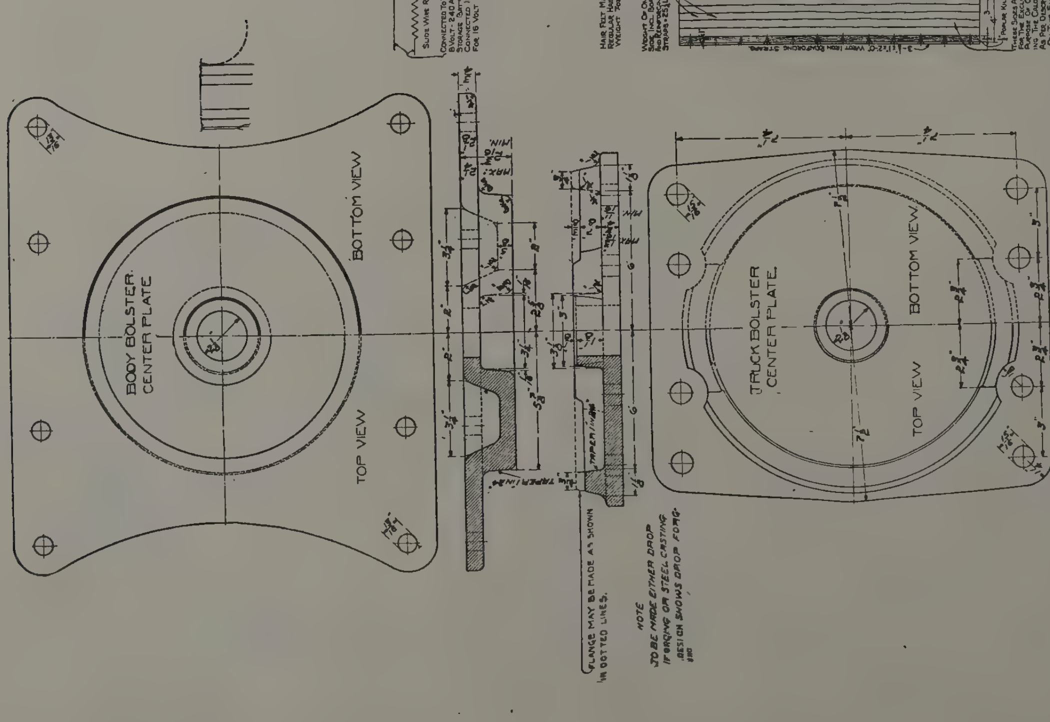


Fig. 3041—Recommended Practice for Center Plates for 80,000, 100,000 and 140,000 lb. Capacity Freight Cars. (M. C. B. Sheet F.)

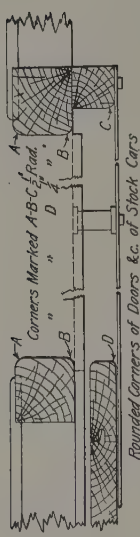


Fig. 3042—M. C. B. Recommended Practice for Rounded Corners of Doors, etc., of Stock Cars. (M. C. B. Sheet F.)

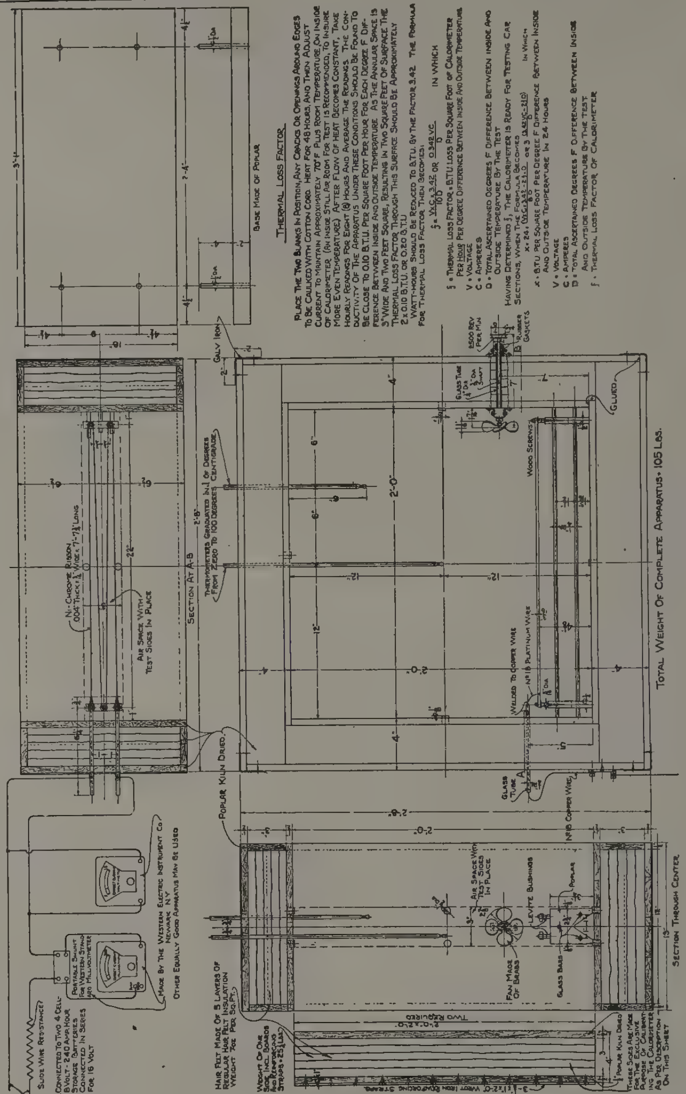
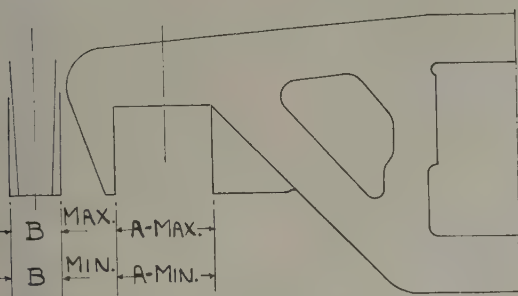


Fig. 3043—Recommended Practice for Insulation, Method and Apparatus for Testing. (M. C. B. Sheet G.)



CAPACITY	TRUCK FRAME				JOURNAL BOX			
	A		B		A		B	
	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
40 TON	$9\frac{3}{16}$"	$9\frac{1}{16}$"	$3\frac{5}{8}$"	$3\frac{9}{16}$"	9"	$8\frac{15}{16}$"	$3\frac{3}{4}$"	$3\frac{11}{16}$"
50 TON	$9\frac{3}{16}$"	$9\frac{1}{16}$"	$3\frac{5}{8}$"	$3\frac{9}{16}$"	9"	$8\frac{15}{16}$"	$3\frac{3}{4}$"	$3\frac{11}{16}$"
70 TON	$10\frac{11}{16}$"	$10\frac{9}{16}$"	$5\frac{15}{16}$"	$5\frac{7}{8}$"	$10\frac{1}{2}$"	$10\frac{7}{16}$"	$6\frac{1}{16}$"	6"

Fig. 3044—Recommended Practice for Limiting Dimensions for Pedestal Jaws and Box for Cast Steel Truck Sides. (M. C. B. Sheet H.)

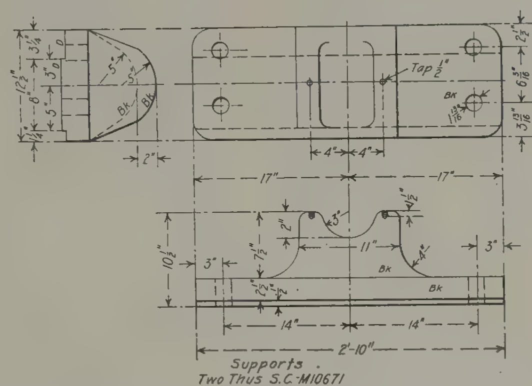


Fig. 3045—Detail for M. C. B. Recommended Practice for Axle Test. (M. C. B. Sheet I.)
(*See Also Fig.* 3046.)

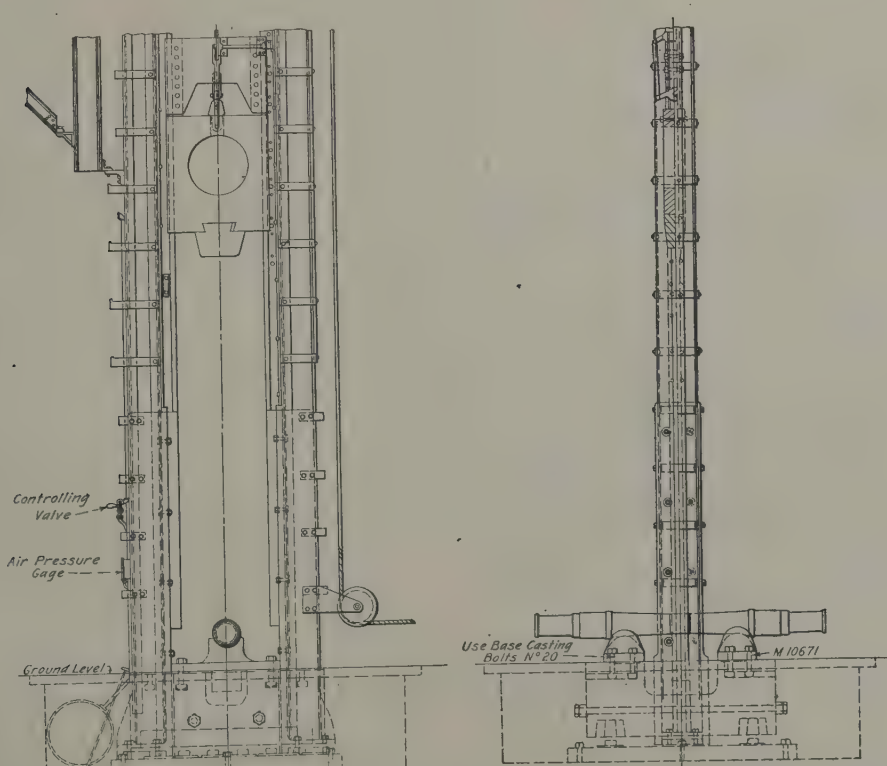


Fig. 3046—M. C. B. Recommended Practice for Axle Test. (M. C. B. Sheet I.)
(*See Also Fig.* 3045.)

Table I
Schedule A
For Cars Weighing 80,000 to 100,000 Lbs.

14" Brake Cylinder
Cylinder Lever BL1-A

For Car Weighing	% Brkg. Power for Cyl. Pres. of 60 Lbs. per Sq. In.	Lever No.	A	B
		1	20"	16"
79,250 to 81,450	89.9 to 87.5	2	20¼"	15¾"
81,500 to 83,800	89.9 to 87.5	3	20½"	15½"
83,850 to 86,200	89.9 to 87.5	4	20¾"	15¼"
86,250 to 88,700	90.0 to 87.5	5	21"	15"
88,750 to 91,300	90.0 to 87.5	6	21¼"	14¾"
91,350 to 94,000	90.0 to 87.5	7	21½"	14½"
94,050 to 96,700	90.0 to 87.5	8	21¾"	14¼"
96,750 to 99,650	90.0 to 87.5	9	22"	14"
99,700 to 102,600	90.0 to 87.5	10	22¼"	13¾"
		11	22½"	13½"

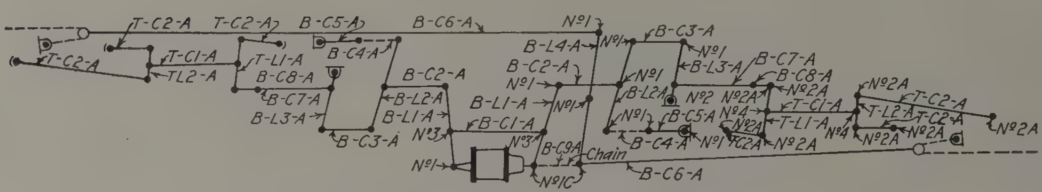
Brake Beams should be suitable for Maximum Load at middle of Beam of 22,000 Lb's.

Table II
Schedule A
For Cars Weighing 100,000 to 137,000 Lbs.

16" Brake Cylinder
Cylinder Lever BL1-A

For Car Weighing	% Brkg. Power for Cyl. Pres. of 60 Lbs. per Sq. In.	Lever No.	A	B
100,500 to 103,300	90.0 to 87.5	1	20"	16"
103,350 to 106,300	90.0 to 87.5	2	20¼"	15¾"
106,350 to 109,300	90.0 to 87.5	3	20½"	15½"
109,350 to 112,500	90.0 to 87.5	4	20¾"	15¼"
112,550 to 115,750	90.0 to 87.5	5	21"	15"
115,800 to 119,100	90.0 to 87.5	6	21¼"	14¾"
119,150 to 122,700	90.1 to 87.5	7	21½"	14½"
122,750 to 126,200	90.0 to 87.5	8	21¾"	14¼"
126,250 to 129,850	90.0 to 87.5	9	22"	14"
129,900 to 133,900	90.2 to 87.4	10	22¼"	13¾"
133,950 to 137,900	90.0 to 87.4	11	22½"	13½"

Brake Beams should be suitable for Maximum Load at middle of Beam of 28,000 Lb's.



The use of the floating lever fulcrum connection and chain may be discontinued and cylinder and floating lever connection (B-C2A) and intermediate and truck-lever connection (B-C7-A) made in one piece, thereby eliminating five parts: B-C5-A, B-C4-A, B-L2-A, B-C3-A, and B-L3-A.

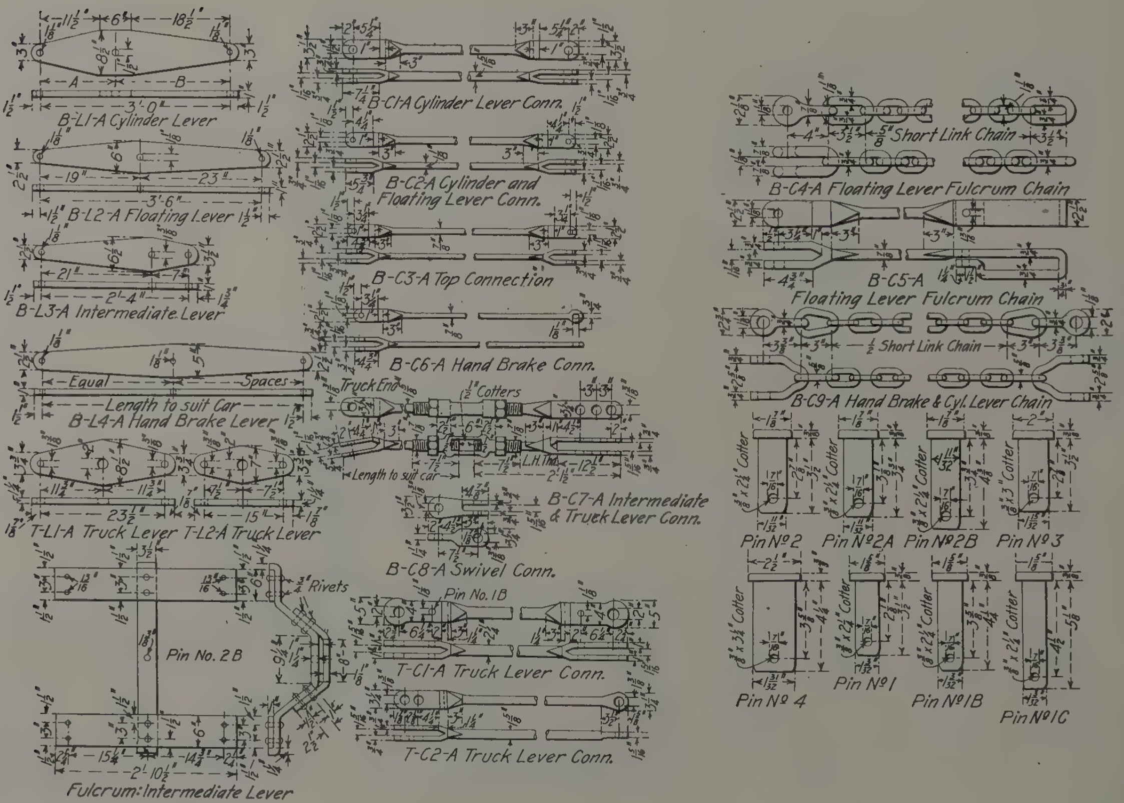


Fig. 3047—M. C. B. Recommended Practice for High Speed Foundation Brake Gear for Passenger Service; Schedule for Six-Wheel Trucks. (M. C. B. Sheet J.)

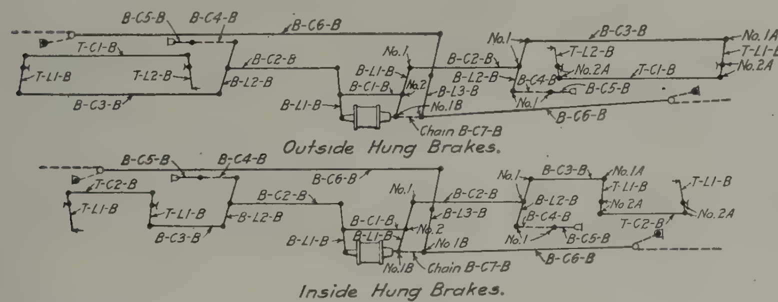
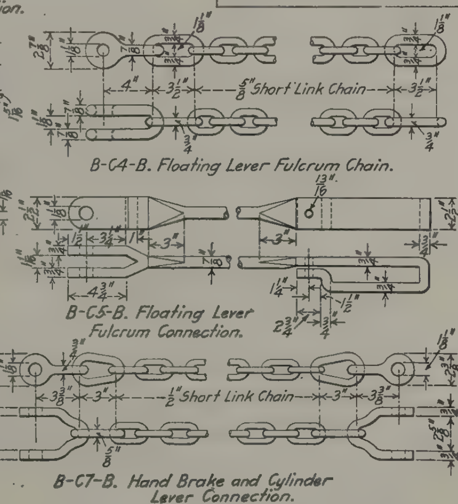


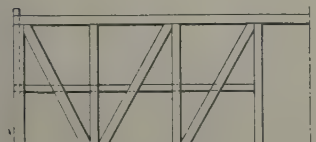
Table I.
Schedule B-1.
For Cars Weighing 50,000 to 70,000 Lbs.

12" Brake Cylinder Cylinder Lever B-L1-B.				
For Cars Weighing	% Brk'g. Power for Cyl. Press. of 60 Lbs. Per Sq. In.	Lever No	A	B
49,000 to 50,500	90.0 to 87.3	1	13"	20"
50,600 " 52,100	90.0 " 87.4	2	13¼"	19¾"
52,200 " 53,700	90.0 " 87.5	3	13½"	19½"
53,800 " 55,300	90.1 " 87.6	4	13¾"	19¼"
55,400 " 57,200	90.2 " 87.4	5	14"	19"
57,300 " 59,000	90.0 " 87.4	6	14¼"	18¾"
59,100 " 60,800	89.8 " 87.3	7	14½"	18½"
60,900 " 62,700	90.0 " 87.3	8	14¾"	18¼"
62,800 " 64,600	90.0 " 87.5	9	15"	18"
64,700 " 66,700	90.0 " 87.4	10	15¼"	17¾"
66,800 " 68,700	90.0 " 87.5	11	15½"	17½"
68,800 " 70,800	90.0 " 87.5	12	15¾"	17¼"
Brake Beams should be suitable for maximum load at middle of beam of 22,000 pounds.				

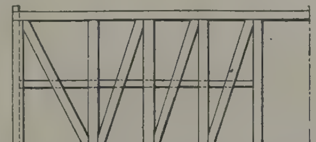
Table II.
Schedule B.
For Cars Weighing 70,000 to 90,000 Lbs.

14" Brake Cylinder Cylinder Lever B-L1-B.				
For Cars Weighing	% Brk'g. Power for Cyl. Press. of 60 Lbs Per Sq. In.	Lever No.	A	B
		1	13"	20"
68,800 to 70,900	90.0 to 87.4	2	13¼"	19¾"
71,000 " 73,200	90.0 " 87.4	3	13½"	19½"
73,300 " 75,500	90.0 " 87.5	4	13¾"	19¼"
75,600 " 77,900	90.0 " 87.4	5	14"	19"
78,000 " 80,300	90.0 " 87.4	6	14¼"	18¾"
80,400 " 82,800	90.0 " 87.4	7	14½"	18½"
82,900 " 85,400	90.0 " 87.4	8	14¾"	18¼"
85,500 " 88,000	90.0 " 87.5	9	15"	18"
88,100 " 90,800	90.0 " 87.4	10	15¼"	17¾"
Brake Beams should be suitable for maximum load at middle of beam of 28,000 pounds.				

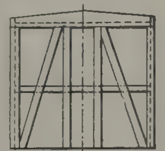




Elevation Half Side Framing for 60,000-Lb. Capacity Cars.



Elevation Half Side Framing for 80,000, and 100,000-Lb. Capacity Cars.



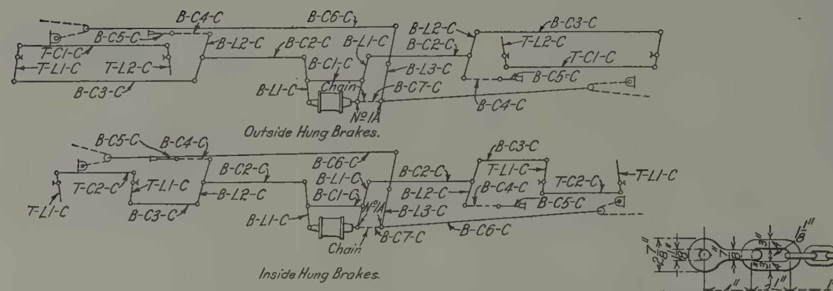
Elevation End Framing for 60,000, 80,000 and 100,000 Lb. Capacity Cars.

Framing of Box Cars.

Fig. 3048—M. C. B. Recommended Practice for High Speed Foundation Brake Gear for Passenger Service, Schedule for Four Wheel Trucks; and Framing for Box Cars. (M. C. B. Sheet K.) See also Fig. 3049.

Schedule C.
For Cars Weighing 39,000 to 50,000 Lbs.

10" Brake Cylinder. Cylinder Lever B-L1-C.				
For Cars Weighing	% Brk'g Power for Cyl Pres of 60 Lbs. per Sq. In.	Lever No.	A	B
38600 to 39700	89.9 to 87.2	1	14"	19"
39800 to 40900	90.0 to 87.6	2	14¼"	18¾"
41000 to 42200	90.1 to 87.5	3	14½"	18½"
42300 to 43500	90.0 to 87.5	4	14¾"	18¼"
43600 to 44900	90.1 to 87.4	5	15"	18"
45000 to 46300	89.9 to 87.4	6	15¼"	17¾"
46400 to 47700	89.9 to 87.5	7	15½"	17½"
47800 to 50000	90.0 to 86.0	8	15¾"	17¼"
Brake Beams Should Be Suitable for Maximum Load at Middle of Beam of 15,200 Pounds.				



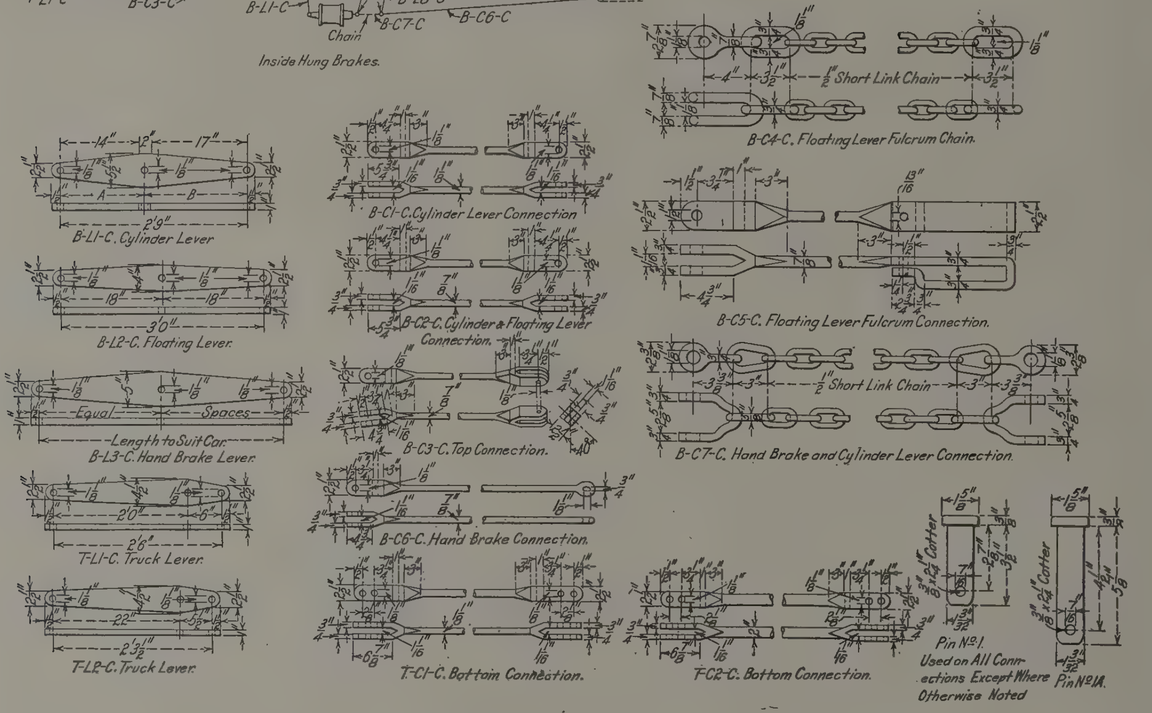


Fig. 3049—M. C. B. Recommended Practice for High Speed Foundation Brake Gear for Passenger Service, Schedule for Four-Wheel Truck. (M. C. B. Sheet L.)

(See Also Fig. 3048.)

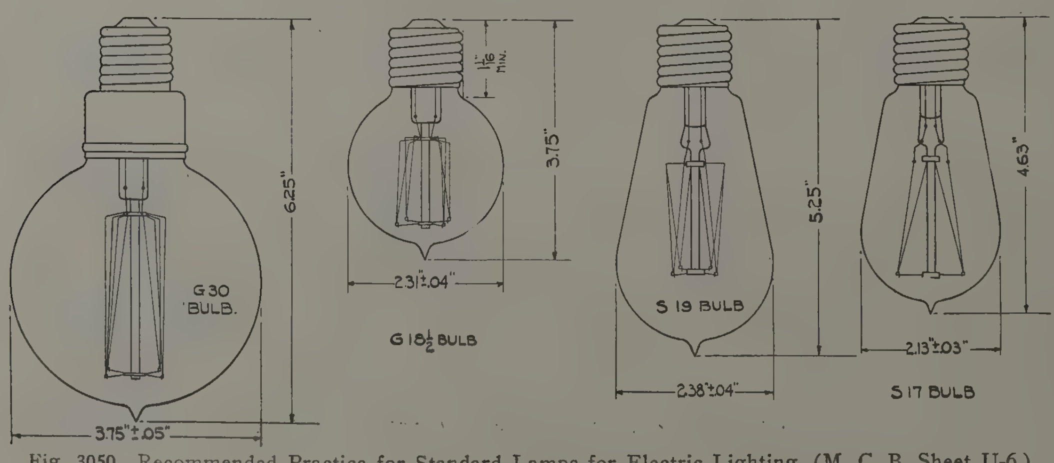


Fig. 3050—Recommended Practice for Standard Lamps for Electric Lighting. (M. C. B. Sheet U-6.)

(See U-U7 on Pages 1095-1098.)

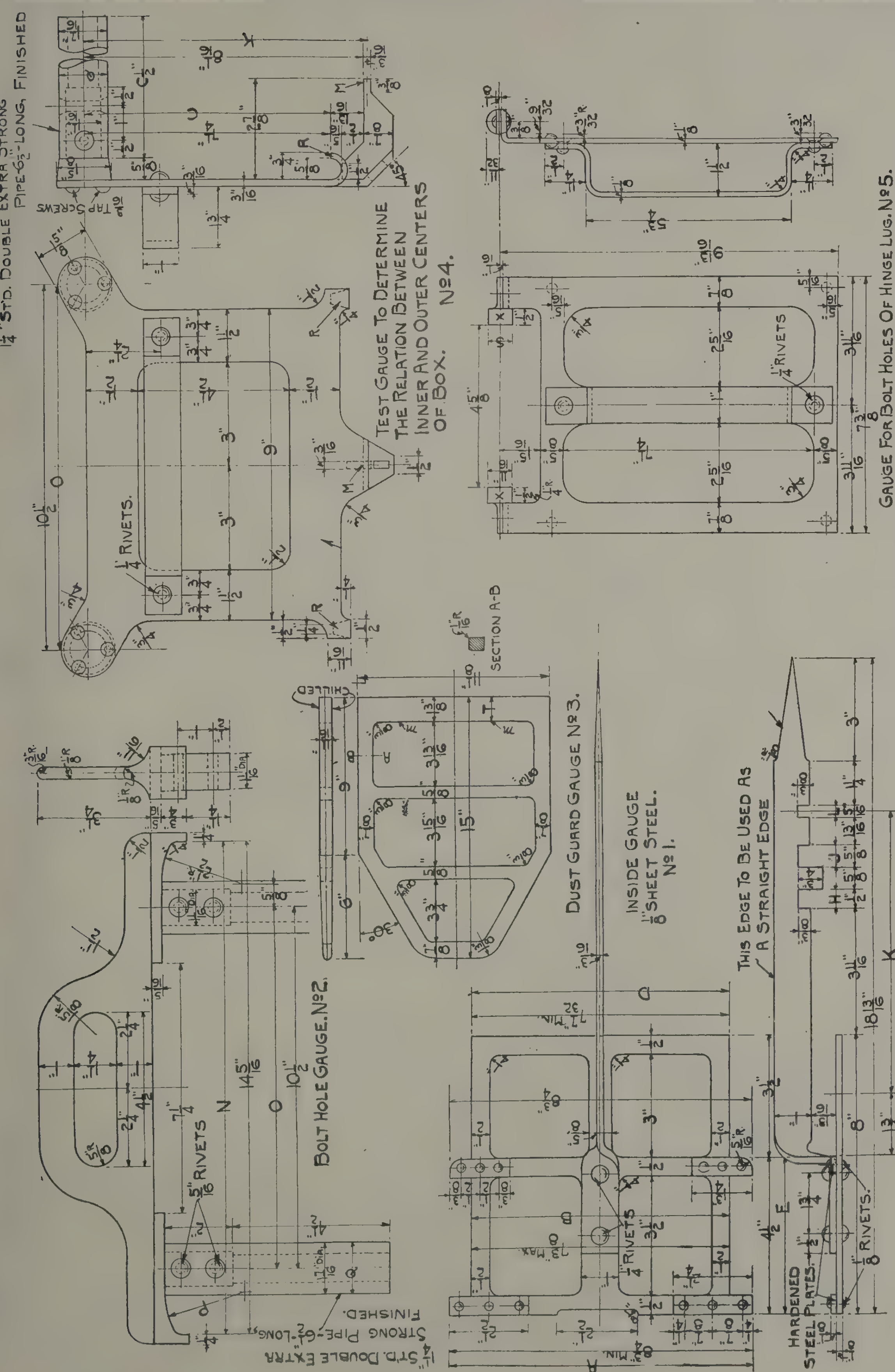


Fig. 3051—Recommended Practice for Journal Box Gages for Journal 6 in. x 11 in. (M. C. B. Sheet M.)

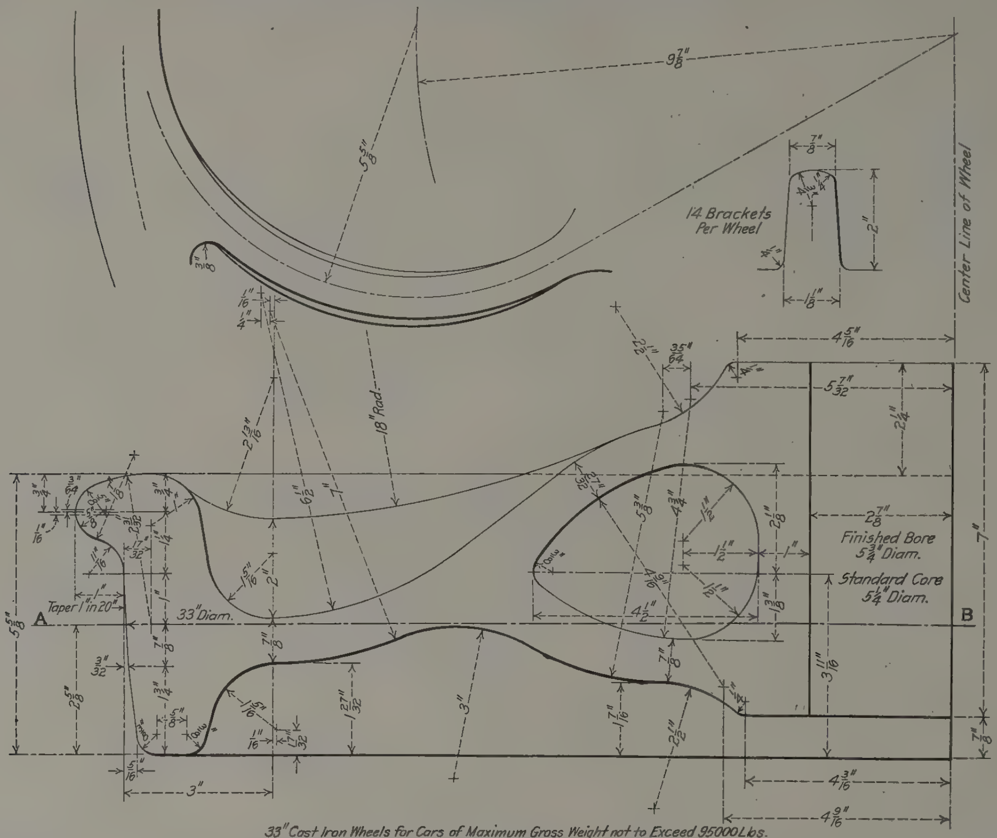


Fig. 3052—M. C. B. Recommended Practice for 33 in. Cast Iron Wheels for Cars of Maximum Gross Weight Not to Exceed 95,000 lb. (M. C. B. Sheet N.)

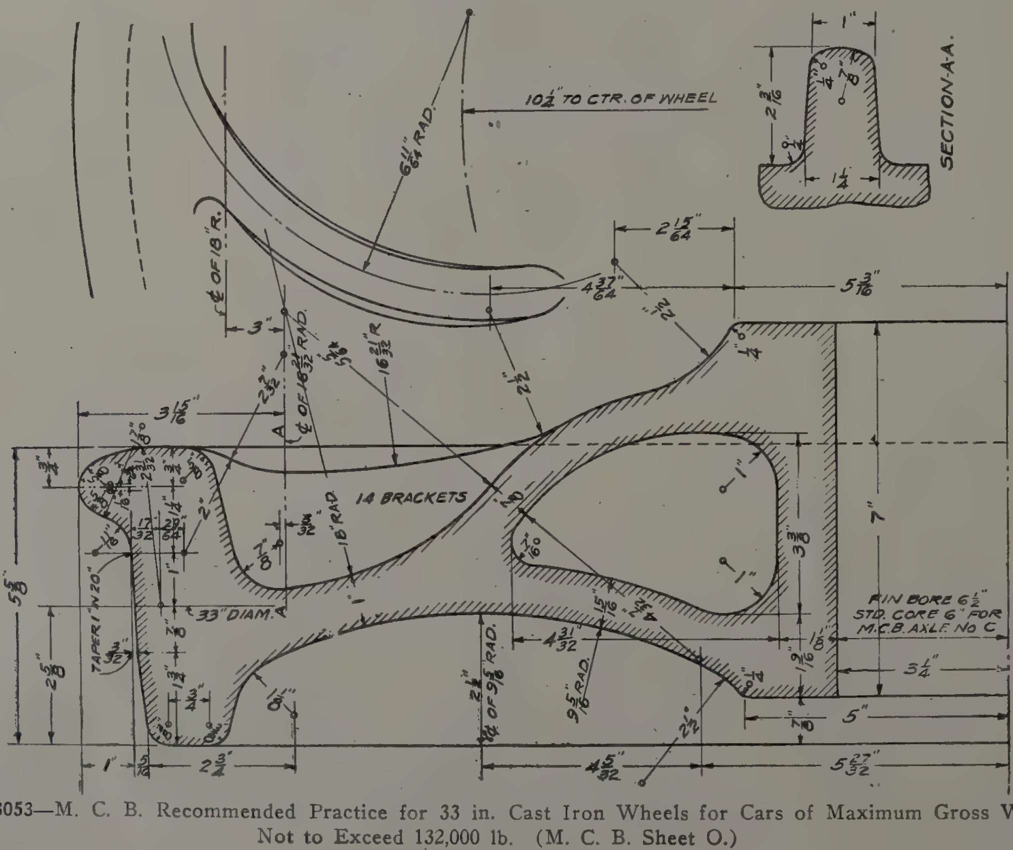
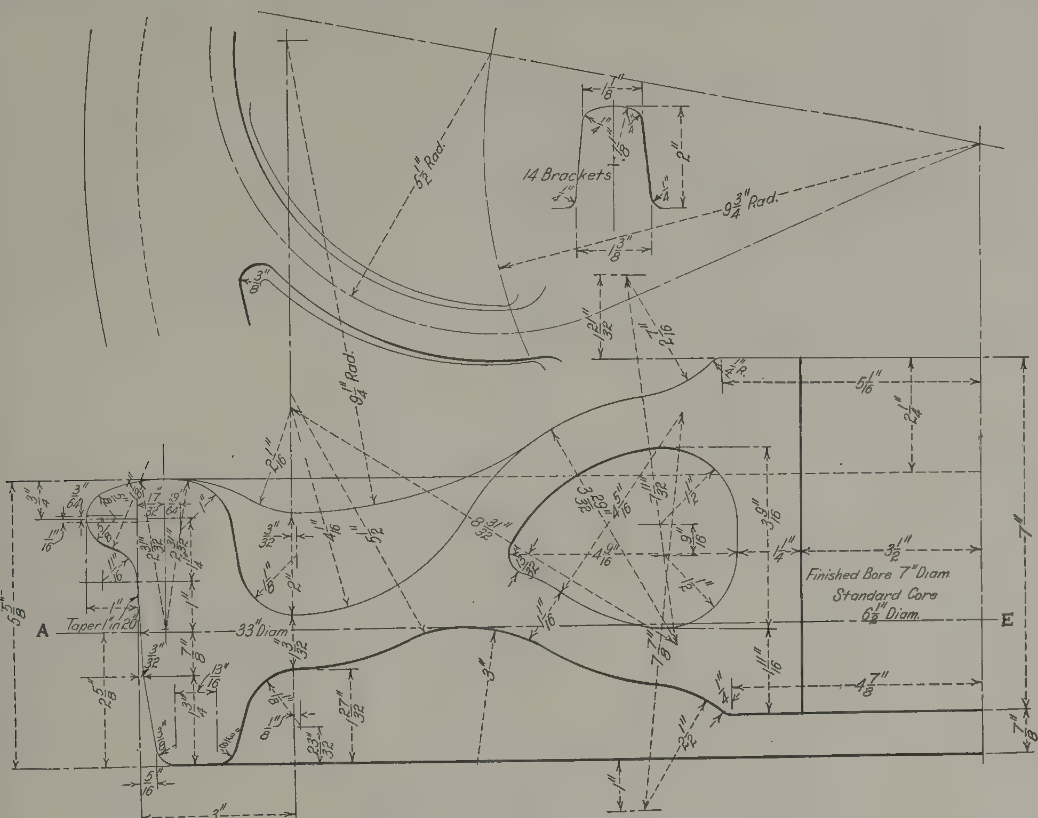


Fig. 3053—M. C. B. Recommended Practice for 33 in. Cast Iron Wheels for Cars of Maximum Gross Weight Not to Exceed 132,000 lb. (M. C. B. Sheet O.)



33" Cast Iron Wheels for Cars of Maximum Gross Weight Not to Exceed 161,000 Lbs.

Fig. 3054—M. C. B. Recommended Practice for 33 in. Cast Iron Wheels for Cars of Maximum Gross Weight Not to Exceed 161,000 lb. (M. C. B. Sheet P.)

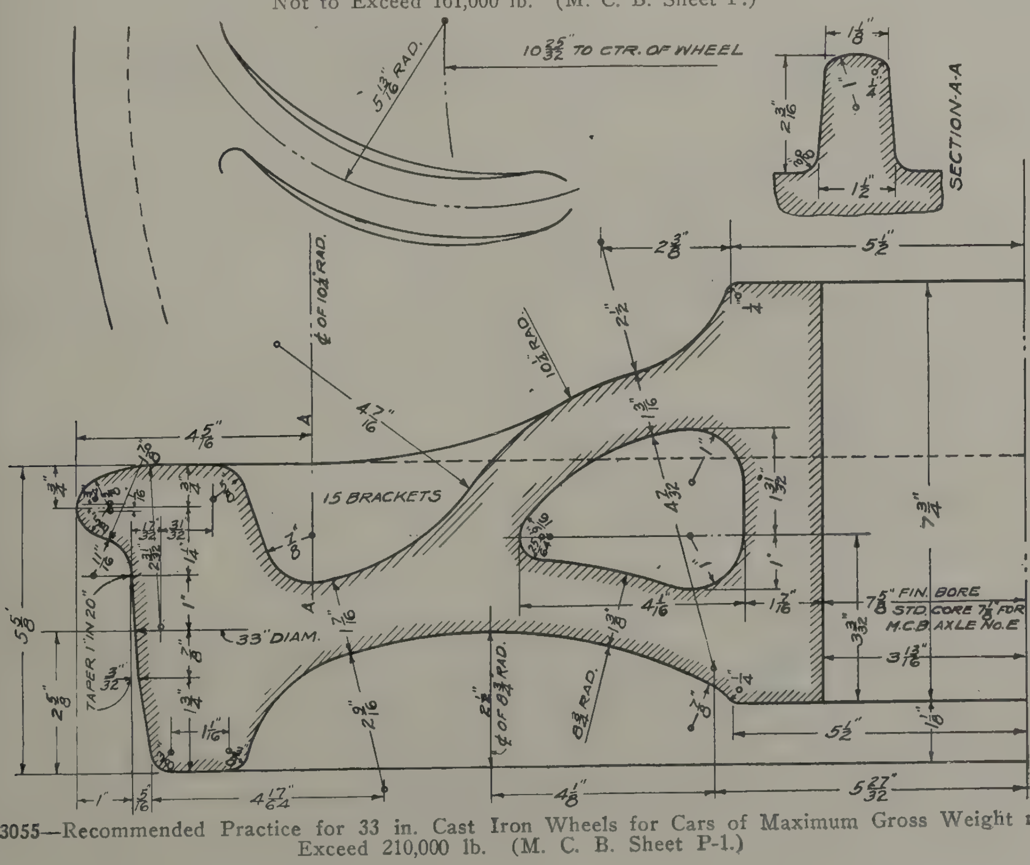


Fig. 3055—Recommended Practice for 33 in. Cast Iron Wheels for Cars of Maximum Gross Weight not to Exceed 210,000 lb. (M. C. B. Sheet P-1.)

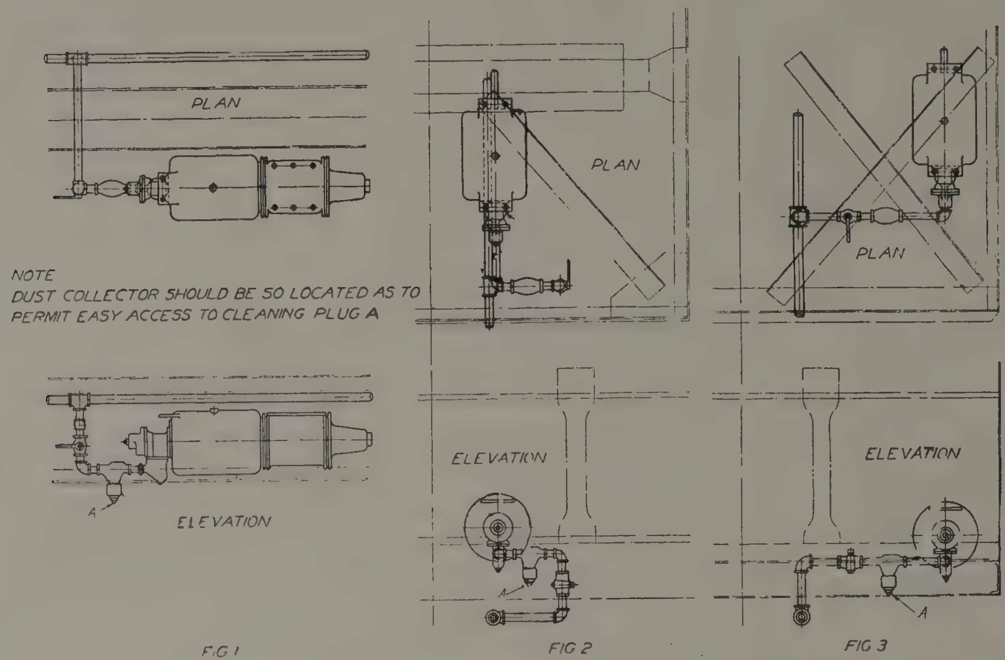


Fig. 3056—Recommended Practice for Installation of Centrifugal Dust Collector. (M. C. B. Sheet Q.)

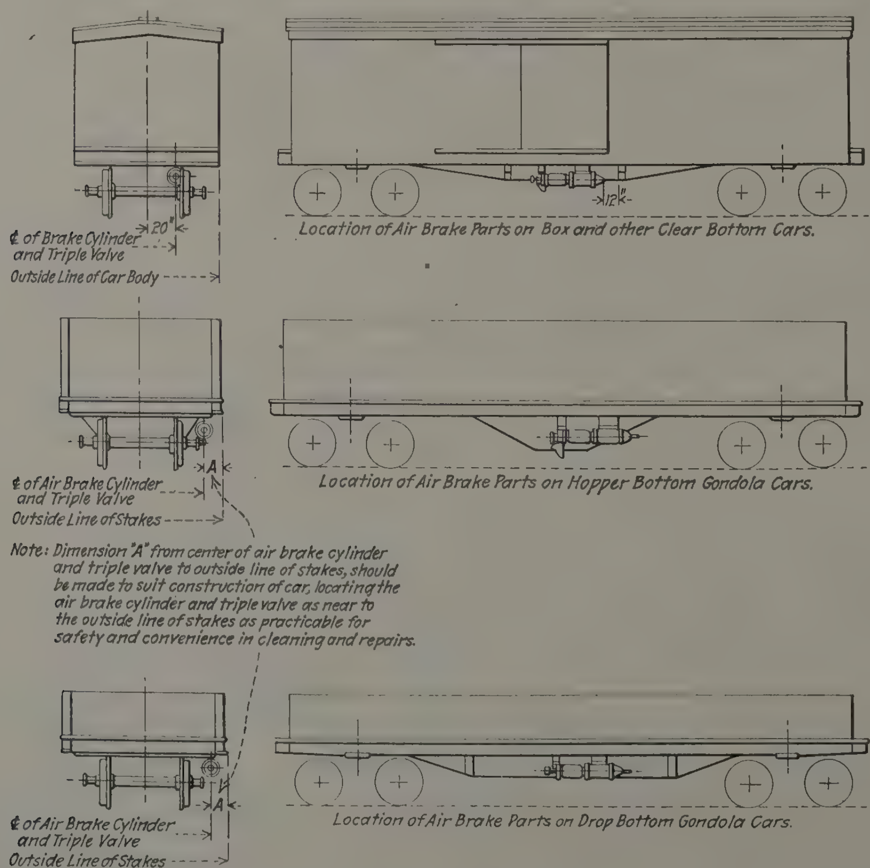
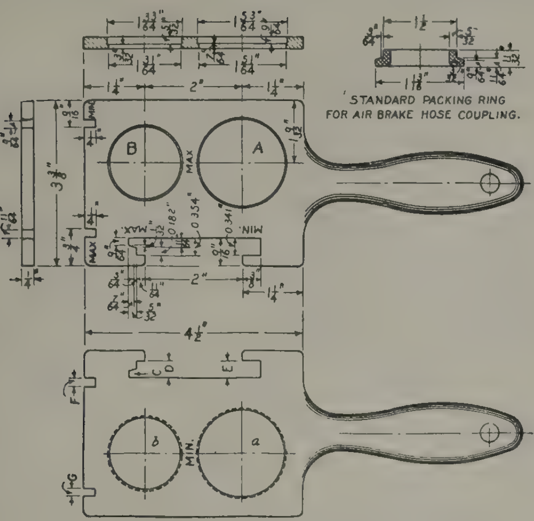
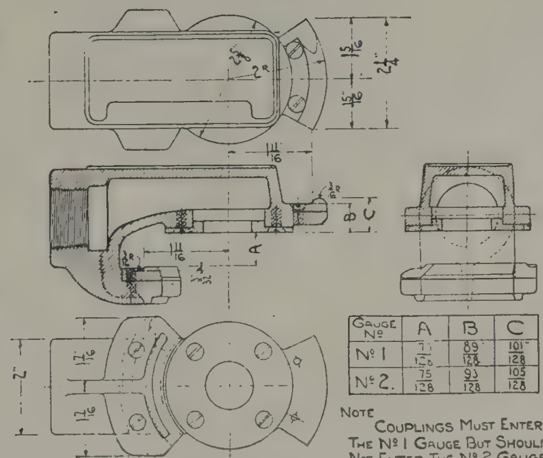


Fig. 3057—M. C. B. Recommended Practice for Location of Air Brake Parts on Freight Cars. (M. C. B. Sheet Q.)



OPENINGS A AND a ARE FOR GAUGING MAX. AND MIN. (EXTERNAL) DIAMETER OF PACKING RING FLANGE.
OPENINGS B AND b ARE FOR GAUGING MAX. AND MIN. (EXTERNAL) DIAM. OF PROJECTING WALL OR FACE PORTION OF RING.
SLOT C IS FOR GAUGING THICKNESS OF FLANGE AND BEVEL ON SURFACE OF FLANGE.
SLOTS D AND E ARE FOR GAUGING MAX. AND MIN. OVERALL DEPTH OF RING AT FACE.
SLOTS F AND G ARE FOR GAUGING MAX. AND MIN. THICKNESS OF PROJECTING WALL OR FACE PORTION OF RING.
FLANGE OF PACKING RING MUST FIT SLOT C. RINGS MUST ENTER ALL SECTIONS OF GAUGE MARKED "MAX." AND MUST NOT ENTER ANY SECTION OF GAUGE MARKED "MIN."

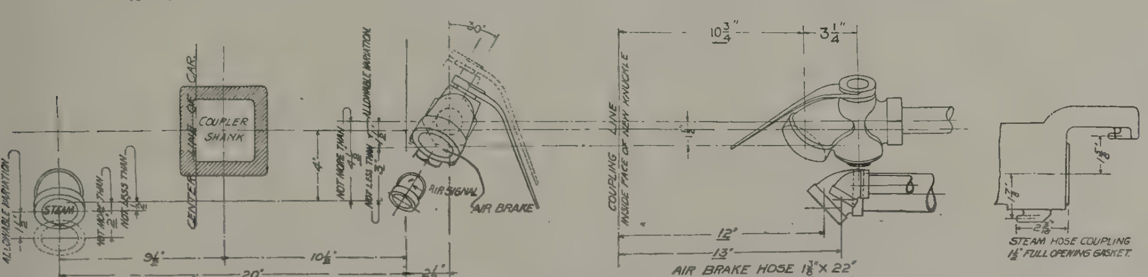
Fig. 3058—Recommended Practice for Gage for Air Brake Hose Coupling Packing Ring. (M. C. B. Sheet Q-1.)



GAUGE No	A	B	C
No 1	[illegible]/128	89/128	101/128
No 2.	75/128	93/128	105/128

NOTE
COUPLINGS MUST ENTER THE No 1 GAUGE BUT SHOULD NOT ENTER THE No 2 GAUGE.

Fig. 3059—Recommended Practice for Gage for Air Brake Couplings. (M. C. B. Sheet Q.)



NOTE:– THE DIMENSIONS UNDERSCORED SHOULD BE MAINTAINED BUT DEPARTURE FROM OTHER DIMENSIONS ARE ALLOWABLE TO SUIT CONDITIONS.

2" TRAIN LINE. END VALVES WITH NOT LESS THAN 1 1/2" OPENING.
DIAMETER OF STEAM HOSE TO BE 1 5/8 INCHES, AND OF SUCH LENGTH THAT DISTANCE FROM FACE OF COUPLING GASKET TO END OF NIPPLE WILL BE 31 INCHES

Fig. 3060—M. C. B. Recommended Practice for Steam and Air Connections for Passenger Cars. (M. C. B. Sheet Q-1.)

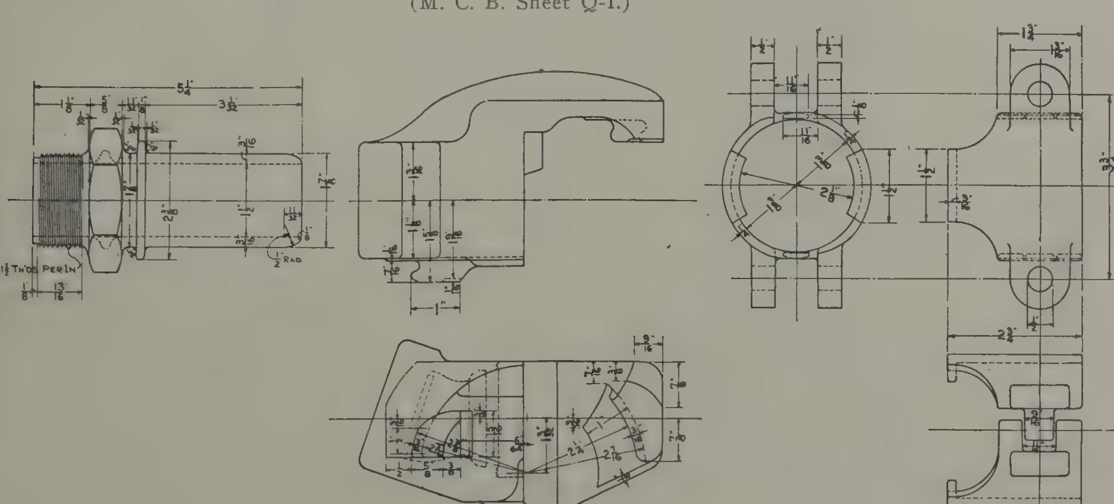


Fig. 3061—Recommended Practice for Steam Hose Couplings. (M. C. B. Sheet Q-1.)

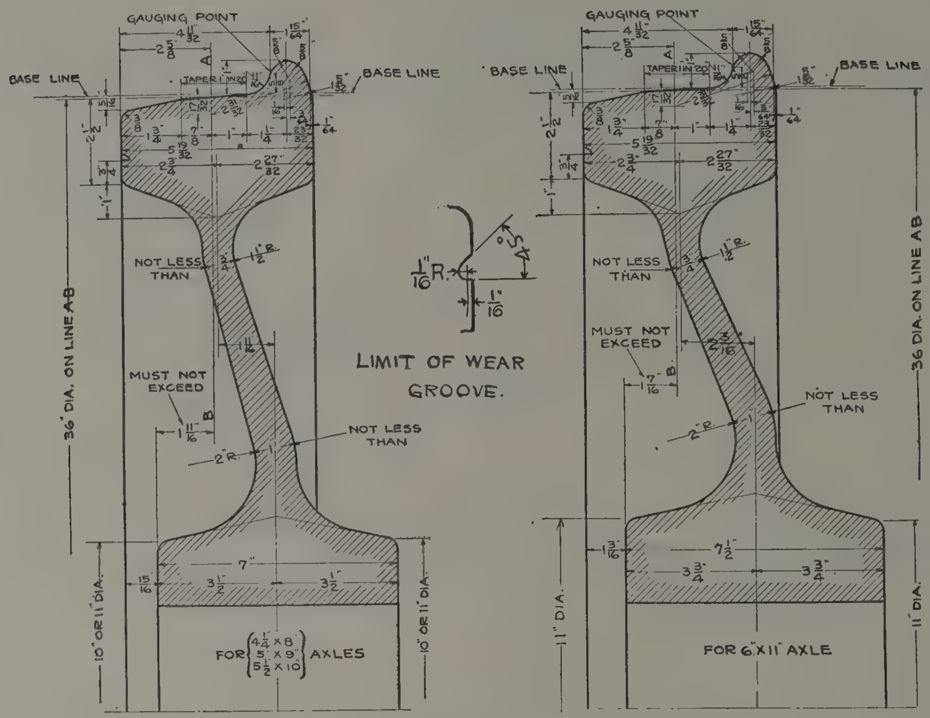


Fig. 3062—Recommended Practice for 36 in. Solid Steel Wheels. (M. C. B. Sheet S.)

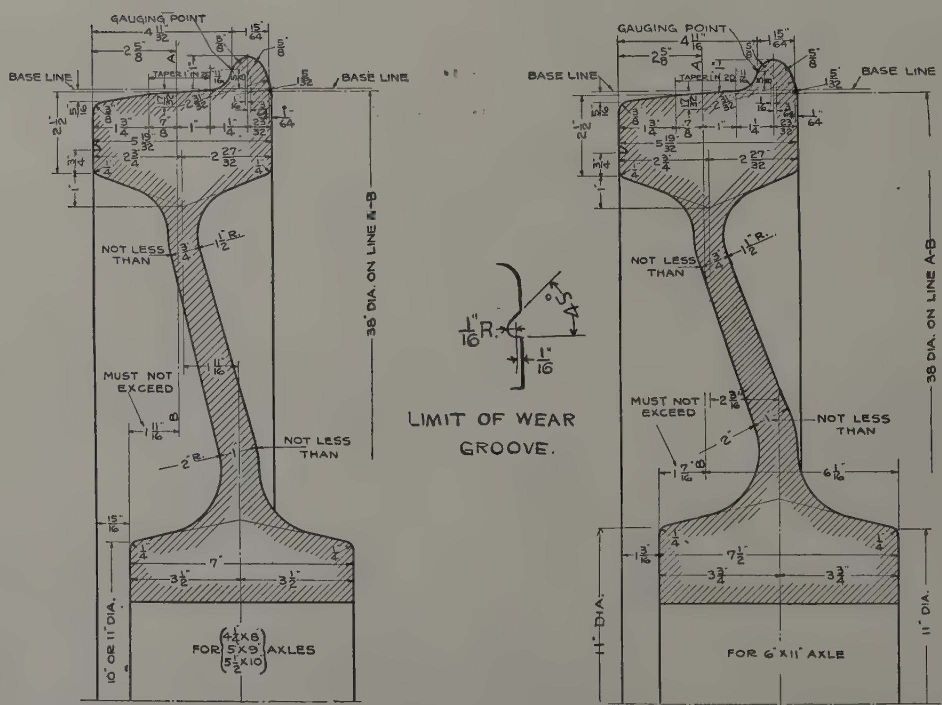


Fig. 3063—Recommended Practice for 38 in. Solid Steel Wheels. (M. C. B. Sheet T.)

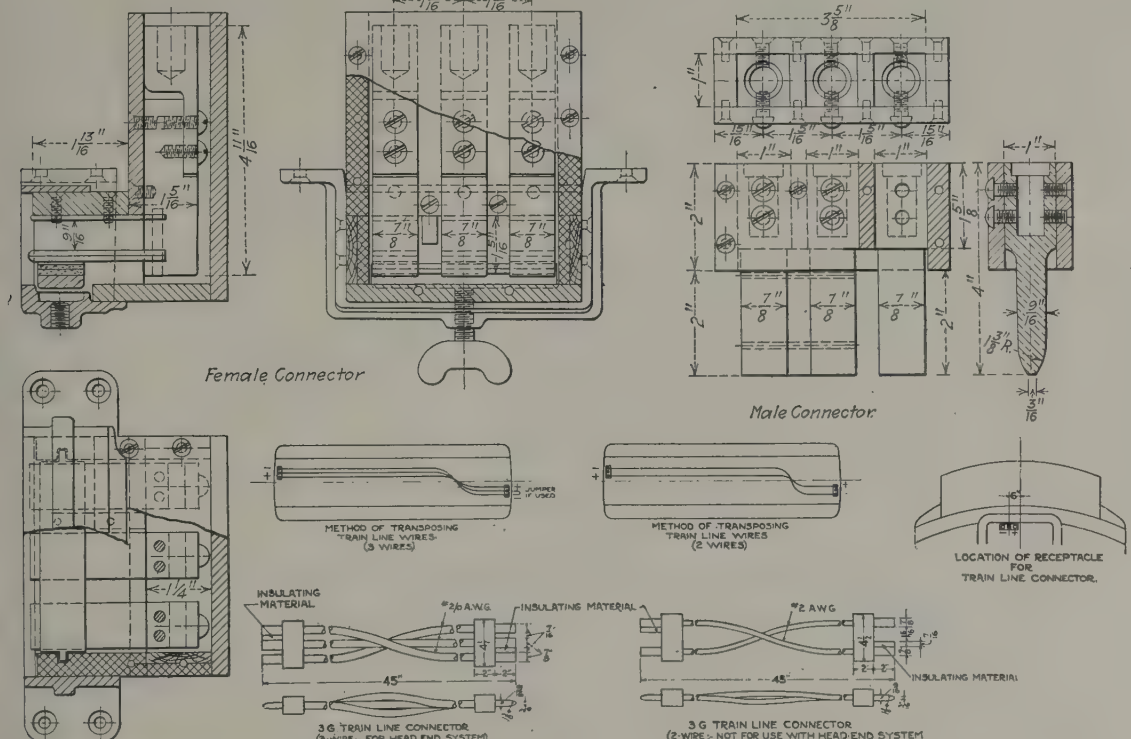


Fig. 3064—M. C. B. Recommended Practice for Train Line Connectors and Location of Train Line Receptacle for Electric Lighting. (M. C. B. Sheet U.)

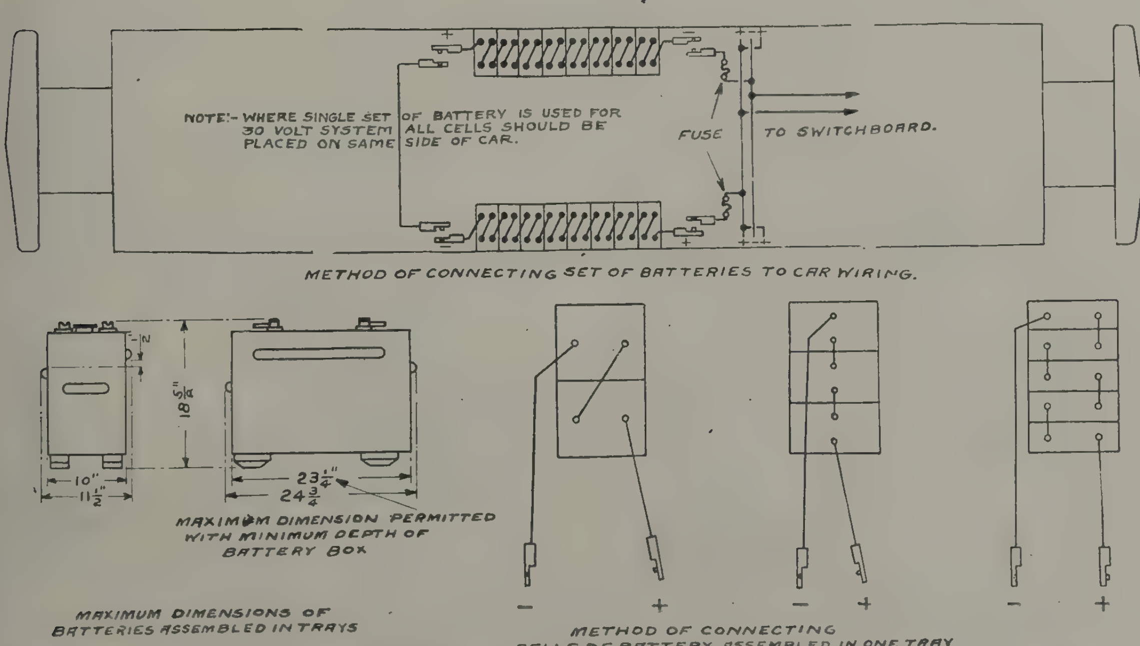


Fig. 3065—Recommended Practice for Storage Battery and Connections for Electric Lighting. (M. C. B. Sheet U-4.)

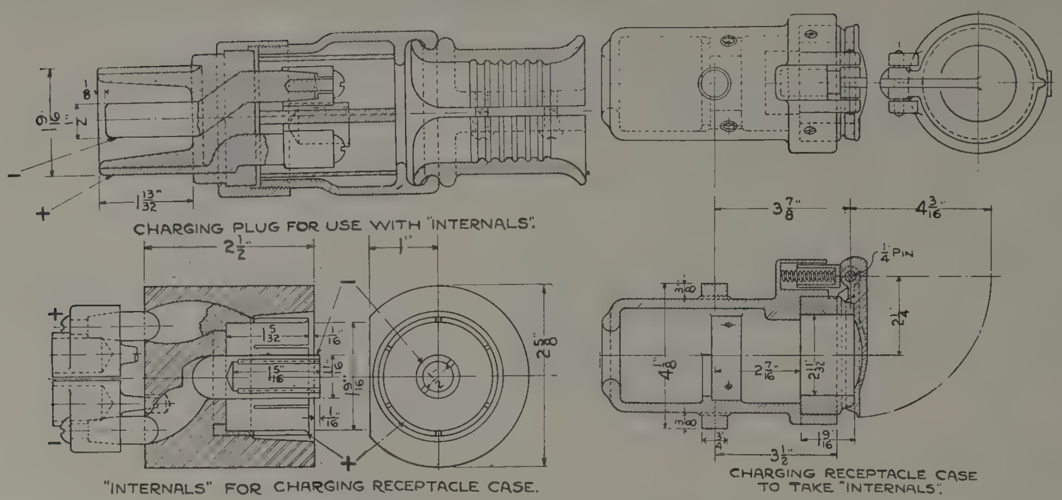


Fig. 3066—Recommended Practice for Electric Lighting. (M. C. B. Sheet U-2.)

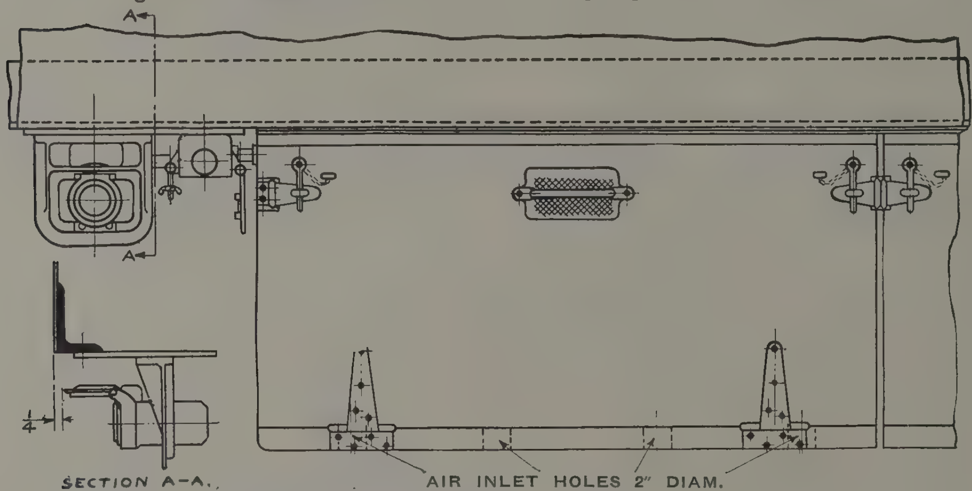


Fig. 3067—Recommended Practice for Location of Charging Receptacle, Fuse Block and Arrangement for Ventilation of Battery Box for Electric Lighting. (M. C. B. Sheet U-3.)

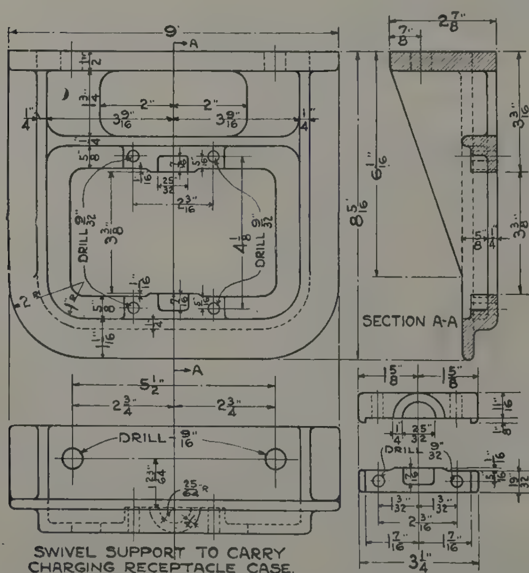


Fig. 3068—Recommended Practice for Electric Lighting. (M. C. B. Sheet U-1.)

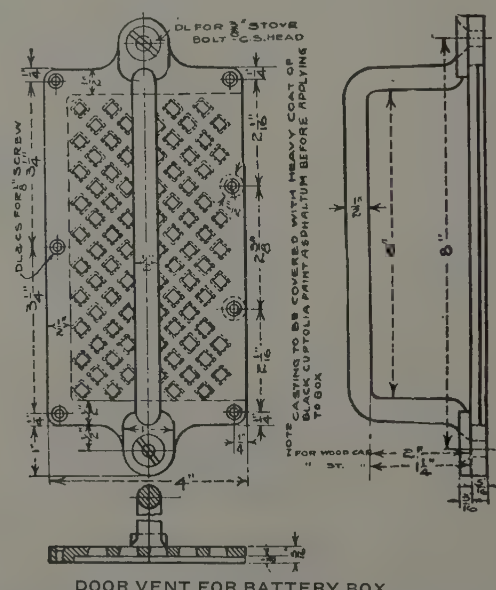


Fig. 3069—Recommended Practice for Electric Lighting. (M. C. B. Sheet U-3.)

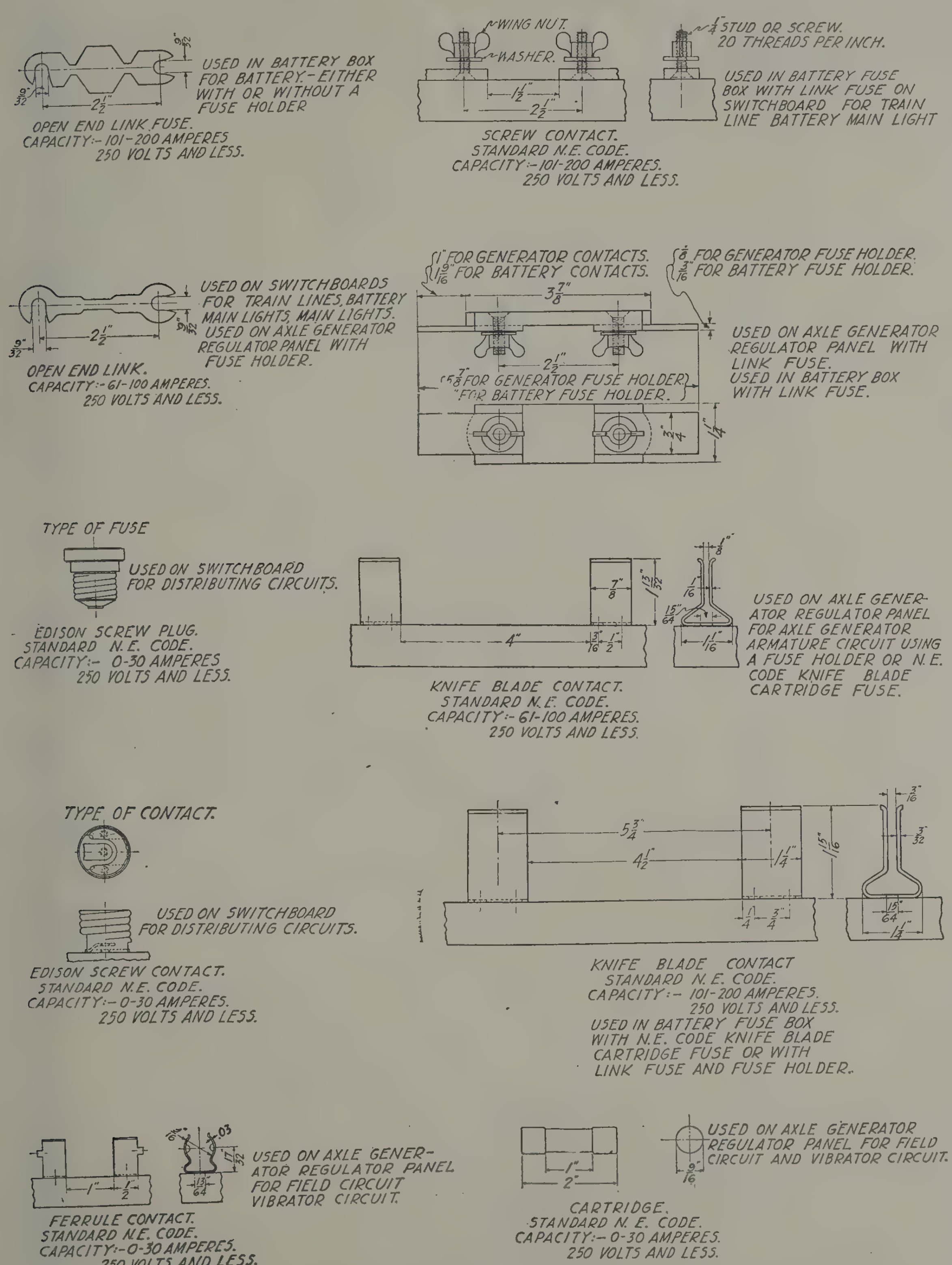
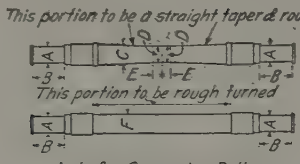


Fig. 3070—Recommended Practice for Electric Lighting Details. (M. C. B. Sheet U-5.)

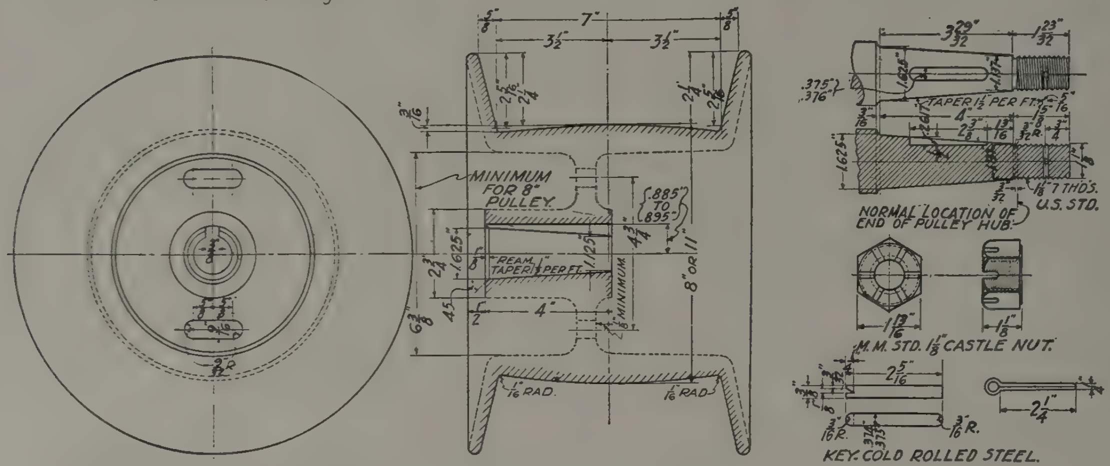
(See Sheet U-6 on Page 1088.)



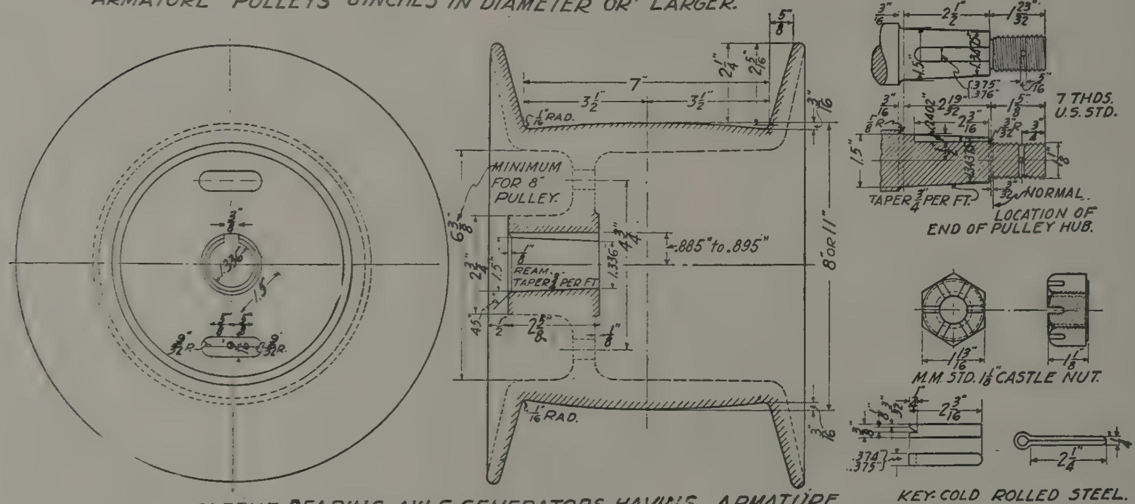
Axle for Generator Pulleys.

DIMENSIONS OF AXLES AT AXLE PULLEY BUSHING FIT.

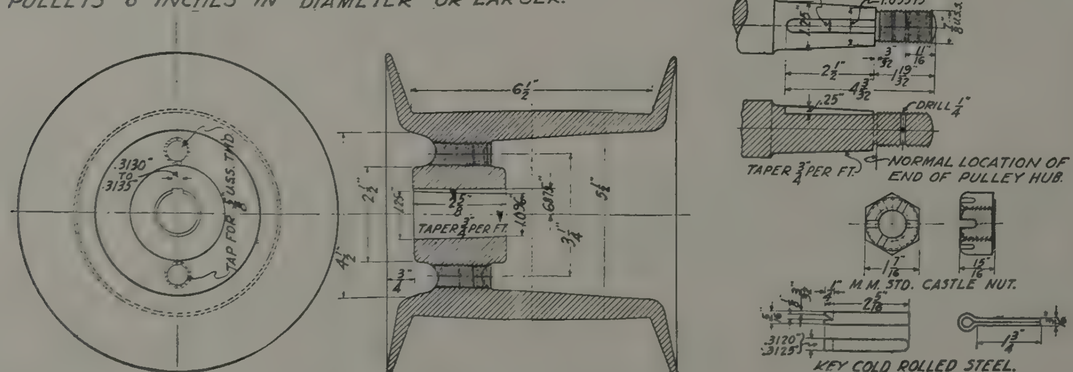
JOURNAL	A	B	C	D	E	F
$4\frac{1}{4}$"×8"	$4\frac{1}{4}$"	8"	$5\frac{7}{16}$"	$4\frac{3}{4}$"	$1\frac{1}{2}$"	$6\frac{3}{16}$"
5"×9"	5"	9"	$6\frac{3}{16}$"	$5\frac{3}{8}$"	$1\frac{1}{2}$"	$6\frac{3}{16}$"
$5\frac{1}{2}$"×10"	$5\frac{1}{2}$"	10"	$6\frac{3}{4}$"	$5\frac{7}{8}$"	3"	$6\frac{3}{4}$"



USED ON ALL BALL BEARING AXLE GENERATORS HAVING ARMATURE PULLEYS 8 INCHES IN DIAMETER OR LARGER.



USED ON ALL SLEEVE BEARING AXLE GENERATORS HAVINS ARMATURE PULLEYS 8 INCHES IN DIAMETER OR LARGER.



USED ON ALL AXLE GENERATORS HAVING ARMATURE SHAFTS LESS THAN 1½" INCHES IN DIAMETER AT INNER END OF PULLEY SEAT.

PULLEYS FOR GENERATOR ARMATURE SHAFTS. ARMATURE SHAFTS, PULLEY ENDS.

Fig. 3071—Recommended Practice for Electric Lighting Details. (M. C. B. Sheet U-7.)

Loading of Materials

(For rules see pages 625-871, M. C. B. Proceedings 1918)

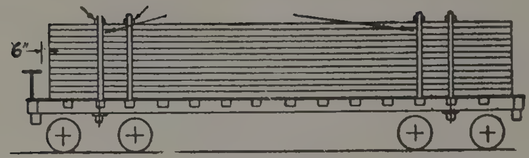


FIG. 1—LIMITS OF PROJECTION OF LADING ON SINGLE CARS WHICH DOES NOT REQUIRE THE USE OF AN IDLER.

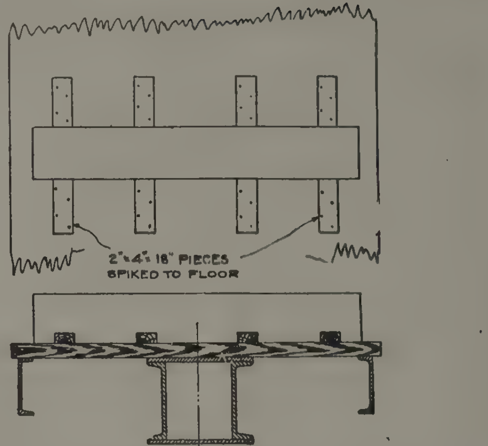
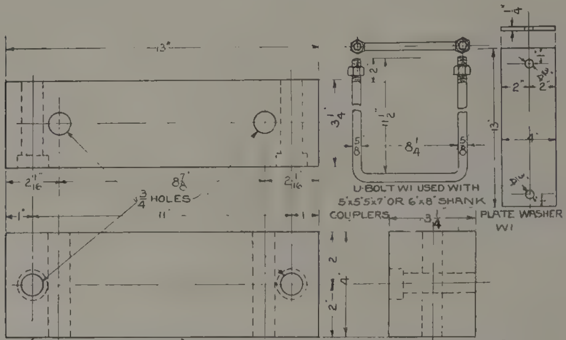


FIG. 2—MANNER OF BLOCKING BEARING-PIECE FOR LUMBER, LOGS, TELEGRAPH AND TELEPHONE POLES, PILING, PROPS AND SIMILAR MATERIAL.



CARS(TWIN AND TRIPLE LOADS) MUST BE JACKED APART BY PLACING ONE JACK ON EACH SIDE OF COUPLERS. SEPARATING THE CARS UNTIL THE COUPLERS ARE PULLED OUT TO THE FULLEST EXTENT THEN INSERTING METAL BLOCKS WITH PLATE WASHERS TO COMPLETELY FILL THE SPACE BETWEEN THE HORNS OF COUPLERS AND END SILLS. SPACING BLOCK MAY BE MALLEABLE IRON, STEEL CASTING, FORGINGS OR BUILT UP OF METAL PLATES SECURELY RIVETED TOGETHER

FIG. 3—METAL SPACING BLOCKS FOR TWIN OR TRIPLE LOADS.

FIG. 4. ELEVATION SHOWING APPLICATION OF SPACING BLOCKS.

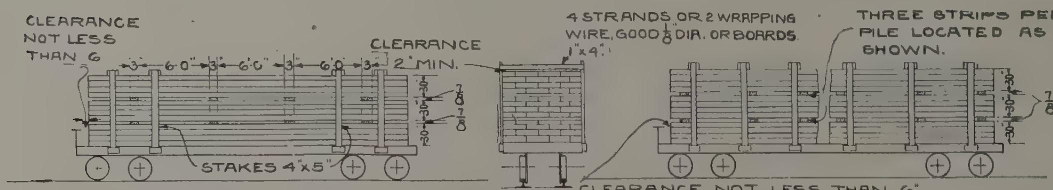


FIG 5 MANNER OF SECURING LUMBER OR TIMBER LESS THAN THE LENGTH OF THE CAR LOADED ON FLAT OR GONDOLA CARS HAVING SIDES LESS THAN 30" HIGH.

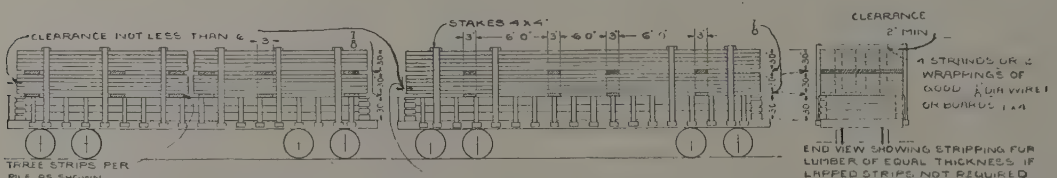


FIG. 6—MANNER OF SECURING LUMBER OR TIMBER LESS THAN THE LENGTH OF THE CAR ON GONDOLA CARS HAVING SIDES 30 HIGH AND OVER.

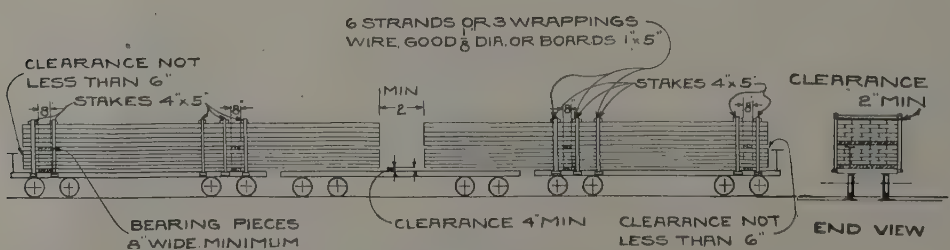


FIG. 7 MANNER OF SECURING SINGLE OVERHANGING LOADS OF LUMBER OR TIMBER ON OPEN CARS.

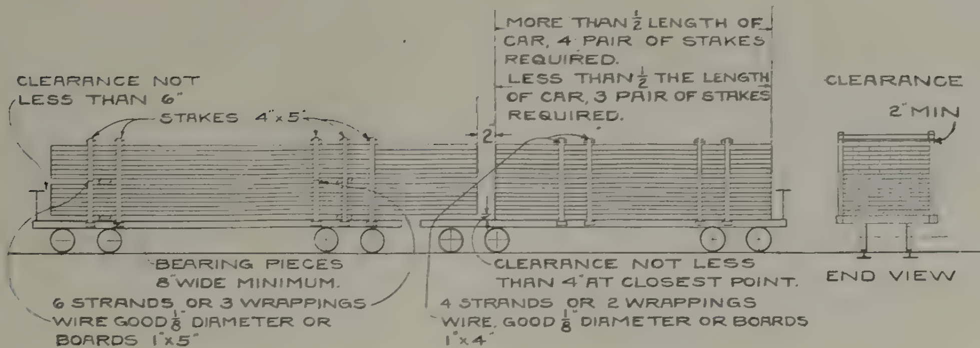


FIG. 8. MANNER OF SECURING SINGLE OVERHANGING LOADS OF LUMBER OR TIMBER ON OPEN CARS.

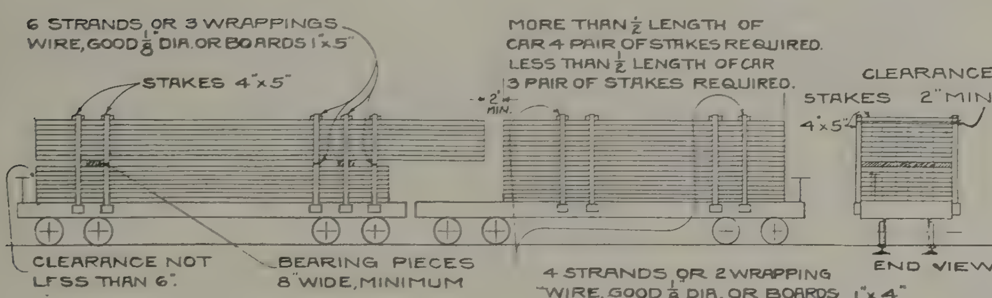


FIG. 9. MANNER OF SECURING SINGLE OVERHANGING LOADS OF LUMBER OR TIMBER ON OPEN CARS.

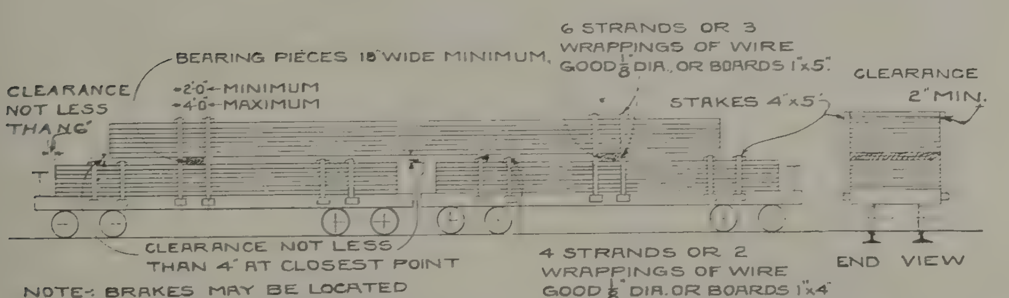


FIG. 10. MANNER OF SECURING LONG LUMBER OR TIMBER ON TOP OF SHORT PIECES ON SINGLE CARS.

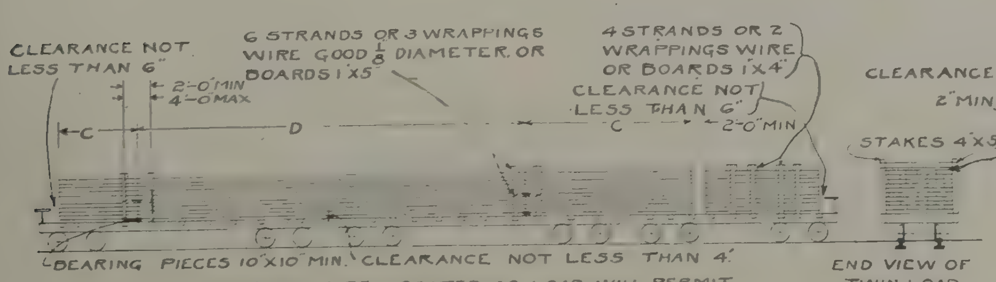


FIG. 11. MANNER OF SECURING LONG LUMBER OR TIMBER ON TWO OR MORE CARS

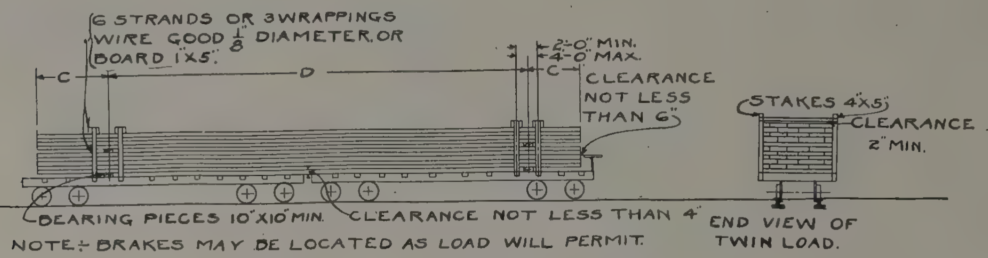


FIG. 12 MANNER OF SECURING LONG LUMBER OR TIMBER ON TWO OR MORE CARS.

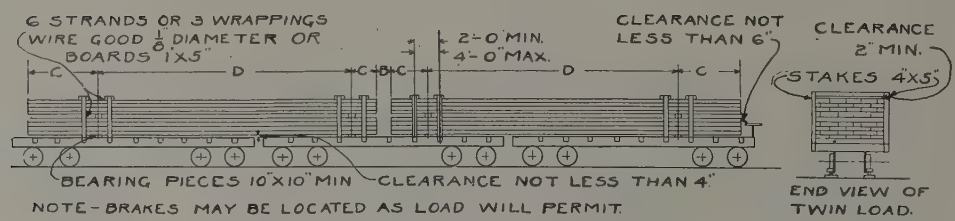


FIG 13 MANNER OF SECURING LONG LUMBER OR TIMBER LOADED ON TWO OR MORE CARS

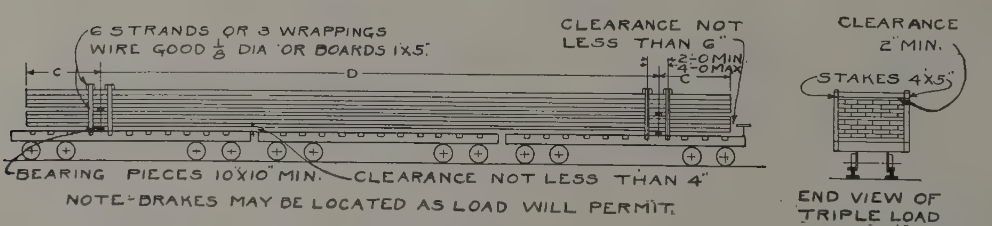


FIG 14 MANNER OF SECURING LONG LUMBER OR TIMBER LOADED ON TWO OR MORE CARS.

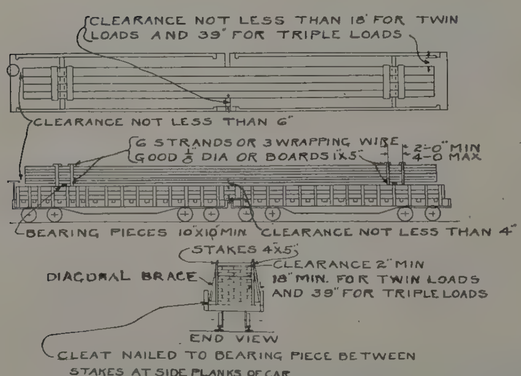


FIG. 15 TWIN OR TRIPLE LOADS OF LUMBER OR TIMBER ON GONDOLA CARS

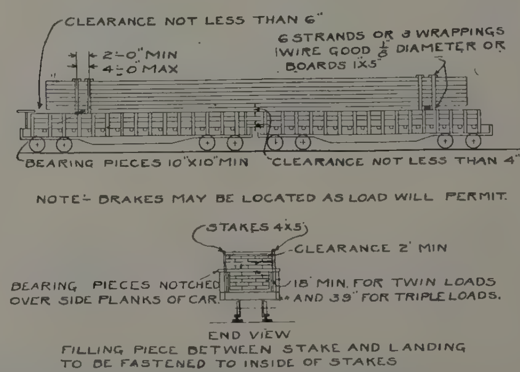


FIG. 16 TWIN OR TRIPLE LOADS OF LUMBER OR TIMBER ON GONDOLA CARS

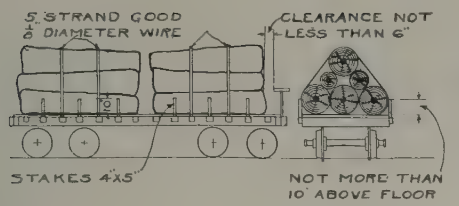


FIG. 17 MANNER OF SECURING LOGS LESS THAN THE LENGTH OF THE CAR LOADED ON FLAT CARS

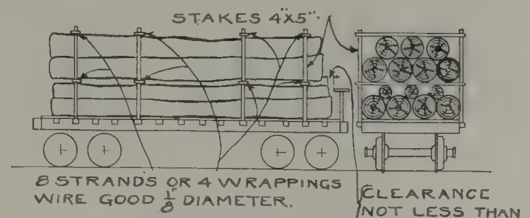


FIG. 18 MANNER OF SECURING LOGS, PILING, PROPS AND TELEGRAPH POLES LESS THAN THE LENGTH OF CAR LOADED ON FLAT CARS

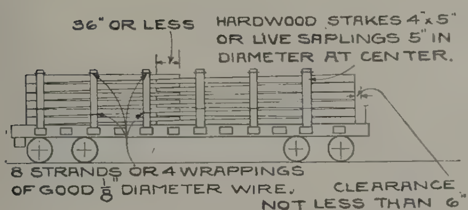


FIG. 19. MANNER OF SECURING POLES INTERLACED LOADED ON FLAT CARS.

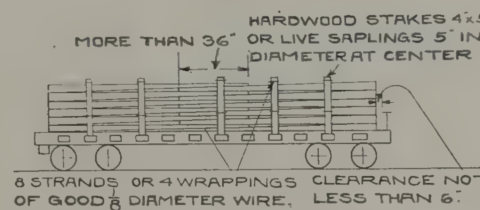


FIG. 20 MANNER OF SECURING POLES INTERLACED LOADED ON FLAT CARS.

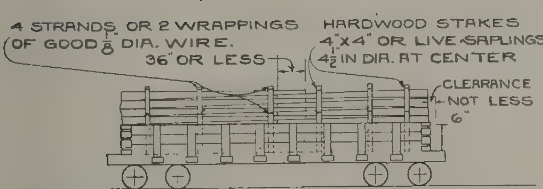


FIG. 21. MANNER OF SECURING POLES INTERLACED LOADED ON GONDOLA CARS

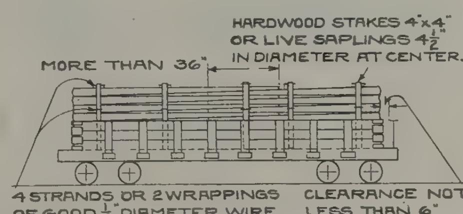


FIG. 22 MANNER OF SECURING POLES INTERLACED LOADED ON GONDOLA CARS

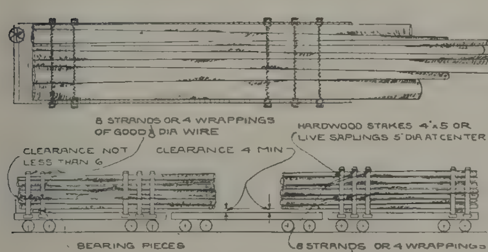


FIG. 23 SINGLE OVERHANGING LOADS OF DIFFERENT LENGTHS OF LOGS, PILING, PROPS, TELEPHONE OR TELEGRAPH POLES

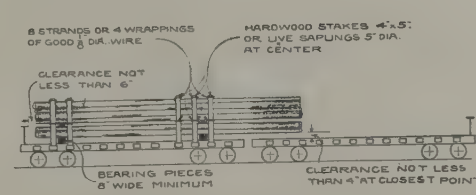


FIG 24. SINGLE OVERHANGING LOADS OF UNIFORM LENGTH OF LOGS, PILING, PROPS, TELEPHONE OR TELEGRAPH POLES.

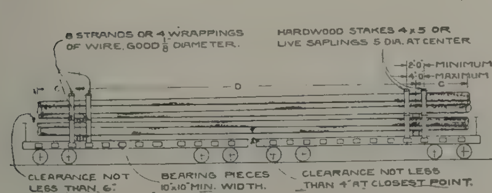


FIG. 25 DOUBLE LOADS LOGS, PILING, PROPS, TELEGRAPH OR TELEPHONE POLES

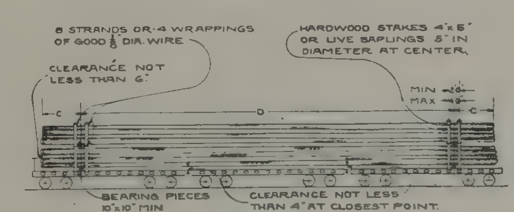


FIG. 26. TRIPLE LOADS LOGS, PILING, PROPS, TELEPHONE OR TELEGRAPH POLES

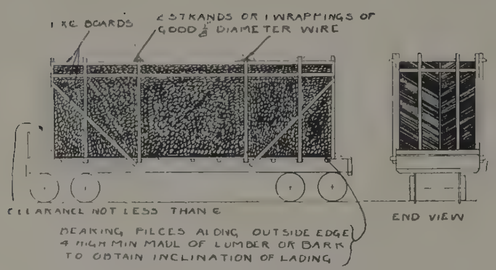


FIG. 27. LADING OF TAN BARK ON FLAT CARS

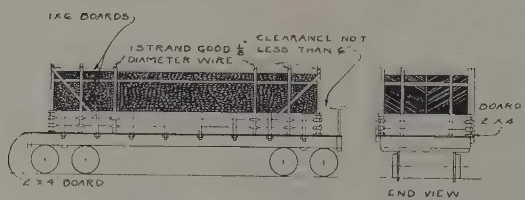


FIG. 28. LADING OF TAN BARK ON GONDOLA CARS

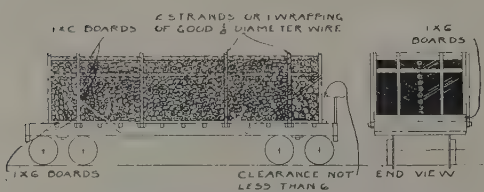


FIG. 29. LATH LOADED ON FLAT CARS

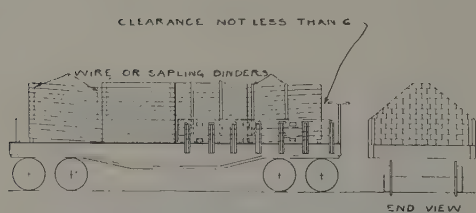


FIG. 30. LADING OF TIES, FENCE POSTS AND SIMILAR MATERIAL LOADED ON GONDOLA CARS

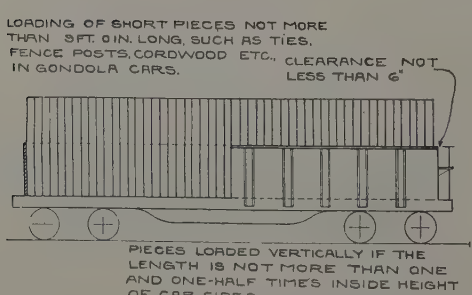


FIG. 31. LOADING OF TIES, FENCE POSTS AND SIMILAR MATERIAL ON GONDOLA CARS.

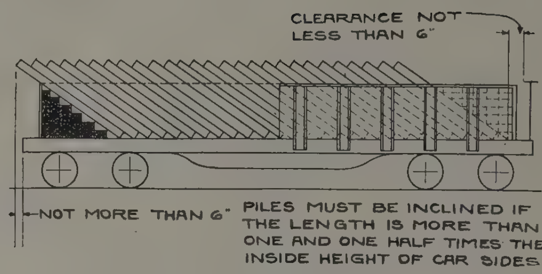
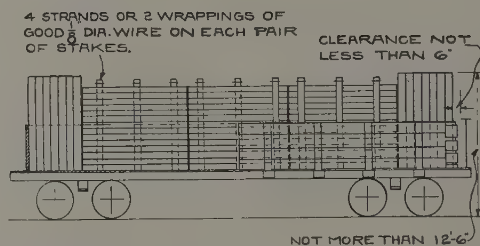
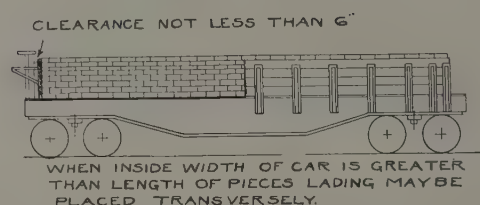


FIG. 32. LOADING OF TIES, FENCE POSTS AND SIMILAR MATERIAL ON GONDOLA CARS.



WHEN INSIDE WIDTH OF CAR IS LESS THAN THE LENGTH OF PIECES TO BE LOADED, END BLOCKING AND STAKES MAY CONSIST OF PIECES PLACED VERTICALLY.

FIG. 33. LOADING OF TIES, FENCE POSTS AND SIMILAR MATERIAL ON GONDOLA CARS.



WHEN INSIDE WIDTH OF CAR IS GREATER THAN LENGTH OF PIECES LADING MAY BE PLACED TRANSVERSELY.

FIG. 34 LOADING OF TIES, FENCEPOST AND SIMILAR MATERIAL IN GONDOLA CARS

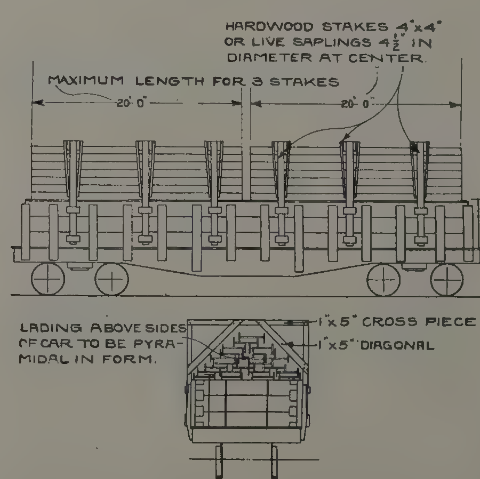


FIG. 35. LADING OF SHORT STRUCTURAL MATERIAL

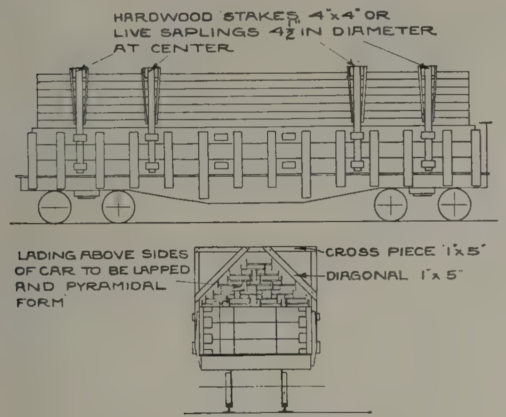


FIG. 36. LADING OF STRUCTURAL MATERIAL MORE THAN 20'-0" IN LENGTH.

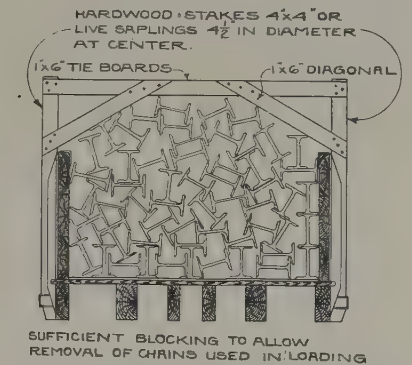


FIG. 37 MANNER OF LOADING LIGHT STRUCTURAL MATERIAL ON SINGLE GONDOLA CARS.

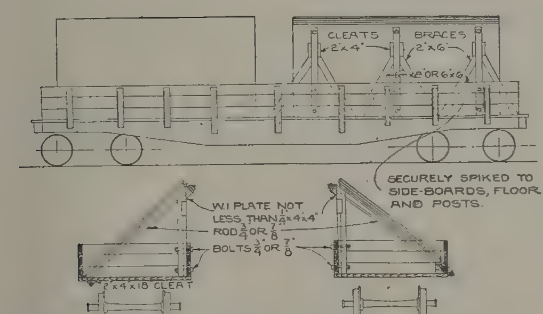


FIG. 38. MANNER OF SECURING WIDE STEEL PLATES DIAGONALLY ON GONDOLA CARS.

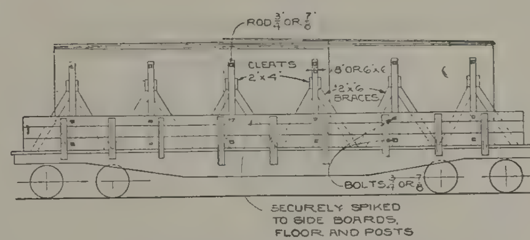


FIG. 38-A MANNER OF SECURING PLATES (LAPPED) LOADED IN DIAGONAL POSITION ON GONDOLA CARS.

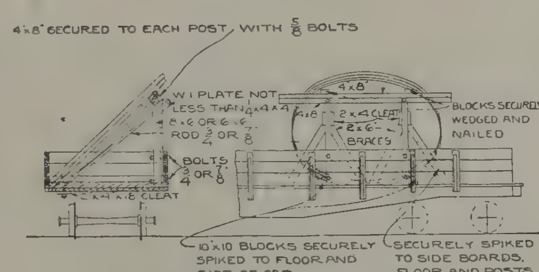


FIG. 38-C. MANNER OF SECURING ROUND FLANGED PLATES LOADED DIAGONALLY ON GONDOLA CARS.

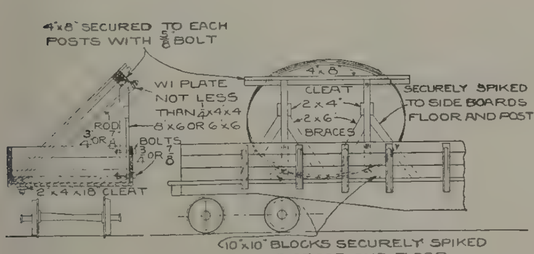


FIG. 38-B. MANNER OF SECURING ROUND FLAT PLATES LOADED DIAGONALLY ON GONDOLA CARS.

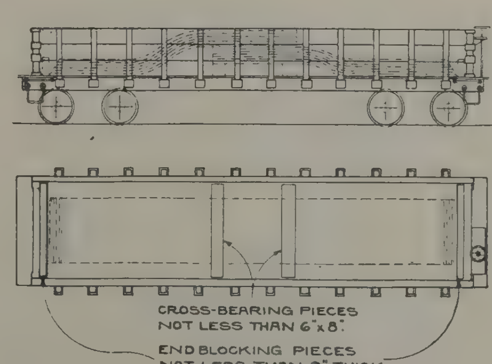


FIG. 39. LOADING FLEXIBLE PLATES ON SINGLE CARS.

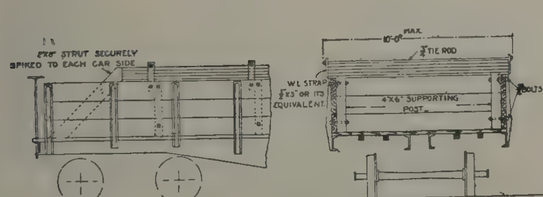


FIG. 38-D. MANNER OF SECURING FLAT PLATES LOADED ON TOP OF CAR SIDES.

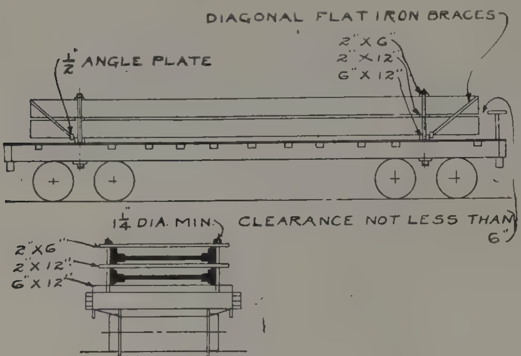


FIG. 40. LARGE GIRDERS LOADED FLAT ON FLAT CARS.

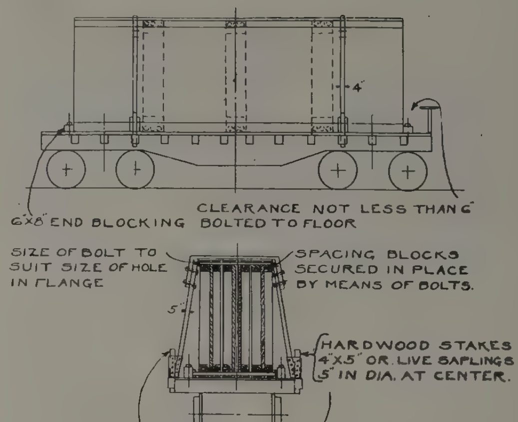


FIG 44 MANNER OF SECURING DEEP GIRDERS LOADED ON FLAT CARS.

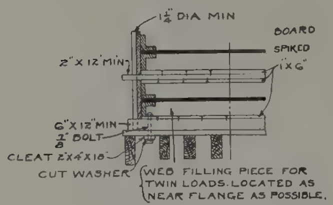


FIG 41 LARGE GIRDERS LOADED FLAT ON FLAT CARS.

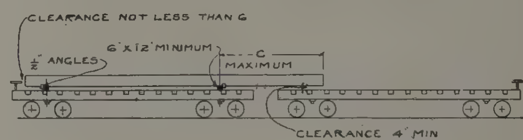


FIG. 45. SINGLE OVERHANGING LOADS OF LARGE GIRDERS ON FLAT CARS

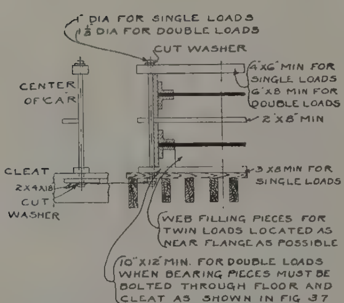
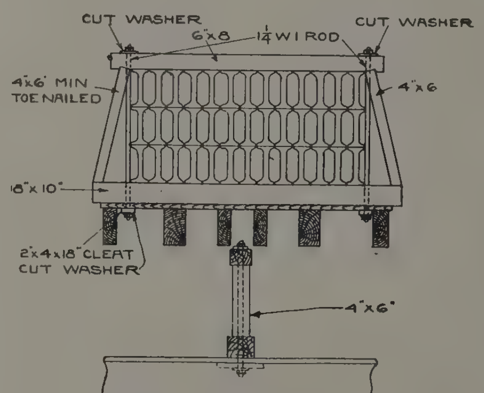


FIG 42 LARGE GIRDERS LOADED FLAT ON FLAT CARS.



NOTE:- WHEN LOADING ON TOP OF THE SIDES OF GONDOLA CARS, THESE BOLTS TO EXTEND THROUGH BEARING-PIECE ONLY.

FIG 46 STRUCTURAL MATERIAL LOADED ON FLAT CARS OR ON TOPS OF SIDES OF GONDOLA CARS

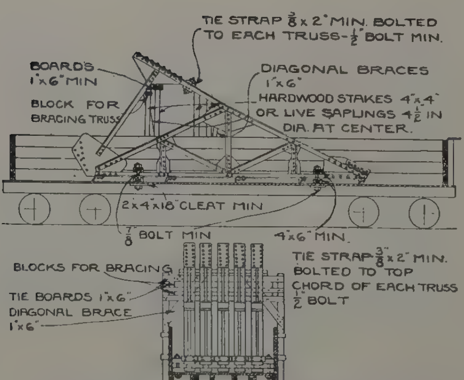


FIG. 43. LADING OF STEEL HALF ROOF TRUSSES.

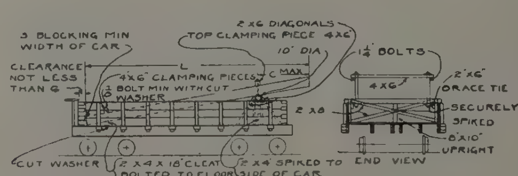


FIG 47 SINGLE OVERHANGING LOADS ON GONDOLA CARS

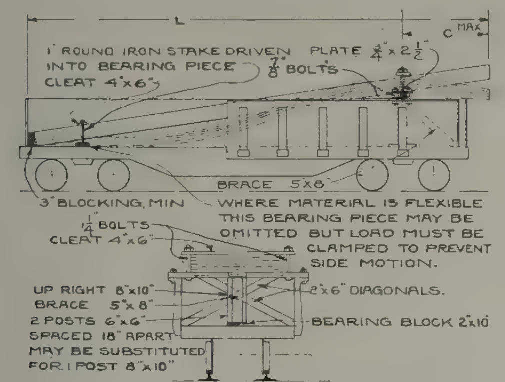


FIG. 48 MANNER OF LOADING OVERHANGING LOADS OF STRUCTURAL MATERIAL ON STEEL GONDOLA CARS WITH BEARING PIECES LOCATED OVER THE BOLSTER

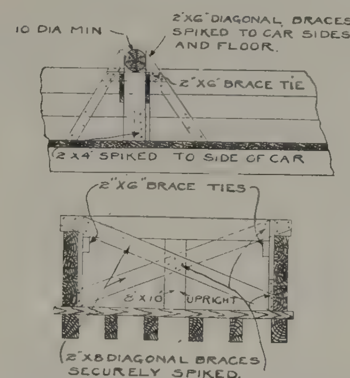


FIG. 49. MANNER OF BLOCKING ROUND BEARING PIECES, LOW SIDE GONDOLA CARS WITH SIDES 3" OR MORE IN THICKNESS

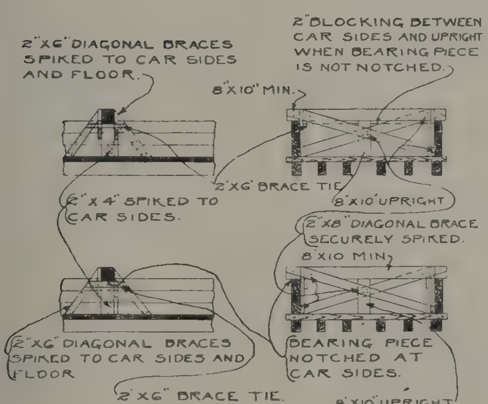
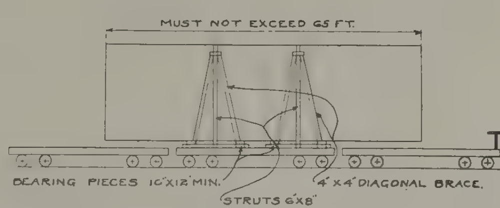


FIG 50. MANNER OF BLOCKING RECTANGULAR BEARING PIECES.



NOTE—BRAKES MAY BE LOCATED AS THE LOAD WILL PERMIT.

FIG 51. MANNER OF SECURING LATTICE GIRDERS, BOX GIRDERS, COLUMNS, ONE-HALF ROOF TRUSSES AND SIMILAR MATERIAL. THIS MANNER OF LOADING TO BE USED ONLY WHEN ABSOLUTELY NECESSARY.

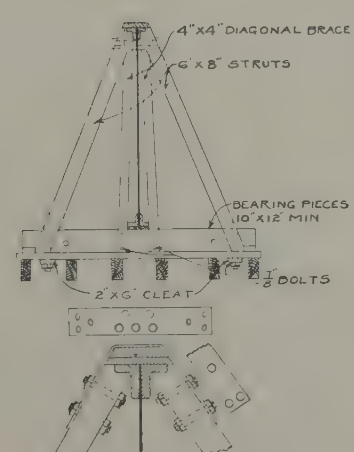


FIG. 53. ALTERNATIVE FASTENING.

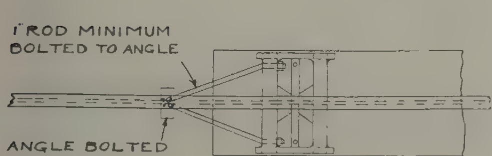


FIG. 52

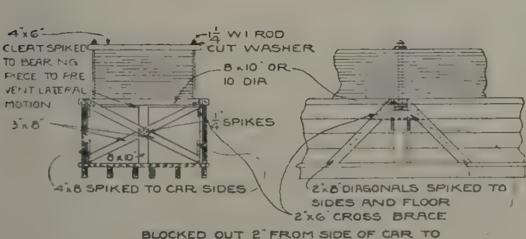
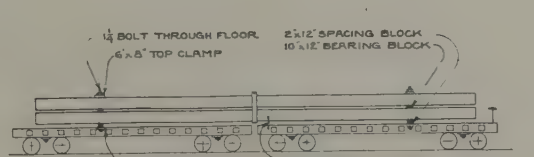
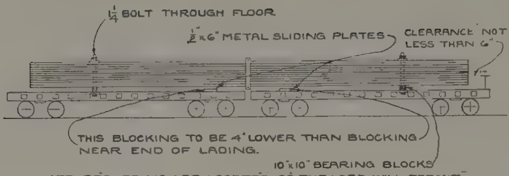


FIG. 54. TWIN SHIPMENTS ON GONDOLA CARS NOT EQUIPPED WITH DROP ENDS AND HAVING SIDES THREE OR MORE INCHES THICK



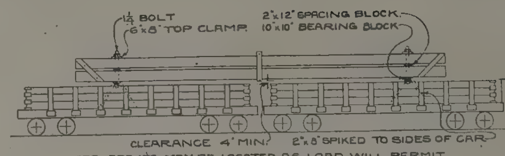
NOTE—BRAKES MAY BE LOCATED AS LOAD WILL PERMIT.

FIG. 55. LADING OF LONG MATERIAL ON FLAT OR DROP END GONDOLA CARS.



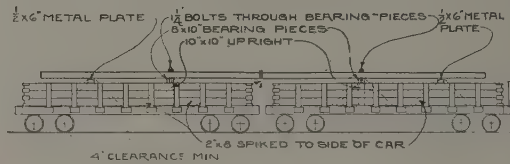
NOTE- BRAKES MAY BE LOCATED AS THE LOAD WILL PERMIT

FIG. 56. LADING OF LONG FLEXIBLE MATERIAL ON FLAT OR DROP END GONDOLA CARS.



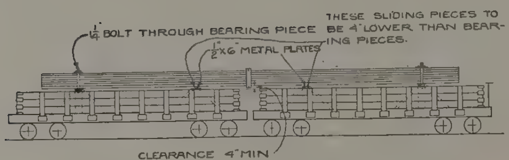
NOTE- BRAKES MAY BE LOCATED AS LOAD WILL PERMIT.

FIG. 57. LADING OF LONG MATERIAL ON GONDOLA CARS.



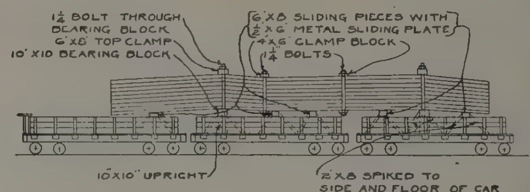
NOTE BRAKES MAY BE LOCATED AS THE LOAD WILL PERMIT

FIG 55 LADING OF LONG FLEXIBLE MATERIAL ON GONDOLA CARS NOT HAVING DROP ENDS



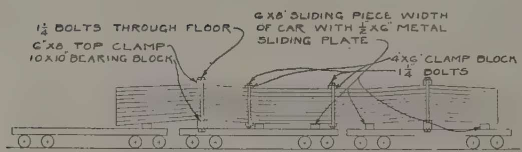
NOTE- BRAKES MAY BE LOCATED AS LOAD WILL PERMIT

FIG. 58 LADING OF LONG FLEXIBLE MATERIAL ON GONDOLA CARS NOT HAVING DROP ENDS.



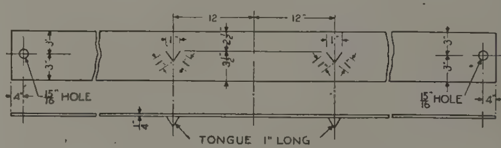
NOTE - BRAKES MAY BE LOCATED AS THE LOAD WILL PERMIT

FIG. 61 LOADING OF LONG FLEXIBLE MATERIAL ON GONDOLA CARS



NOTE:- BRAKES MAY BE LOCATED AS LOAD WILL PERMIT.

FIG. 60. LOADING OF LONG FLEXIBLE MATERIAL ON FLAT CARS



SKETCH A

MANNER OF PREPARING ¼"x 6" METAL SLIDING PLATES FOR LOADS OVER 40,000 LBS. PER BEARING PIECE

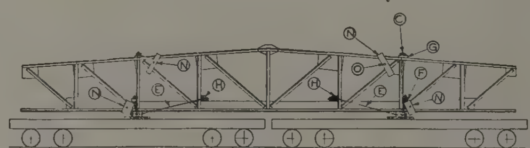


FIG. 64 MANNER OF LOADING ROOF TRUSSES AND SIMILAR MATERIAL.

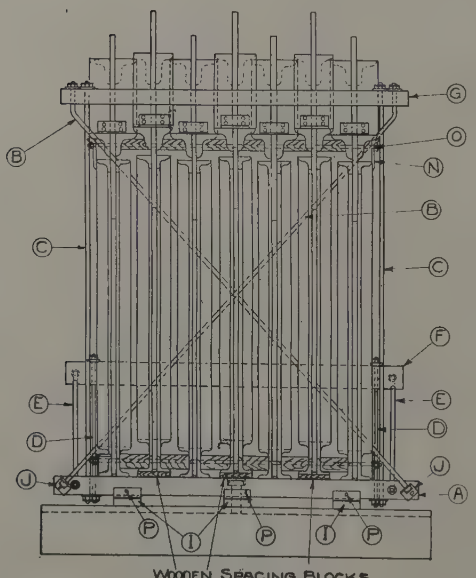


FIG 64B END VIEW OF FIG. 64.

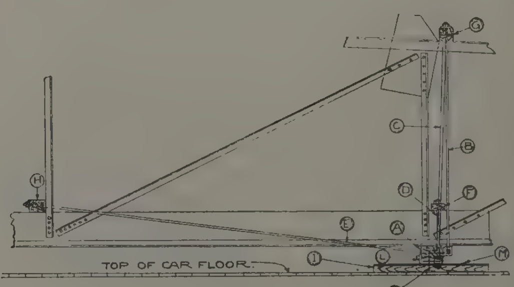


FIG. 64A. SIDE VIEW AT BOLSTER FIG. 64.

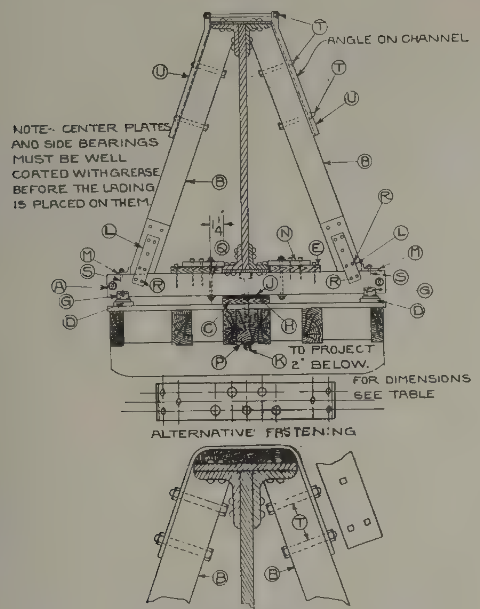


FIG 65. LOADING OF GIRDERS IN VERTICAL POSITION ON TWO OR MORE CARS.

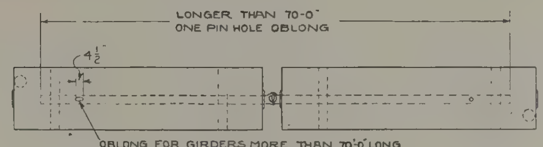


FIG.65A PLAN VIEW OF FIG 65

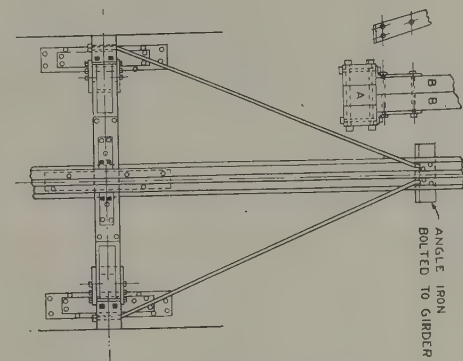


FIG. 66. PLAN VIEW OF FIG. 67

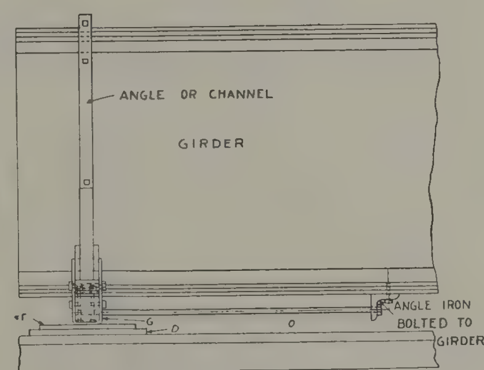
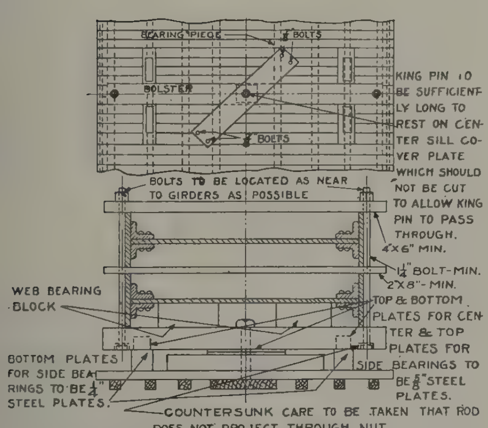


FIG 67. SIDE VIEW OF FIG. 68.



BOLSTERS SHOULD IN NO CASE BE MORE THAN 9'-6" LONG. FOR GIRDERS WEIGHING 30,000 LBS. OR LESS BOLSTERS TO BE 8" DEEP X 10" WIDE. FOR GIRDERS WEIGHING 30,000 LBS. TO 72,000 LBS. 10" DEEP X 14" WIDE. FOR GIRDERS WEIGHING 72,000 LBS. OR MORE 12" DEEP X 14" WIDE.

FIG.68. HORIZONTAL LOADING OF LONG GIRDERS ON PIVOTED BOLSTERS CARS EQUIPPED WITH STEEL UNDERFRAME.

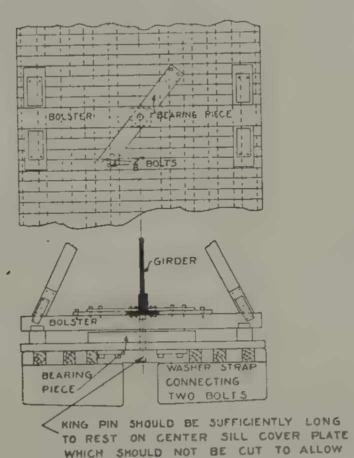


FIG.69. VERTICAL LADING OF LONG GIRDERS LOCATION OF BEARING PIECE FOR BOLSTERS FOR TWIN LOADS. CARS EQUIPPED WITH STEEL UNDERFRAMING

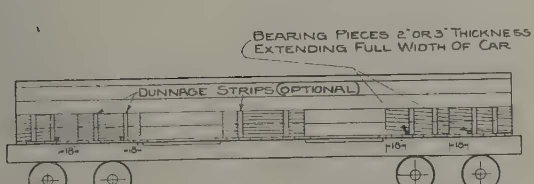
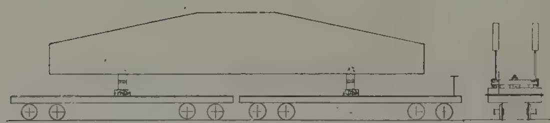


FIG 70 MANNER OF LOADING BILLETS, AXLES AND SIMILAR MATERIAL, FOUR FEET LONG OR OVER, WITHOUT DOOR PROTECTION

NOTE BRAKES MAY BE LOCATED AS LOAD WILL PERMIT

FIG 71 LOADING OF TURNTABLES



NOTE BRAKES MAY BE LOCATED AS THE LOAD WILL PERMIT   END VIEW

FIG 72 LOADING OF TURNTABLES

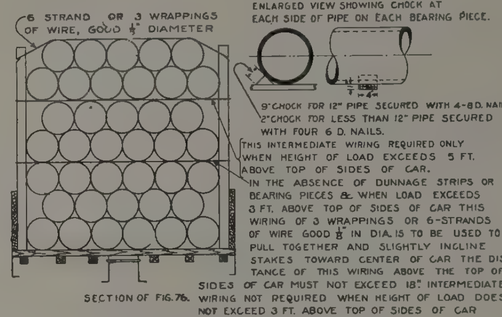
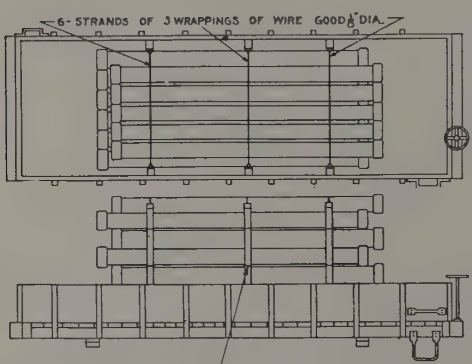


FIG. 76 LOADING IN GONDOLA CARS OF ALL PIPE OR TUBING 12" OR LESS IN DIA. X 23 FEET OR LESS IN LENGTH.



BEARING PIECES SPACED NOT MORE THAN SIX (6) FEET APART MUST BE PLACED BETWEEN CONSECUTIVE COURSES OF PIPE THESE BEARING PIECES MUST NOT BE LESS THAN FOUR (4) INCHES WIDE AND AT LEAST ONE (1) INCH THICK FOR WROT IRON PIPE AND TWO (2) INCHES THICK FOR CAST-IRON PIPE IN THE ABSENCE OF DUNNAGE STRIPS OR BEARING PIECES & WHEN LOAD EXCEEDS THREE (3) FEET ABOVE TOP OF SIDES OF CAR THIS WIRING OF SIX (6) STRANDS OR THREE (3) WRAPPINGS OF WIRE GOOD 1/8" IN DIA. IS TO BE USED TO PULL TOGETHER AND SLIGHTLY INCLINE STAKES TOWARD CENTER OF CAR. THE DISTANCE OF THIS WIRING ABOVE THE TOP OF SIDE OF CAR MUST NOT EXCEED EIGHTEEN (18) INCHES.

FIG. 74 LOADING IN GONDOLA CARS ONE LENGTH OF ALL PIPE OR TUBING 12 INCHES OR LESS IN DIA.

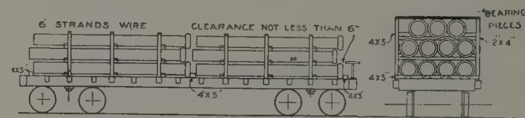


FIG 77. LADING OF WROUGHT IRON PIPE ON FLAT CARS PIPE MORE THAN 12" & LESS THAN 24" IN DIA.   END VIEW

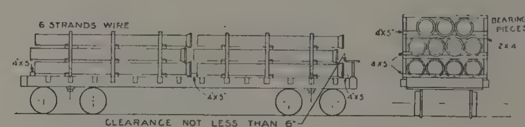


FIG 78 LADING OF CAST IRON PIPE ON FLAT CARS PIPE MORE THAN 12" & LESS THAN 24" IN DIAM.   END VIEW

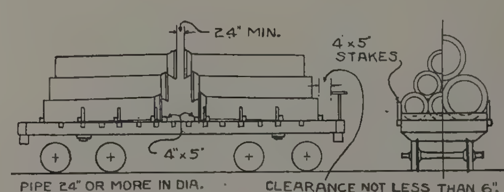
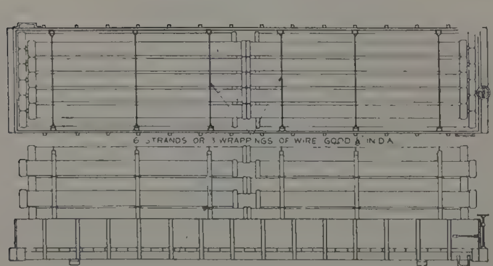


FIG. 79. LADING OF PIPE ON FLAT CARS.



IN THE ABSENCE OF DUNNAGE STRIPS OR BEARING PIECES AND WHEN LOAD EXCEEDS 3 FT ABOVE TOP OF SIDES OF CAR THIS WIRING OF 3 WRAPPINGS OR 6 STRANDS OF WIRE GOOD 1/8" DIA. IS TO BE USED TO PULL TOGETHER AND SLIGTLY INCLINE STAKES TOWARD CENTER OF CAR THE DISTANCE OF THIS WIRING ABOVE THE TOP OF SIDE OF CAR MUST NOT EXCEED 18 INCHES.

FIG 75. LOADING IN GONDOLA CARS TWO LENGTHS OF ALL PIPE OR TUBING 12" OR LESS IN DIAMETER BY 23-FEET OR LESS IN LENGTH

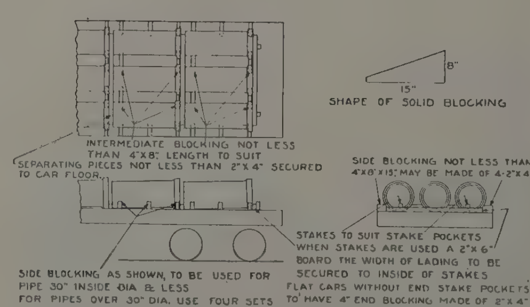
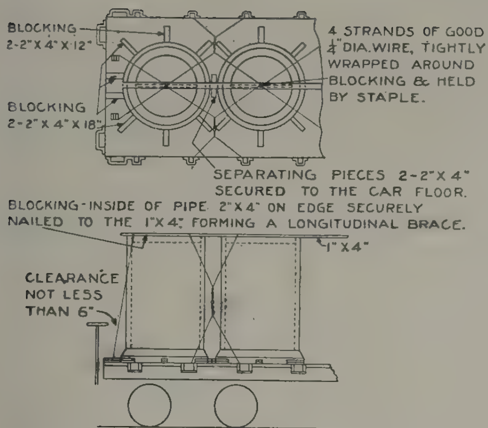


FIG. 81 MANNER OF LOADING CONCRETE CULVERT PIPES ON FLAT CARS.



NOTE:- IF THE HEIGHT OF THE PIPE IS MORE THAN 1½ TIMES ITS DIAMETER IT MUST BE WIRED AS SHOWN, OTHERWISE FLOOR BLOCKING ONLY WILL BE REQUIRED.

FIG. 82 MANNER OF LOADING CONCRETE CULVERT PIPE ON END, ON FLAT CAR.

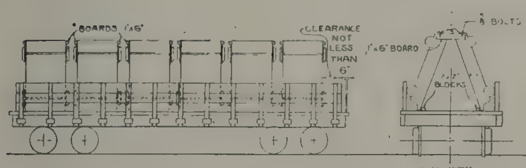


FIG. 83 MANNER OF LOADING MINING CARS AND SIMILAR VEHICLES IN GONDOLA CARS.

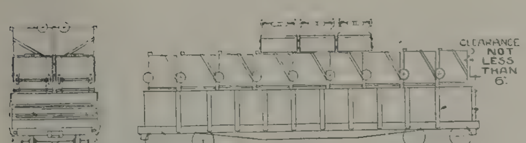
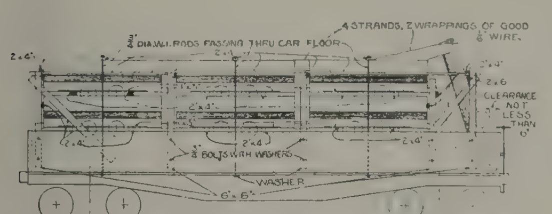


FIG. 84. MANNER OF LOADING MINING CARS AND SIMILAR VEHICLES IN GONDOLA CARS.



NOTE.- ALL TIMBERS USED TO SUPPORT LOAD MUST BE HARDWOOD. SIZES GIVEN ARE MINIMUM.

FIG 85 MANNER OF LOADING MINING CARS IN GONDOLA CARS WITH SIDES LESS THAN 44" IN HEIGHT.

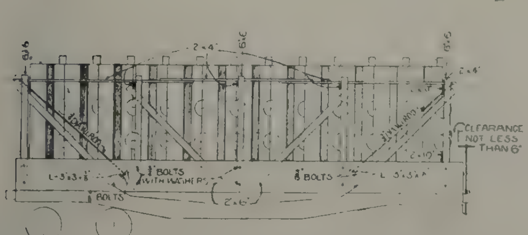


FIG. 86. MANNER OF LOADING MINING CARS IN GONDOLA CARS WITH SIDES LESS THAN 44" IN HEIGHT.

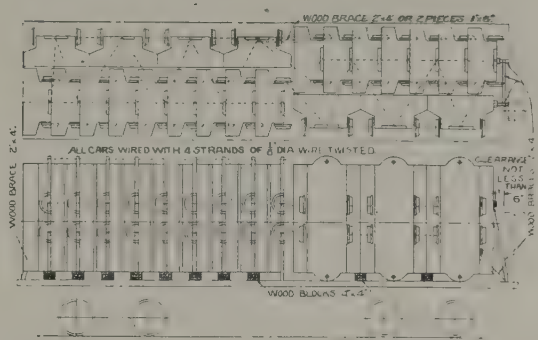


FIG. 87 MANNER OF LOADING MINING CARS IN GONDOLA CARS

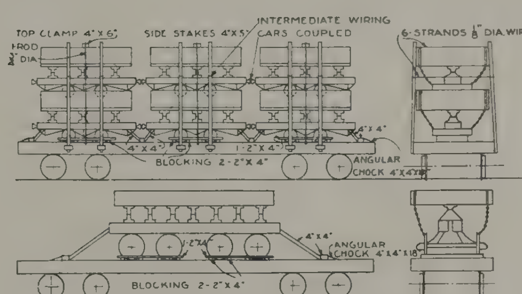


FIG 88 MANNER OF SECURING DUMP CARS & SIMILAR VEHICLES ON FLAT CARS

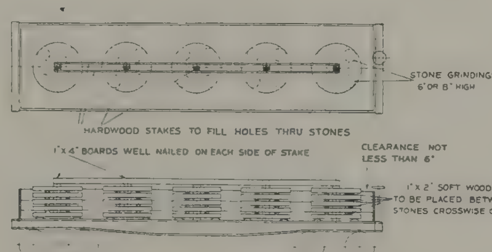


FIG 89 MANNER OF LOADING GRINDSTONES ON GONDOLA CARS.

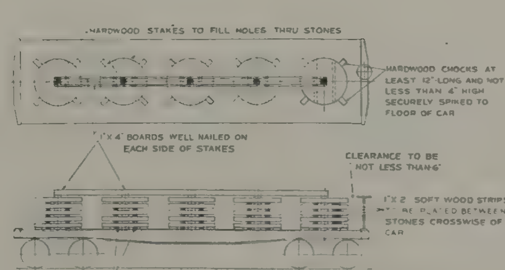


FIG 90 MANNER OF LOADING GRINDSTONES ON FLAT CARS

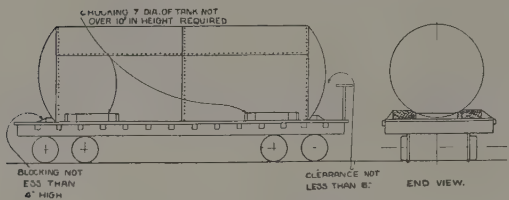


FIG 91 BOILER SHELLS AND TANKS 8FT OR LESS IN DIAMETER

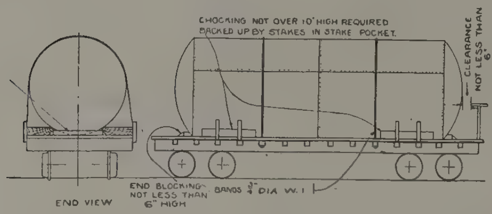


FIG 92 BOILER SHELLS AND TANKS OVER 8 FT. IN DIAMETER

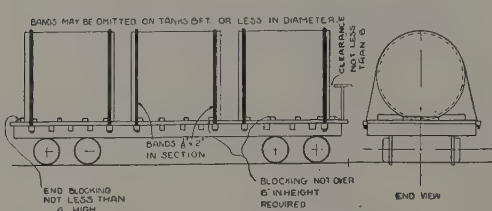


FIG. 93. SECTION OF BOILERS TANKS OR SHELLS OVER 8 FT. IN DIA. WEIGHING LESS THAN 2500 LBS. PER SECTION

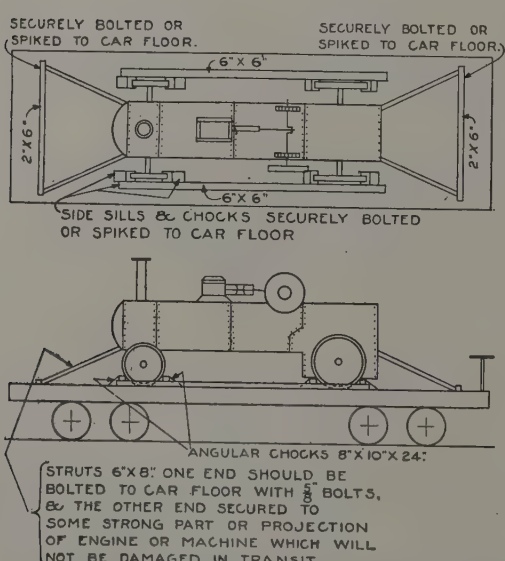


FIG. 94 LOADING OF ENGINES & SIMILAR MACHINERY.

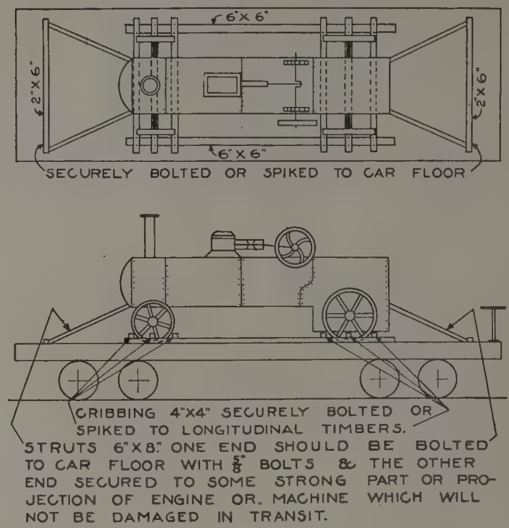


FIG. 95 MANNER OF LOADING ENGINES & SIMILAR MACHINERY.

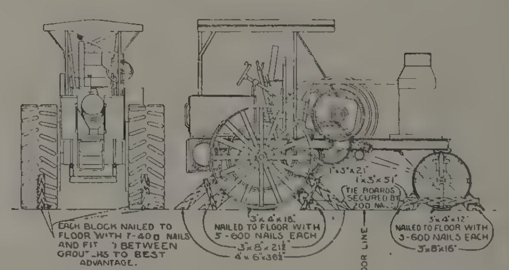


FIG. 96 MANNER OF LOADING GASOLINE TRACTOR ENGINES ON FLAT CARS

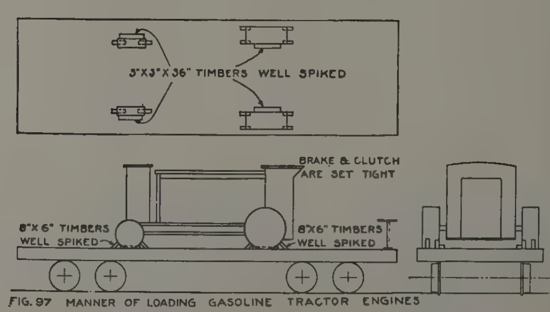


FIG. 97 MANNER OF LOADING GASOLINE TRACTOR ENGINES ON FLAT CARS.

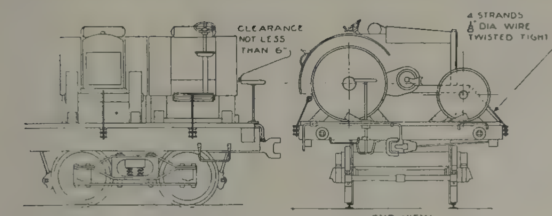
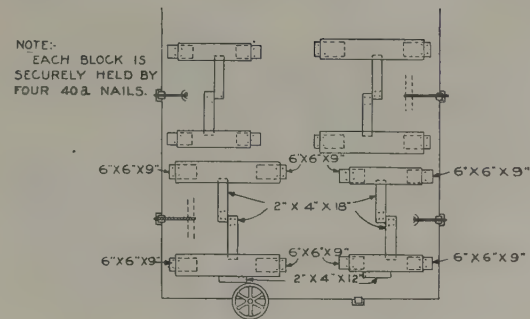
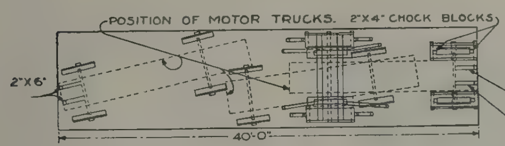


FIG 98. MANNER OF SECURING TRACTOR ENGINES LOADED ON FLAT CARS THE LENGTH OF WHICH IS LESS THAN THE WIDTH OF CAR.



PLAN VIEW OF BLOCKING OF FIG. 98.

FIG. 98 A MANNER OF SECURING TRACTOR ENGINES LOADED ON FLAT CARS THE LENGTH OF WHICH IS LESS THAN THE WIDTH OF CAR.



PLAN OF ARRANGEMENT OF WHEEL BLOCKING ON CAR FLOOR.

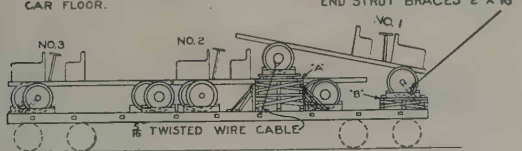
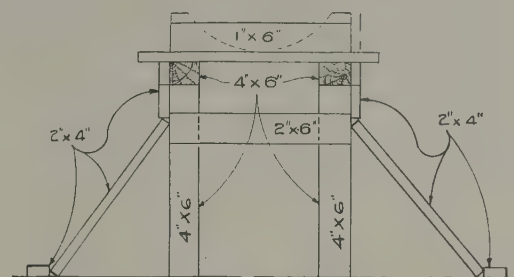


FIG. 99 MANNER OF LOADING 3-1, 1½, 2, OR 3 TON MOTOR TRUCKS ON GONDOLA AND FLAT CARS.



SIDE ELEVATION.

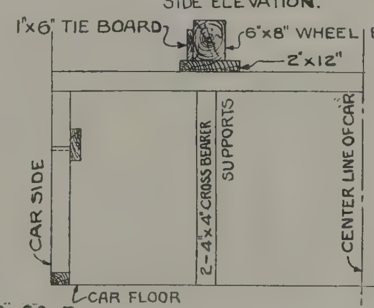
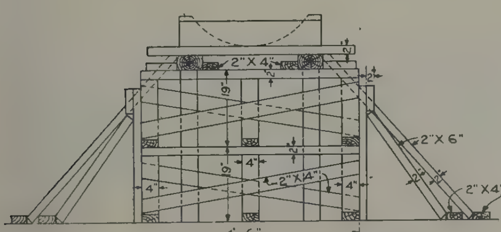
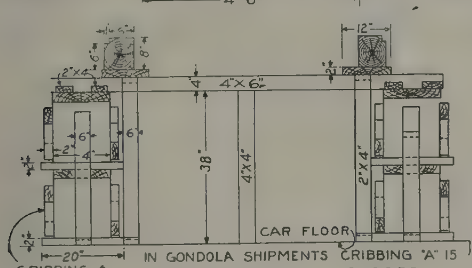


FIG. 99-B. THIS METHOD OF SUPPORTING CROSSBEARER MAY BE USED IN BOX CARS INSTEAD OF CRIBBING "A".





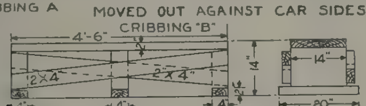


FIG. 99 A CRIBBING A

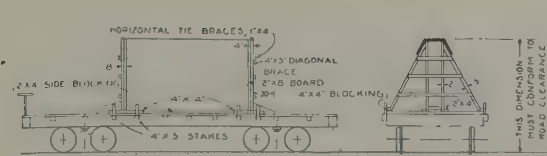


FIG 101 LADING OF PLATE GLASS ON FLAT CARS

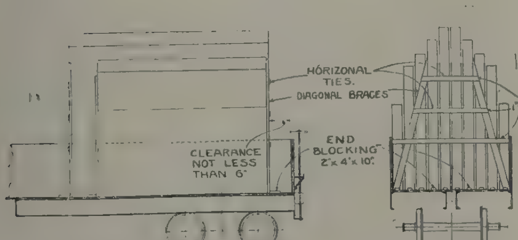


FIG. 102. MANNER OF LOADING PLATE GLASS ON FLAT OR GONDOLA CARS.

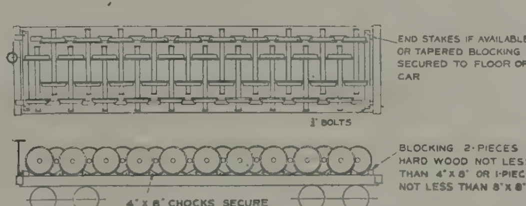


FIG. 103 MANNER OF SECURING MOUNTED WHEELS LOADED ON FLAT CARS

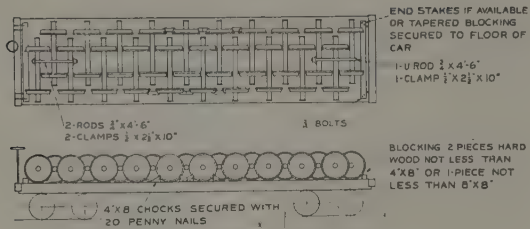


FIG 104 MANNER OF SECURING MOUNTED WHEELS LOADED ON FLAT CARS

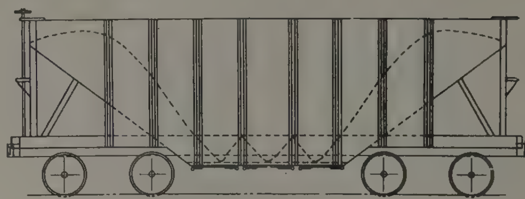


FIG. 106 MANNER OF LOADING IRON ORE, LIMESTONE & SIMILAR MATERIAL

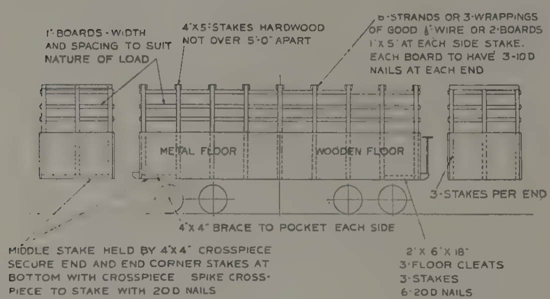


FIG. 105

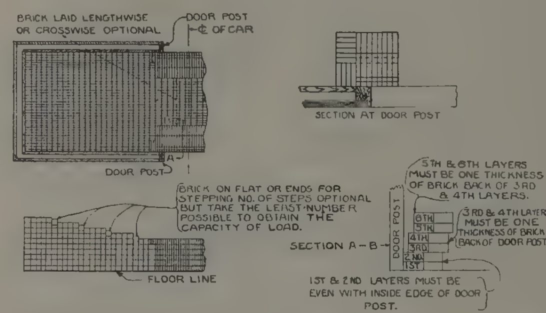


FIG. 107. MANNER OF LOADING BRICK 15" OR LESS IN LENGTH WITHOUT DOOR PROTECTION

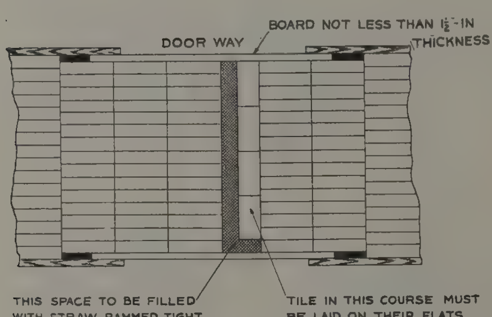


FIG. 108 MANNER OF LOADING BRICK WHEN DOOR PROTECTION IS REQUIRED

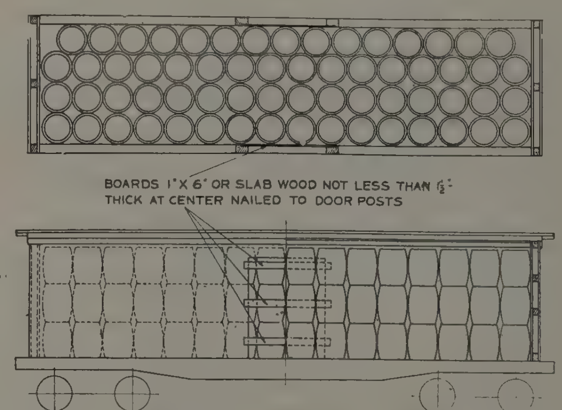


FIG. 110 MANNER OF LOADING BARRELS IN BOX OR STOCK CARS

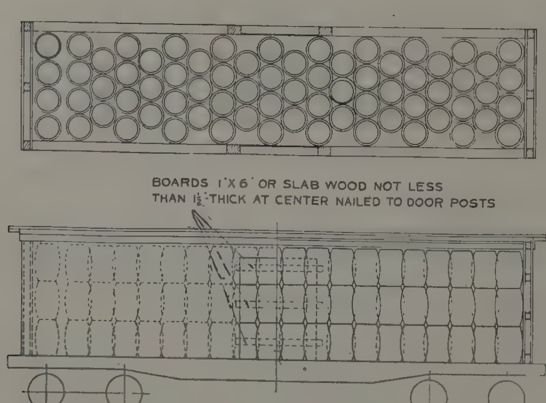


FIG 108 MANNER OF LOADING BARRELS IN BOX OR STOCK CARS

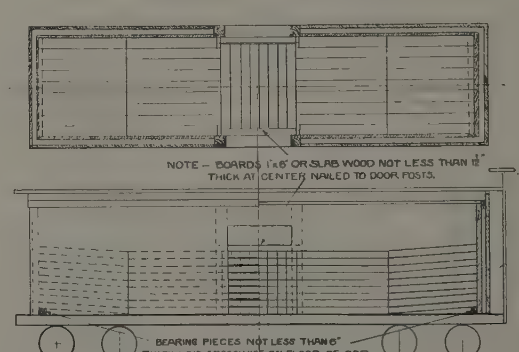


FIG. 111 MANNER OF LOADING TIES, FENCE POSTS, WOODEN BILLETS, BARREL STAVES AND SIMILAR SHORT WOOD IN CLOSED CARS.

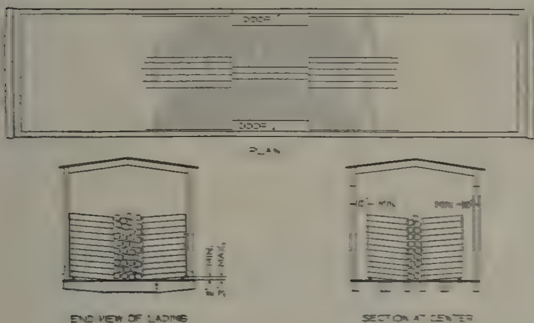


FIG. 111-A MANNER OF LOADING WOOD CORES 3 TO 4½ FEET LONG IN BOX OR STOCK CARS

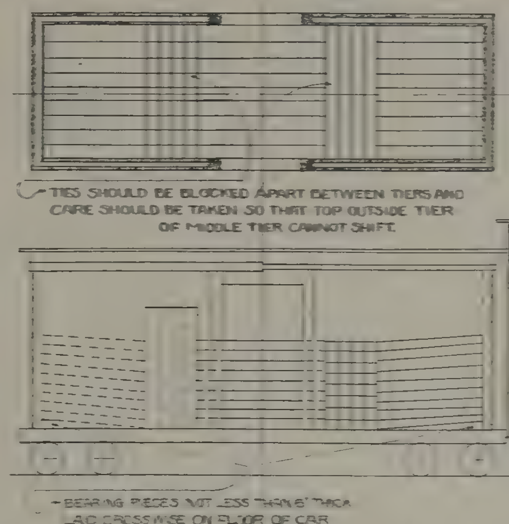


FIG. 114 MANNER OF LOADING THREE PILES OF TIES IN CLOSED CARS.

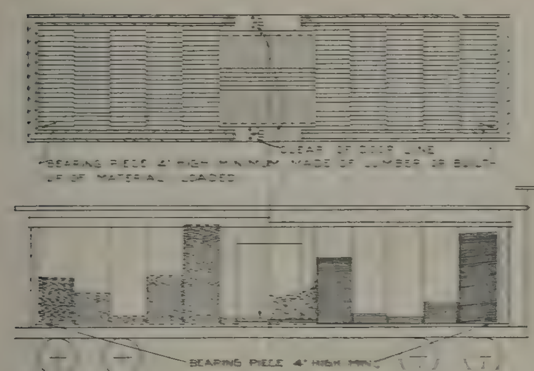


FIG. 112 MANNER OF LOADING STAVES-FENCE POSTS-LATH-TANBARK & SIMILAR MATERIAL IN CLOSED CARS WITHOUT DOOR STRIPPING.

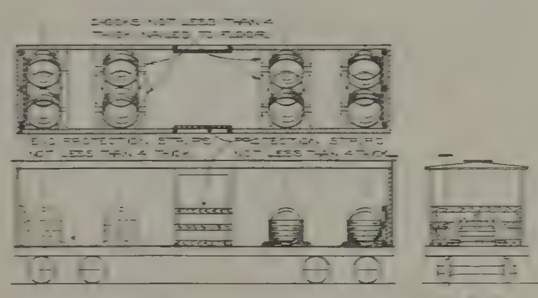


FIG. 115 MANNER OF LOADING TIRES IN BOX OR STOCK CARS

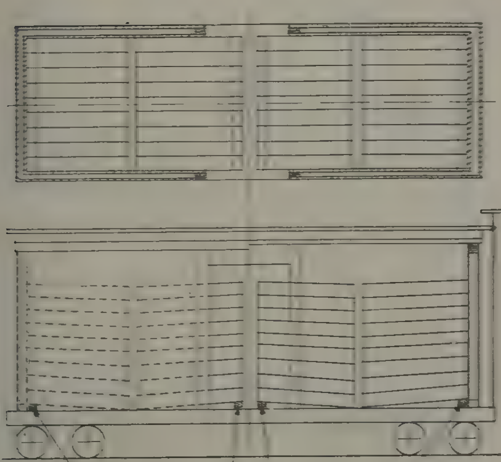


FIG. 113 MANNER OF LOADING FOUR PILES OF TIES IN CLOSED CARS.

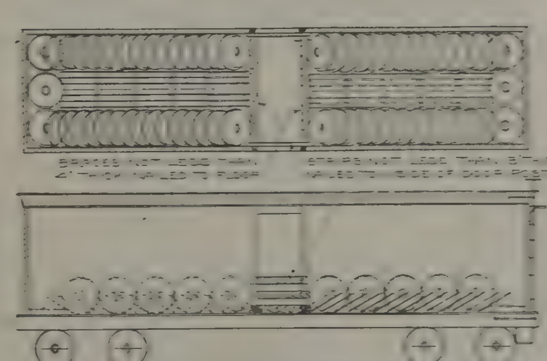


FIG. 116 MANNER OF LOADING WHEELS IN CLOSED CARS.

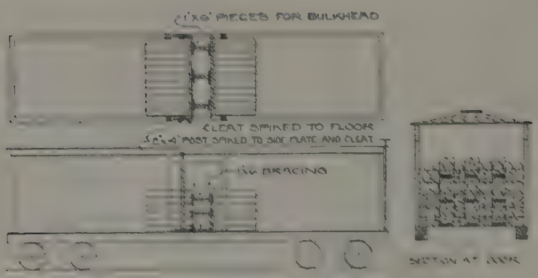


FIG. 117. MANNER OF LOADING SEWER PIPE IN CLOSED CARS.

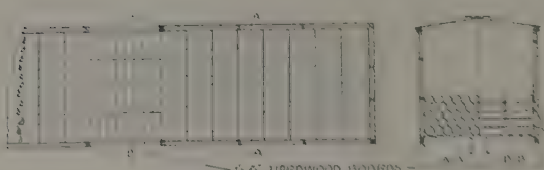


FIG. 118. MANNER OF LOADING DRAIN TILE 8" IN DIAMETER AND UNDER.

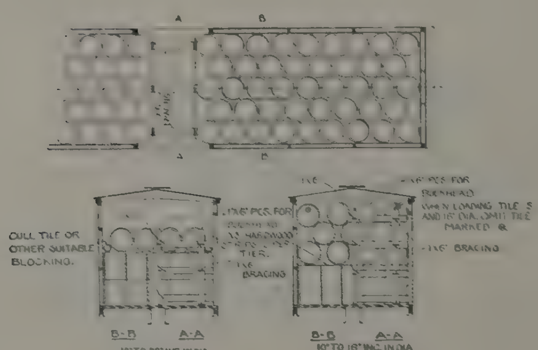


FIG. 119. MANNER OF LOADING DRAIN TILE 10" TO 28" IN DIA.

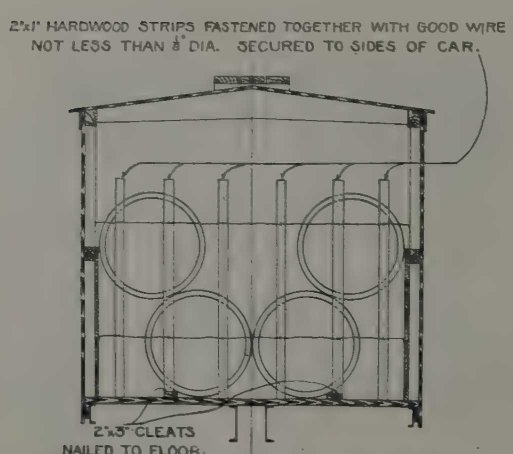


FIG. 120. MANNER OF LOADING DRAIN TILE 30" IN DIA. AND OVER.

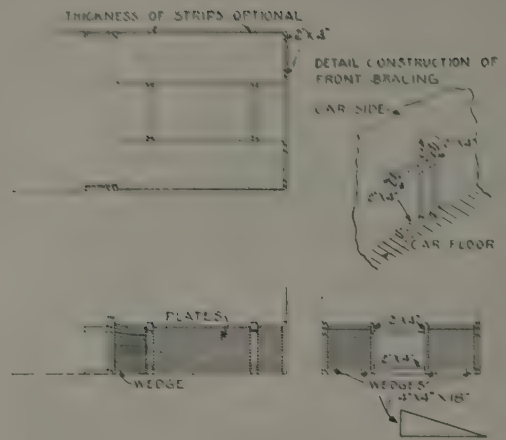


FIG. 121 MANNER OF BRACING STEEL PLATES IN BOX CARS.

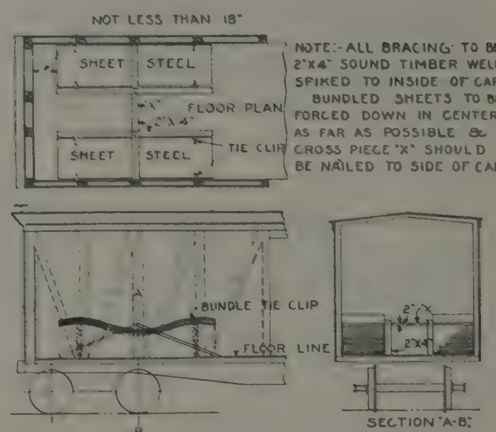


FIG. 122 MANNER OF BRACING BUNDLED SHEET STEEL PLATES IN BOX CARS.

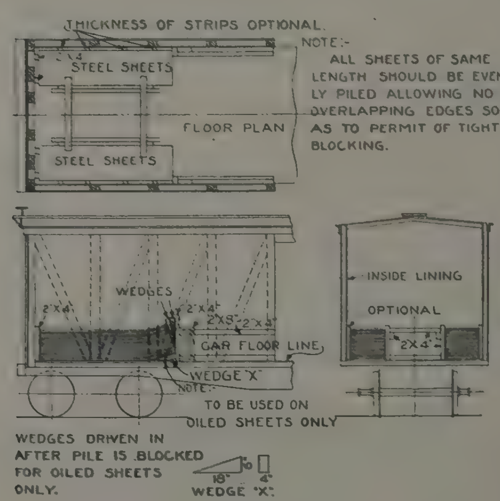


FIG. 123 MANNER OF BRACING LOADS OF PLAIN OR OILED SHEET STEEL PLATES IN BOX CARS.

Catalog
or
Descriptive Section

Because of the limitations and arrangement of the Illustrated Section, which is confined to illustrations, titles and dimensions, a separate section is here devoted entirely to more detailed descriptive data of the various devices shown in the other sections; also information about the selling organization and address of manufacturers and their representatives.

With the addition of this important section users will find the *Car Builders' Dictionary and Cyclopedia* of increased value, since great care has been used in compiling the large fund of data which is intended to be helpful in car design, construction and maintenance.

This entire section has been arranged alphabetically by name of the manufacturer rather than by product, since a classified index of products has been included on pages 1320 to 1330, which not only refers to complete descriptions by page number but also to illustrations throughout the *Dictionary and Cyclopedia* by figure number.

A trade name index is also included on pages 1331 to 1333, which will make possible quick reference to descriptions where only the trade name is known.

The alphabetical index to this entire Catalog or Descriptive Section appears on page 1334.

Passenger Car Fittings

Washstand and Lever Fittings

White Ajax metal washstands are made of solid metal of the same color throughout, including the trimmings. It is therefore unnecessary at any time to remove these fixtures for replating. They have the appearance of silver or nickel plate and retain their color throughout their life.

White Ajax Metal Washstand

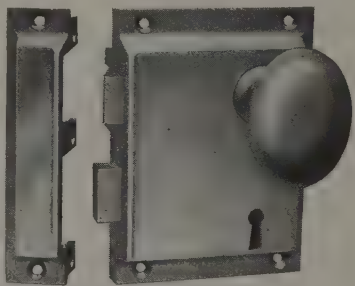
The three important considerations in selecting trimmings are: 1. Ease of operation. 2. Simplicity of construction. 3. Economy of maintenance.

All working parts of the Adlake Lever Faucet and Lever Drain are removable from above the washstand. The removal of two screws which hold the housing in position gives access to all working parts for repairs or replacement. The working parts are accessible through the top of the stand and the loosening of the hexagonal nut permits them to be withdrawn.

The faucet is self-draining; since the valve set is higher than the pipe leading into the bowl, water that would otherwise tend to remain in the faucet after the valve is closed drains directly into the bowl. As no water remains in the faucet there is no danger of freezing.

The drain plug is operated by a flexible shaft. Removing a screw at the side of the valve casing permits removal of the valve for cleaning the outlet pipe.

Outside Car Door Lock

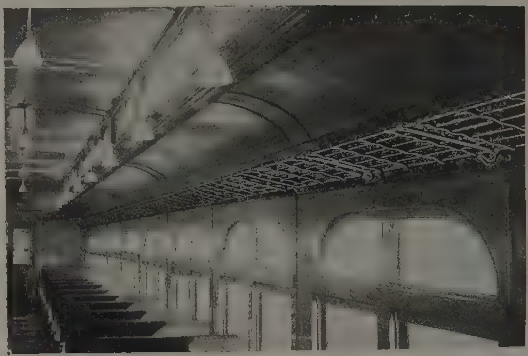


One of the Many Adlake Door Locks

The Adams & Westlake Company manufactures many types of car door locks, one of which is shown in the accompanying illustration. Door locks are an important part of the interior hardware of passenger cars on account of the more constant use of the working parts than occurs with any of the other fittings.

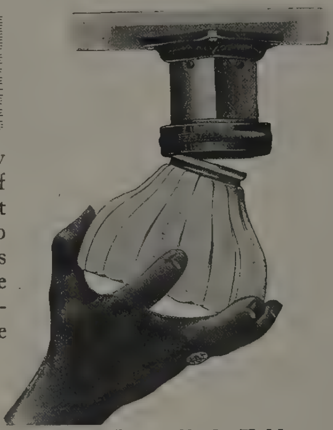
Rod Bottom Basket Rack

The Adlake rod bottom basket rack is not only neater in appearance than the cast rack, but is stronger and roomier. It is made in sections which can be used either as separate sections or together to make a continuous rack the length of the car. The individual



sections can be made up in any length but should not exceed 40 inches between the supporting brackets.

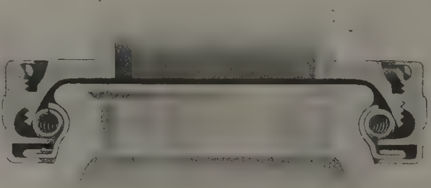
"Flex" Lamp Shade Holder



"Flex" Lamp Shade Holder

The thumb screw grip on the neck of a shade is inefficient and costly owing to the breakage of shades from unequal pressure and because of no allowance being made for expansion under change of temperature. Thumbscrews work loose and allow the shade to rattle or drop out and shocks to the train sometimes cause breakage of the neck at the point of contact of the screws.

The "Flex" shade holder consists essentially of a



Detail of "Flex" Shade Holder

continuous spring coil held between a recess in the body of the shade support and a split sheet metal guide ring with spring fingers. This construction prevents the flexible spring collar from becoming weak or loose with continued use and affords sufficient elasticity to prevent chipping or otherwise damaging the shade as it enters the collar.

The Adams & Westlake Company has developed a large line of fittings and trimmings for passenger cars, including many types of brake handles, lighting fixtures, washstands and closets, basket racks and general car interior hardware, and is prepared to fulfill any requirements for materials, equipments or appliances of this kind.

Car Brake Shoes

Requirements

The requirements of the brake shoe are safety, friction and durability, with no harmful action on the wheel.

Development

The product of the American Brake Shoe and Foundry Company is the result of long experience in the manufacture of brake shoes, together with constant tests in the laboratory and in actual service.

Types

Improved methods of manufacture; the selection of special body metal and inserts; approved reinforcing features; produce types of brake shoes combining the highest efficiency, durability and safety, which have become the recognized standards of American practice.

The types of brake shoes illustrated, fully meet the M. C. B. requirements for friction and wear, and are in general use on the chilled iron and steel wheels in all classes of railway service.

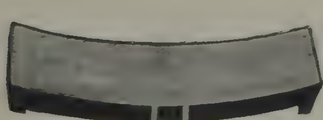
Steel Back Shoe—*New*

Steel Back Shoe—Cracked, but Good for service

Steel Back Shoe—Worn to the limit

Plain Gray Iron Type

The *Plain Gray Iron,* steel back and steel lug shoe has the highest friction and durability that can be obtained from a gray iron wearing face.

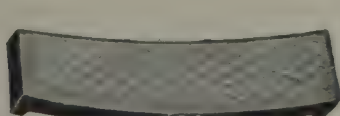


Special Chilled Type

The *Special Chilled* steel back and lug shoe has a strong gray iron wearing face, with hardened ends, and has increased durability with satisfactory frictional qualities.

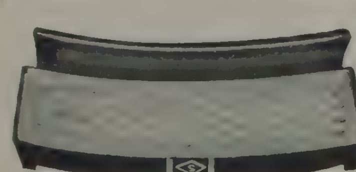
Diamond "S" Type

The *Diamond "S,"* steel back and steel lug shoe, combines the high frictional qualities of the Plain Gray iron, with the maximum durability, and is reinforced throughout the life of the shoe by the insert of expanded mild steel, producing a shoe which is indestructible except by actual wear.



Flanged Diamond "S" Type

For Motor and Interurban Service where Brake Beams cannot be used, and the unflanged shoe will not keep its position on the wheel, the flanged Diamond "S" steel back brake shoe has proven efficient and economical.



Sales Offices

The offices of this company are at 30 Church Street, New York City; 332 S. Michigan Ave., Chicago, Ill.; and Chattanooga, Tenn.

The American Automatic Slack Adjuster

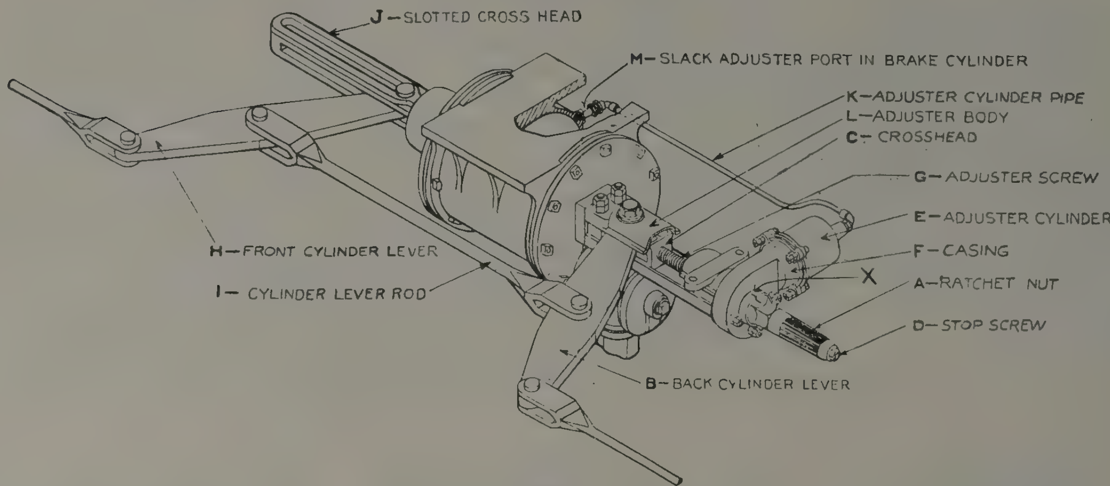
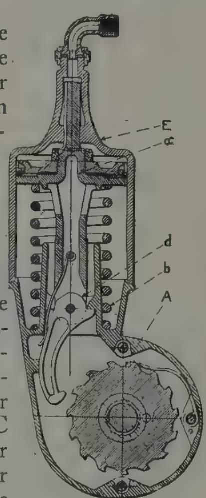


Plate 1

Description and Operation

The American Automatic Slack Adjuster is designed particularly for steam passenger equipment and electric traction cars. While made in types to suit the various sizes of brake cylinders, the type J, as here illustrated will show the principles and operation of all.

It is secured to the pressure cylinder head, as shown on Plate 1; and the end of the back cylinder lever B, otherwise fulcrumed on this head, is connected to the adjuster crosshead C. Screw G is secured to this crosshead and extends through a hole in the end of the slack adjuster body L. Ratchet nut A, having a hollow extension to protect the screw, turns on this screw and, by bearing against the end of the body, draws the crosshead C away from the brake cylinder when taking up slack, carrying with it the end of back cylinder lever B. Moving the crosshead C from or toward the brake cylinder any given distance shortens or lengthens the piston travel the same amount,—an important feature when a brake application shows just how much this piston travel should be altered, particularly as the ratchet nut requires at most an ordinary wrench to turn it. The adjuster is automatic *only in taking up slack.* Slack must always be let out on the adjuster by hand.



RELEASED
Plate 2

In automatically shortening the piston travel, or "taking up the slack," as it is commonly termed, the ratchet nut A is turned by the adjuster cylinder E, which receives its compressed air from the brake cylinder through the adjuster cylinder pipe connecting with adjuster brake cylinder port M, tapped into the brake cylinder at the desired piston travel. The port opening into the brake cylinder is small, (1/8″), so as to prevent damage to the piston packing leather. When the latter passes beyond this port the brake cylinder air, thereby admitted to the adjuster cylinder E, acts on its piston *a,* Plate 2, compresses its spring *b,* moves its pawl *d* over two teeth of the ratchet nut A and allows it to engage one of them. However, this does not take up any slack; it is the wrong time to do so, as the brake is applied; but when it is released and the brake cylinder piston has passed back beyond the slack adjuster port M, Plate 1, the air from the adjuster cylinder E escapes through the non-pressure head of the brake cylinder. Then, as the heavy strain is removed from the brake rigging, spring *b* moves piston *a* back, pulls pawl *d* with it and makes about 1/8 of a turn of the ratchet nut A. This shortens the piston travel 1/30 of an inch, the small amount which years of experience have shown to give the most satisfactory results. As this movement is completed, the hook on pawl *d,* Plate 2, is disengaged from the ratchet nut tooth it was acting on, thereby permitting the ratchet nut A to be turned either way by hand. While in the illustration the pawl is disengaged from the ratchet nut by its lug coming in contact with a similar one on the casing, with the K-1 type it remains against the ratchet nut, but in such a position that its hook cannot engage the teeth.

Advantages

Each Passenger Car Brake Cylinder is supplied from an auxiliary reservoir carefully proportioned to produce a certain pressure in the brake cylinder with a given brake pipe reduction, but whether this is obtained in practice depends on an operative feature of the brake cylinder which varies constantly and which is termed Piston Travel. Piston Travel means the distance the brake cylinder piston moves outward (from its position with the brake released) when a brake application is made, and to obtain the best results, it must not only be uniform on all cars in a train, but must also be at the amount for which the brakes are designed.

The great importance of maintaining correct piston travel is clearly illustrated on Plates 3 and 4.

Plate 3 shows graphically the constant piston travel maintained with the slack adjuster (Car 1); the gradually reduced brake cylinder pressure and braking power with a lack of slack adjustment (Car 2); and the constant variation of piston travel with the best hand adjustment (Car 3).

On Car 1 it is shown that the gradual wearing

The American Automatic Slack Adjuster

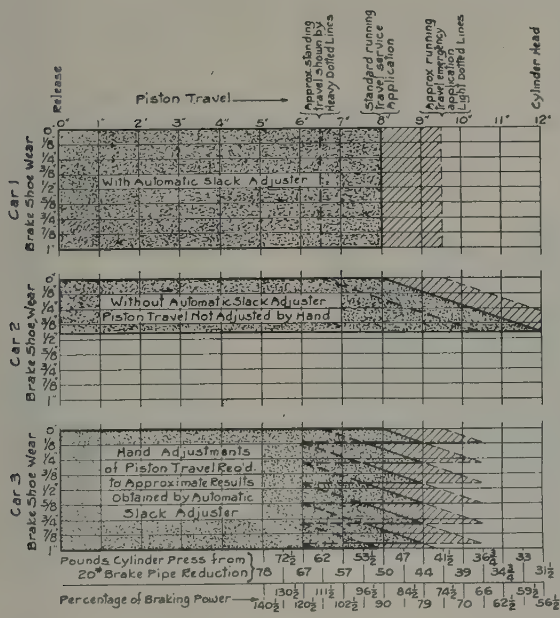


Plate 3

away of brake shoes has no effect on the desired piston travel.

On Car 2 when the brake shoes have worn only 7/16″ the piston has come in contact with the cylinder head, and on Car 3 the frequent readjustment of the piston travel by hand gives a constantly varying cylinder pressure.

Plate 4 illustrates the results in piston travel when Cars 1 and 2, Plate 3, are started from the terminal with 8″ standing piston travel. It will be observed that Car No. 1 has 9½″ *running* piston travel at the start, which is gradually taken up to 8″ by the slack adjuster and then maintained at this travel, while the piston travel on Car No. 2, starting at the same amount, steadily increases until with only 5/16″ brake shoe wear the piston comes in contact with the cylinder head —12″ travel and brake useless.

As an example of the effect of varying piston travel, shown by Plate 4, if one car in a train has 6″ and another one 9″ piston travel (both of which are very moderate variations from standard where hand adjustment of piston travel is depended upon), a brake pipe reduction of 20 pounds will produce 23 pounds higher brake cylinder pressure with the car having the 6″ travel. While this means a difference in percentages of braking power of over 40, certainly bad enough, yet in the far more usual lighter brake applications the difference is materially greater. Wider variations in piston travel increase these differences and their consequent bad effects.

So far we have dealt with brake cylinder and brake shoe pressures, but what do variations in them mean in practice? Long piston travel prevents trains from being stopped as quickly as they should be when danger is impending. Short piston travel means that the brakes not only do proportionately more than they should, but that their "flexibility," is seriously impaired. In other words, even a moderate brake pipe reduction gives more braking power than desired. Furthermore, different piston travels on cars in the same train make them hold or retard unequally, and by causing the slack to run violently, produce disagreeable and damaging shocks. Finally, too high braking power on some of the cars in a train and the consequent shocks from the slack running in or out violently are two of the more common causes of wheel sliding. Low braking power from long piston travel on any car, necessitates just that much more work being done by the brakes on cars with shorter piston travel.

The two principal causes of variation in piston travel are wear of brake shoes and the greater effect of lost motion in car trucks, etc., when a car is running than when it is standing. Running piston travel is always greater than standing piston travel, and varies on different cars from one inch to four inches and sometimes even more.

Hand adjustment is only approximate at the best; because (1) it can be made only when cars are standing, (2) the increase of running over standing piston travel is not known, and (3) on long runs the necessary delay causes guesswork.

Running piston travel is always more than standing piston travel, yet running travel also varies greatly on the same car. While, generally speaking, it is about 1½″ more than standing travel, considering the average running brake application, the difference grows greater with heavier applications and longer time required to stop, as from higher speeds and down steeper grades. Therefore, with an automatic slack adjuster designed to take up at one brake application all excess over the desired piston travel, even one unusually heavy service application from high speed would result in too short and unequal travel on all cars until enough brake shoe metal had been worn off to partly restore the desired piston travel, add an emergency application and the results would be proportionately worse. This explains why uniform regulation of piston travel automatically is impossible if the device can take up all excessive travel at one operation.

While it is important to have an automatic slack adjuster so located as to best protect it from dirt, snow and ice and to render it accessible for letting out slack, inspection and repairs, yet another and most important consideration makes it almost imperative that it be located close to the brake cylinder, as it is piston travel that is to be regulated, not brake shoe clearance. To secure these advantages, the American Automatic Slack Adjuster is located on the brake cylinder and actuated by the movement of the brake cylinder piston.

See also Figs. 1529-1530, in Illustrated Section.

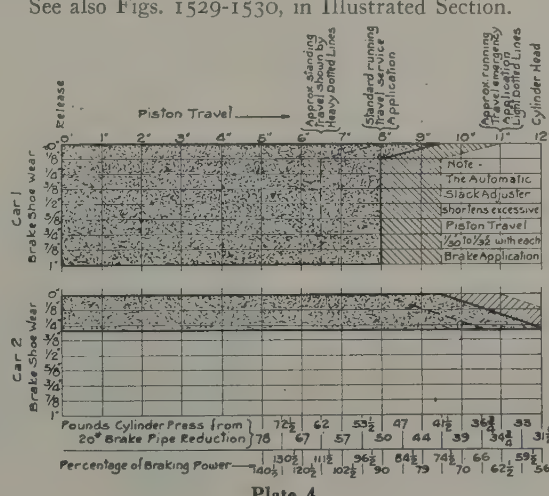
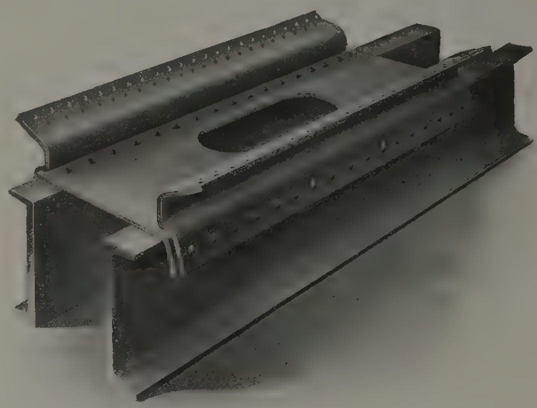


Plate 4

The American Center Anchor for Tank Cars

Advantages

The idea of anchoring a tank at the center of the car by a strongly riveted connection with the underframe has demonstrated unquestioned superiority over any form of riveted or bolted double anchor, in that it leaves the tank free to expand in every direction, where with the latter form unequal expansion between tank and center frame causes intermittent strains and ultimate leakage, and also makes assembling difficult because the rivet holes in tank and anchor do not register well.



The center anchor shown is recommended and used as standard on new tank cars built by the American Car and Foundry Company, and in the overhauling of old cars. Its installation eliminates the old head blocks and double anchors, and completely overcomes the faults of both. The use of this device is particularly desirable on old cars because it is applied at the point where the tank has not previously been strained.

This anchor consists of a base plate and two side plates formed from heavy pressed steel. The base plate is riveted to the upper flanges of the center sill channels and has down-turned edges that fit over them. In addition to its function as part of the anchor, the base plate also acts as a cover plate for the sills, ties them together and materially increases their strength and stiffness. Where a continuous cover plate is used on top of center sills this base plate becomes a part of the cover plate.

The side plates are shaped in their top flanges to conform to and support the tank and are *permanently* riveted thereto. The bottom edges are similarly riveted to the down turned portions of the base plate. The side plates are formed with projecting ledges that act as limiting stops to secure proper distance between tank and underframe and to insure that the rivet holes in the side plates will coincide with the corresponding holes in the base plate in assembling. After assembling, these ledges carry the weight of the tank and relieve the rivets from shearing strains.

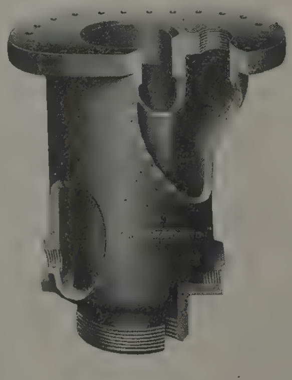
This construction possesses decided advantages. Bolts, which fit imperfectly and become loose, are entirely eliminated, and even the uncertainties of hand and air driven riveting are avoided, as all rivets are set in a "bull machine," at the correct temperature and compression for maximum tightness.

If removal of the tank is desired in overhauling, the rivets in the tank do not have to be disturbed as in ordinary constructions. All that is necessary is to cut and remove the conveniently located single rows of rivets at the bottom of each side plate, after which the tank may be lifted bodily. Upon replacement, the rivet holes will register in their original position and a new set of rivets completes the job.

The American Steam-jacketed Outlet

Advantages

The unloading of heavy liquids and semi-solids such as asphalt, pitch, resin, heavy oils, etc., from tank cars has proven difficult because of sluggishness of flow and because, as these materials are very poor heat conductors, the heating effect from even the most elaborate system of internal coils does not reach the valve and outlet—at least not in sufficient degree to thoroughly liquify the material at these very important points. As a result, the outlet valve often cannot be opened quickly or closed tightly. In addition to this fault at the valve, more or less of the residue remains and hardens in the neck of the outlet where it cannot be loosened or removed by ordinary steam coils. The building of fires under the outlet has been resorted to as a means of overcoming these conditions but damages the car.



The patented steam-jacketed outlet shown applies the heat directly where most needed, assures quick, thorough drainage with least effort and without abuse to the car, and may be used in connection with any number and length of coils. Tank-cars having this equipment can be unloaded and put back into service with the least delay.

Operation

Steam enters the jacket near the bottom of the outlet and in its travel upward through the jacket completely surrounds the outlet chamber. As all steam going to the internal coils is compelled to pass through the jacket, the valve and outlet become the hottest part of the tank.

The whole device is complete in a single casting, which contains the valve seat (machined) on its top, and is made of a special material that is particularly homogeneous in structure and free from blow holes. Every unit is given an adequate pressure test and is acceptable in every way under M. C. B. requirements.

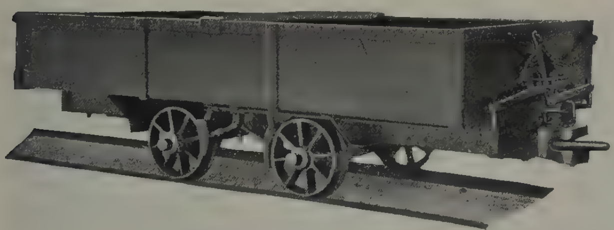
This patented outlet has already been applied to several hundred tank cars and has invariably repaid its cost well and quickly in the saving of labor and time. It can be applied to cars in service as well as to new construction, the installation in the former instance involving no particular difficulty.

Mine Cars

A Wide Range of Types and Sizes

The products of the American Car & Foundry Company include all kinds of wood, steel or composite mine and clay cars, dump cars, etc., as well as logging cars, industrial cars, railway cars for freight and passenger service, pressed steel car parts, mine car trucks with plain or roller bearing wheels, chilled cast wheels of all kinds for mine, motor, street and freight cars, special flange pipe fittings, bar iron and forgings, and general foundry and machine work.

The accompanying illustrations show two of the various types of mine cars manufactured by this Company. The wood car illustrated has an over-all length of 10′ 4″; width 4′ 1″. Length inside, 8′ 3″. Height from top of rail over-all, 3′ 2″. Capacity, 2 tons 5 cwt. Weight, 2100 lbs.



Steel Car for Rotary Dump

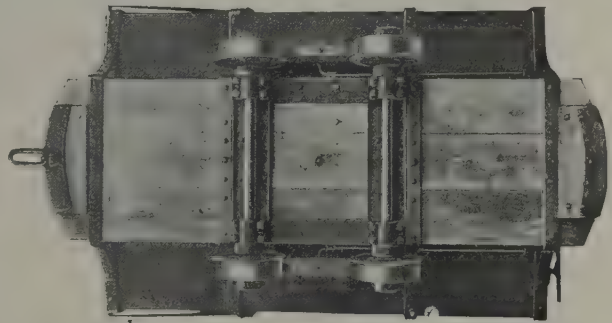
The steel car illustrated has an over-all length of 12′ 6″; width over-all, 6′ 2″. Length inside, 10′ 6″. Height from top of rail over-all, 3′ 2″. Capacity, 119 cu. ft., level full. Weight, 3600 lbs. Roller bearing boxes; wheels tight on axles. Coupler head designed to turn on shank. Dumped without uncoupling.

Specifications covering mine cars of other types and sizes will be sent on request.

Wood Car

In addition to a complete line of mine cars this company is prepared to furnish a patented mine car truck equipped with closed hub wheel, visible linch pins. Open hub, arch oiler, or roller bearing wheels, tight and loose wheel outfits or wheels pressed on the axle with or without roller bearing journal boxes can also be furnished.

For mine motor cars the American Car & Foundry Company can supply new wheels and axles complete and it makes a specialty of refitting new wheels on old axles. These wheels are made in the same foundry and the special mixture used meets P. R. R. specifications. All patterns in stock.



Channel Truck. Applicable to Wood or Steel Car

Chilled Cast Wheels

Uses and Characteristics

The chilled cast wheels manufactured by the American Car & Foundry Company include a wide variety of standard and special types suitable for all kinds of passenger cars, freight cars, street cars, engine tenders, private car lines, and mine equipment. The growth of this industry is demonstrated by the fact that during the past half century the use of chilled cast wheels has increased from 4,000,000 to more than 20,000,000 in service today.

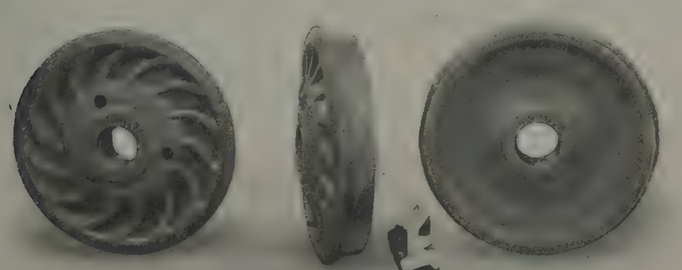
Here are a few of the proven characteristics of chilled wheels:

They are more economical in rail wear and brake shoe wear.

Less tractive power is required to haul heavy trains.

Their structure will withstand crushing or flowing under heavy loads.

They have performed successfully every function required and give the maximum return per unit of investment.



ZOXAC

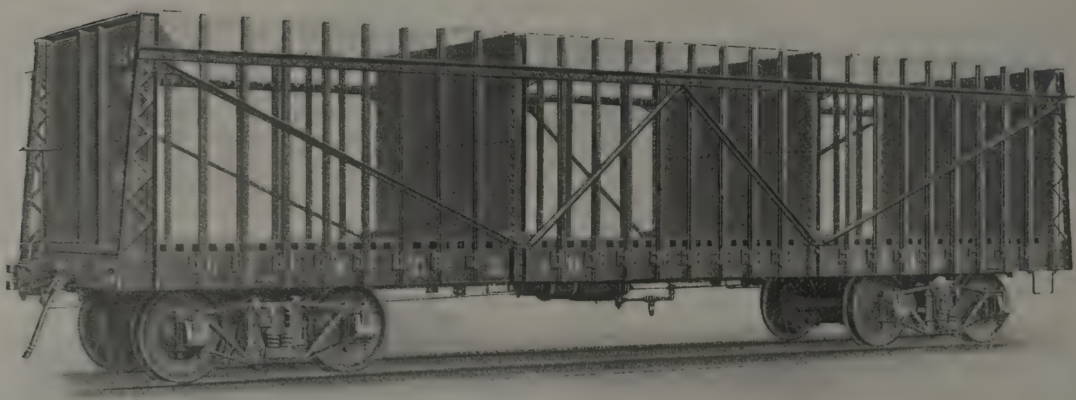
The American Car & Foundry Company has facilities for manufacturing 12,000 mine car wheels and 60,000 freight car and motor wheels per month. They can be furnished in any style to fit any axles. All patterns in stock.

This Company specializes in refitting new wheels on old axles. Make use of their facilities when in doubt, as they are always willing to give their best services to old and new customers.

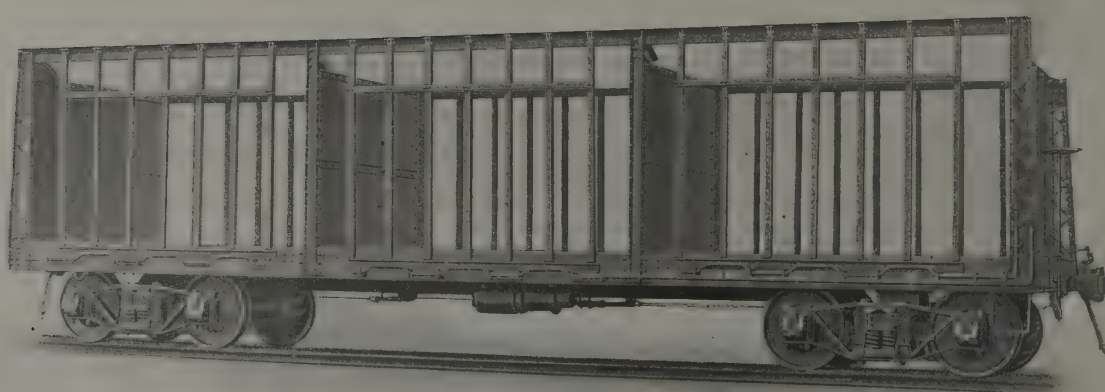
The American Car & Foundry Export Company is the foreign sales representative of the American Car & Foundry Company, New York. Cable address CAREX New York. All codes. In addition to the cane cars illustrated below this Company exports all types of freight and passenger cars, chilled cast wheels, bar iron, grey iron castings, flange pipe, car forgings, and accessories for steam and electric cars.

Steel Cane Cars

Dimensions, capacity and design will be made to suit requirements.



Steel Cane Car with wood slat floor, suitable for sling unload. Code word ZQALU.
Car can be furnished with wooden ends and partitions. Inquiries should state preference.



All Steel Car for side unload, doors operating from ends of car. Code word ZQAKW.
Car can be furnished with wooden ends and partitions. Inquiries should state preference.

Chilled Iron Car Wheels

General

The Association of Manufacturers of Chilled Iron Wheels was organized in 1909 for the purpose of making a study of the car wheel under all the exacting conditions of its service and to formulate recommendations to manufacturers and users which should ultimately result in improvement of the product and its service. Its principal achievements have been the establishment of four standard patterns of car wheels and their substitution for the hundreds of special patterns used by commercial manufacturers and railways manufacturing their own wheels. The correctness of the general design has been established by continuous service since 1909 and upon this as a basis the Association is continuing its study with the view of securing greater service and reduced cost to the railways. The Association includes 50 wheel foundries in the United States and Canada, having a capacity of 20,000 wheels a day.

Extent of Use

There are over two and one-half million freight cars in railway service in the United States and 95 per cent of these are equipped with chilled iron wheels, or about 25,000,000 wheels in all classes of service. The chilled iron wheel, since its introduction in 1850, has always been the standard equipment of vehicles of transportation for rail-borne traffic.

Standard Wheels

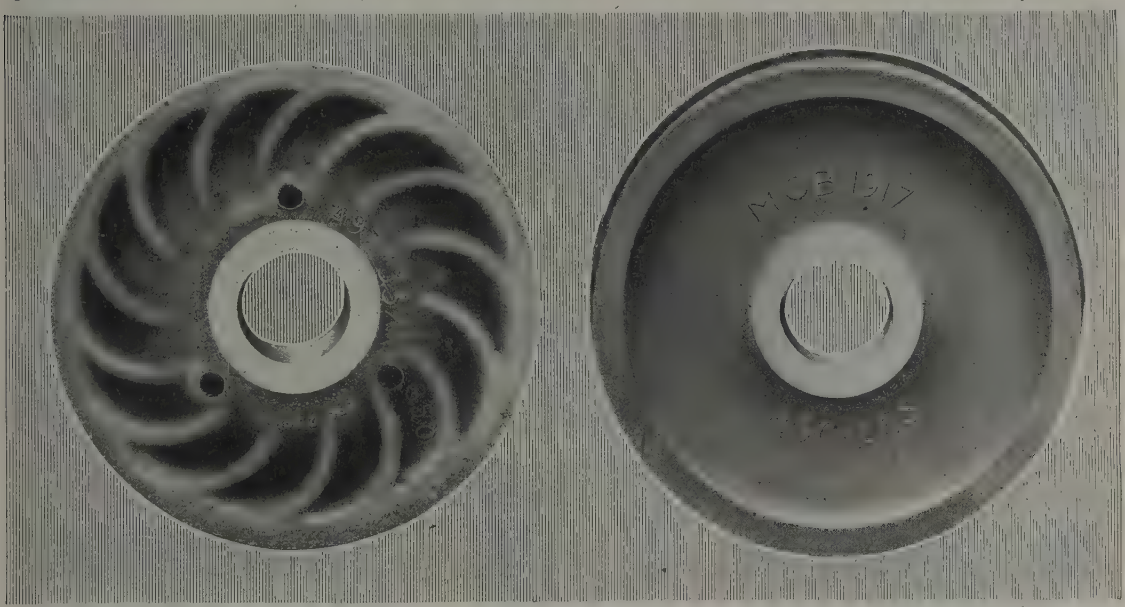
There are four general classes of freight cars, based on capacity, and the Master Car Builders' Association provides for four chilled iron wheel standards, viz:

625 lb. wheel for cars of 30 tons capacity.
700 lb. wheel for cars of 40 tons capacity.
725 lb. wheel for cars of 50 tons capacity.
850 lb. wheel for cars of 70 tons capacity.

Qualities of Chilled Wheels

Some of the properties of the chilled iron wheel that have led to its supremacy are:

1. Hardness of tread, giving maximum service for the minimum loss of metal.
2. The coefficient of friction between wheel and brake shoe is 25 per cent greater than developed by steel under the same pressure. This is of great advantage in reducing strain on the brake rigging and trucks, adding to the effective capacity of air cylinders and air pumps.
3. Chilled iron wheels will carry the heaviest load without distortion or cold-rolling of the surface metal, and always retain their rotundity; eccentric wheels cause broken rails.
4. Flat spots do not "iron out" and cause eccentricity; the noise caused by a small flat spot on a chilled iron wheel calls for its early removal before any damage is done.



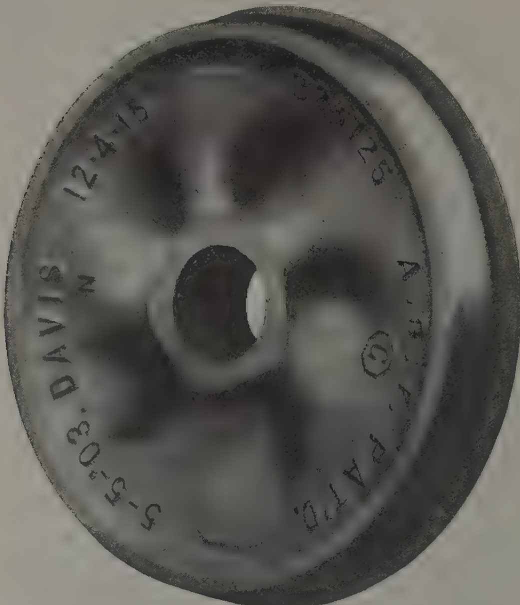
850 lb. M. C. B. Wheel for 70-ton Cars

Economic Advantages

1. Durability of brake shoes on chilled iron is from 25 to 100 per cent greater than on steel, according to the type of shoe. Slow-wearing insert shoes commonly used on chilled wheels cannot be used on steel on account of scoring.
2. The abrasion between a chilled iron flange and steel rail is much less than between a steel flange and steel rail. The reduction in loss of metal from both the flange and the rail constitutes an item of considerable economic importance.
3. So much of train resistance as is due to friction between flange and rail and to slipping of tread is less with chilled iron wheels; and is another important item of economy.
4. Scrap value of chilled iron wheels is relatively greater than of most other materials, due largely to the scattered location of wheel foundries and the consequent reduction in transportation costs.
5. Expensive lathes are not required for machining treads, rendering unnecessary a large investment in shop and machinery.

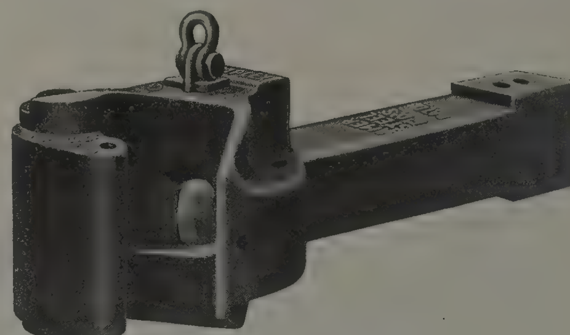
Davis Steel Wheel

The Davis Steel Wheel combines in one casting a hard, tough manganese tread and flange, and a medium soft open-hearth steel plate and hub. Its hard, tough manganese tread and flange resists not only wear but shock, and it is possible to obtain the full mileage value without the expense incident to turning a wheel down several times.



Davis Steel Wheel

ing surface of the tail. In addition, the design of this section is such that it affords the greatest possible strength. The location of the knuckle pin center on the coupling line reduces the leverage about the pin center, thereby decreasing the liability of breakage through the knuckle hub. This also allows a very wide opening of the knuckle and is one of the reasons why the Simplex Coupler "makes" easy.
tread and flange resists not only wear but shock, and are well protected against damage. The lock is a steel



Simplex Coupler

drop forging and has a positive anti-creep hook on its rear end, preventing the lock from working up. The lifter is of one piece and cannot kink. The knuckle pin has a "D" head which prevents the pin from turning and reduces the wear of the holes in the ears of the coupler body. The knuckle tail closely engages the tail pocket of the bar and the coupler will withstand severe pulling stresses, even with the pin omitted.

Section Showing Strong Corrugated Plate Construction of the Davis Steel Wheel. Shaded Area at the Tread and Flange Indicates Manganese Steel.

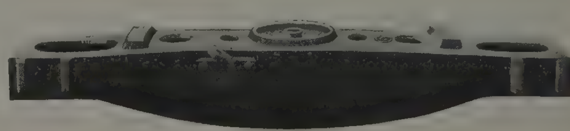
The tread of each wheel is ground to contour, insuring perfect rotundity, and the percentage of slid flats is greatly reduced. Tests have shown the strength of the manganese tread and flange to be very high. It effects a saving by reducing the dead weight from 1000 to 1600 pounds per car. This item alone shows a marked saving in train operating expenses. The Davis Wheel also brings about a marked reduction in wheel maintenance cost by eliminating the frequent removal and replacement of cast iron wheels, or the frequent removal and turning of multiple-wear steel wheels. The Davis Wheel is an economy and convenience to both operating and mechanical departments.

Simplex Coupler

The knuckle of the Simplex Coupler is one of unusual strength. Records show that the percentage of Simplex knuckle repairs is remarkably low. The knuckle has a section of large area between the hub and the lock bear-

Bolsters

The box-shape bolster shown in the illustration unquestionably provides the strongest design obtainable for locomotive tenders or heavy freight equipment. In an integral steel casting it provides simplicity, service and low maintenance cost.



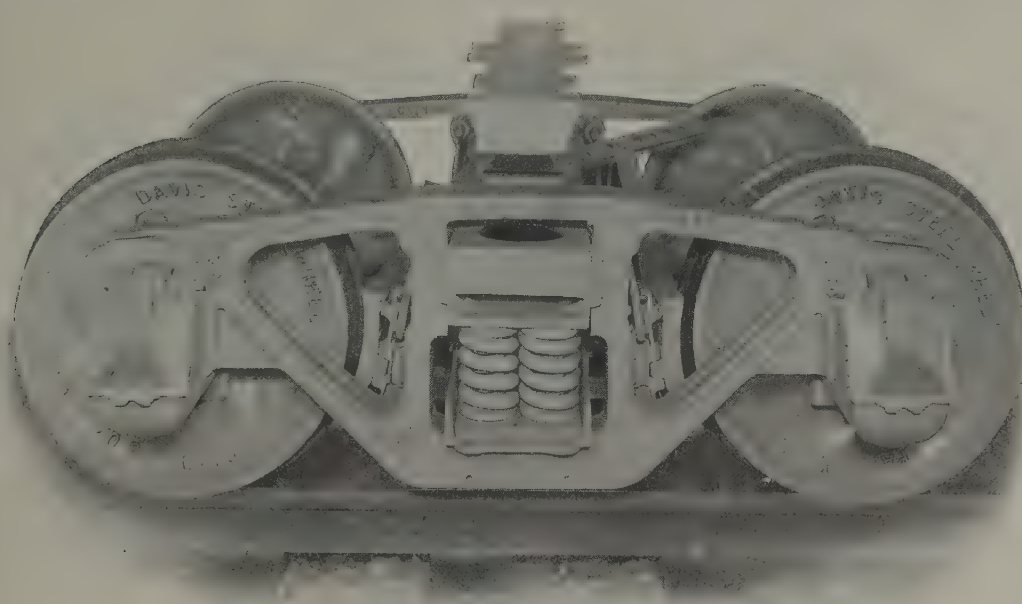
Cast Steel Bolster

We have many other designs in both cast steel and built-up body and truck bolsters, with which to meet your requirements. Our long experience in making bolsters and our extended knowledge of the steel-making art are combined in the making of high quality bolsters.

Vulcan Truck

The Vulcan side frame incorporates in a simple one-piece steel casting, strength and light weight. It combines in one casting the many parts of the old style arch bar truck and eliminates the use of a large number of bolts and nuts. Its pedestal ends fit over and around the journal boxes, holding them securely. The separable journal boxes, should they be broken in a wreck or otherwise do not involve the loss of the side frame. In changing wheels with the Vulcan truck, it is only necessary to remove one small safety tie-bolt over each journal box, jack up the ends of the truck and roll out the wheels.

Because the Vulcan truck is a square truck, there is a decrease in wear and tear, and in frictional resistance. This fact, together with its strength and low maintenance cost, is the reason for the large number of Vulcan trucks in service today.



The Vulcan Truck

Economy Draft Arm

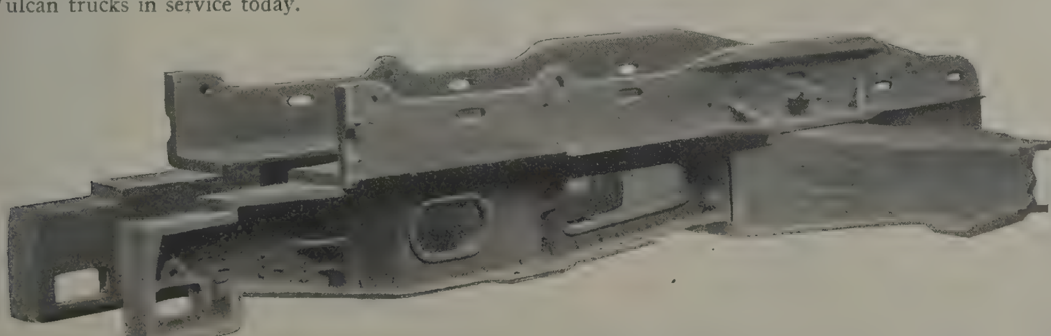
The Economy Draft Arm is a steel casting which strengthens the center sills of old wooden underframe cars and thereby prolongs the revenue-producing life of such cars. It passes alongside and under the center sills and extends thirty inches back of the bolster, at which point it butts against the sub-sill. The gear pockets are cast integral, and in the design the metal is so distributed as to give strength where strength is needed. The construction of the Economy arm does away with the uncertain shear values of numerous riveted and bolted joints.

There are various designs of the Economy arm which can be adapted to suit existing conditions. Its cost is small in comparison to the additional years of service which the car will give.

Economy draft arms are essential to car economy on old equipment.

Springs

Coil, Elliptic and Volute Springs in any capacity desired are manufactured in our spring plant at Hammond, Ind.



Economy Draft Arm

"Type D" Coupler

The Standard "Type D" Coupler of the Master Car Builders' Association is fully illustrated and described on pages 492 and 1210 to 1213. It is the result of years of effort on the part of the Association and the Coupler Manufacturers, and we are prepared to furnish this coupler in large quantities.

Six-Wheel Trucks

American Steel Foundries also manufactures and sells Lewis and Pilcher Articulated Six-Wheel Trucks for heavy freight and tender service. With the present tendency to higher capacity cars for heavy bulk freight, wheel loads have been rapidly approaching their limit, making the use of the six-wheel truck necessary in reducing the destructive effect on wheels and rails.

Other considerations such as length of sidings, train braking, economy of handling, etc., are also factors favoring the use of the heavy capacity car, which is made possible by the application of the six-wheel truck.

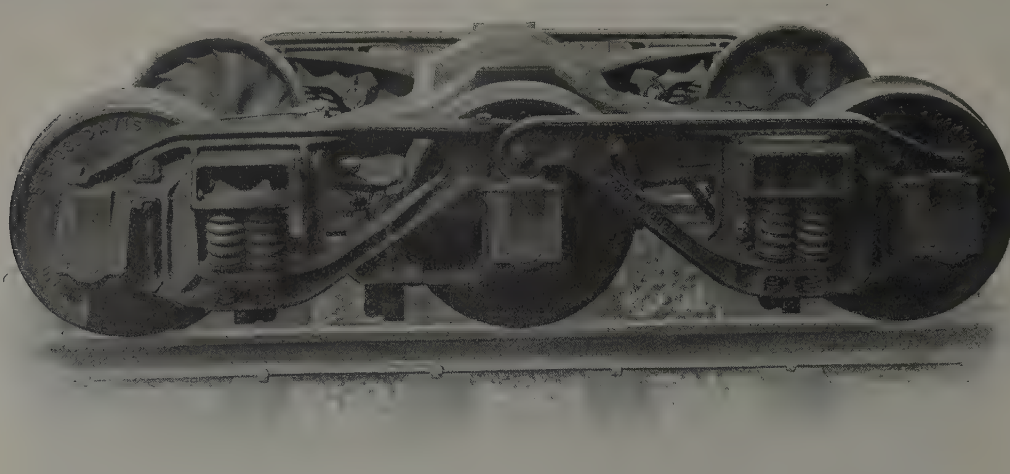
This truck is in use on approximately 2,000 cars of 90-ton capacity and is the latest development in high capacity freight car equipment. The design used on the above mentioned cars is illustrated fully in the descriptive section of this dictionary.

Brake Beams

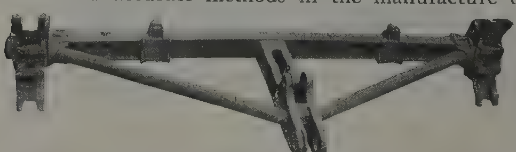
Ajax truss beams for freight service are furnished in any capacity desired. Requirements for passenger and tender service are met by Hercules and Ajax beams. All these beams have channel compression members and round tension members, a type of construction which has been found to give the most satisfactory results.

Compression channels and tension rods are made of open-hearth steel and to rigid specifications. Due to careful and accurate methods in the manufacture of Ajax and Hercules beams, all initial play and lost motion is eliminated, thus insuring the efficiency of the beams and prolonging their lives. Ajax and Hercules beams can be easily identified, as the name appears on the beam or on the heads.

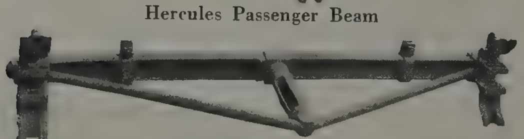
The Acme I-section beam can be also furnished, although solid type beams of this or similar section are practically obsolete.



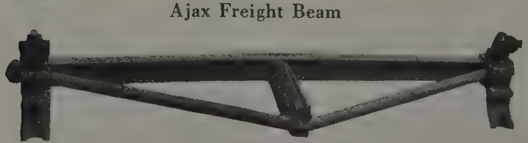
Lewis and Pilcher Articulated Six-Wheel Truck



Hercules Passenger Beam



Ajax Freight Beam



Ajax Freight Beam

Eclipse Coupler Yoke

The Eclipse Cast Steel Coupler Yoke requires no rivets. The coupler shank pulls directly on a bearing surface of the yoke, and not upon rivets or keys. The advantage of getting away from sheared rivets, bent keys and the cost of cutting rivets is apparent.

To remove the coupler, slide off the binder at the coupler end of the yoke. The removal of this connecting piece permits the coupler to be separated from the yoke.

Eclipse Coupler Yoke

Susemihl Side Bearings

The use of Susemihl Side Bearings results in a substantial saving in wheel flange wear, especially with modern heavy equipment. The Susemihl Side Bearing contains no springs or other small parts to become lost. By means of a lever the carriage compels the rollers to roll and to return to their proper positions after rolling. The carriage and lever are of malleable iron and the bearing plate is of high carbon spring steel.

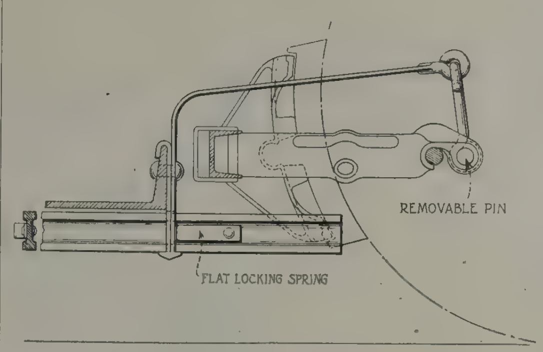
Simplex Clasp Brake

Present day conditions, particularly as to passenger car braking, have called forth the clasp type of foundation brake rigging which, granting proper design, permits relief from many of the limitations of the single shoe brake.

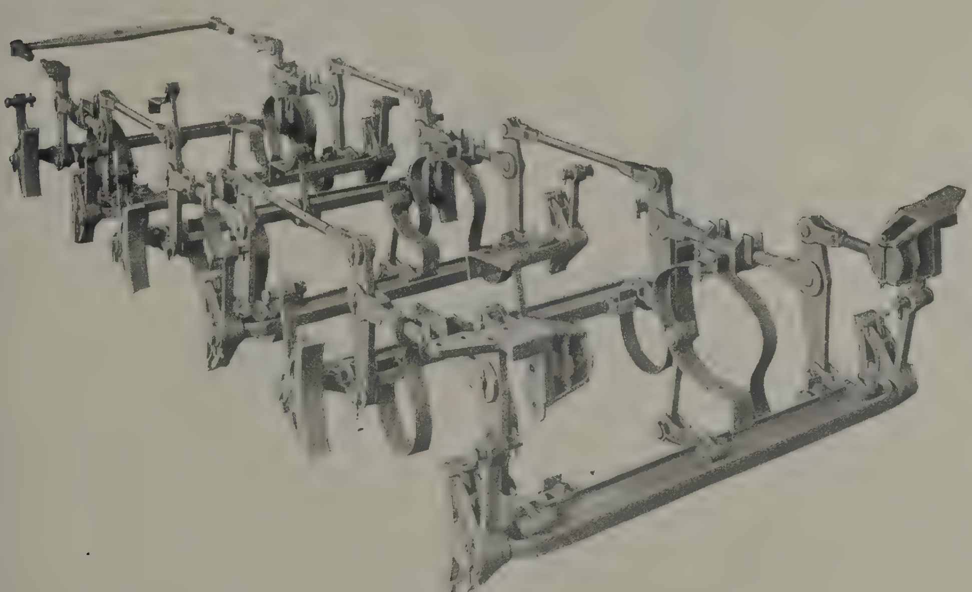
The advantages of the clasp brake have been demonstrated in exhaustive service and other trials, notably those made by the Pennsylvania R. R. in 1913.

Compared to the ordinary single shoe brakes the Simplex Clasp Brake—

Reduces shoe pressure.
Reduces shoe wear.
Reduces false piston travel.
Eliminates necessity of disconnecting brake rods to remove wheels.
Reduces wear and displacement of journals.
Reduces load on pedestals and truck frames.



Atlas Safety Guard and Third Point Support


Simplex Clasp Brake

Reduces load on equalizers and equalizer springs.
Reduces the number of flat wheels.
Produces the much desired uniform retardation of speed.

We have produced a rigging of the fewest possible parts. Every application of the Simplex Clasp Brake is a matter of individual design and study in order to overcome the variations of truck and body designs, and special conditions that may be involved. All installations must be strictly in accordance with the purposes of the design as well as with the best engineering practices. Simplex Clasp Brake is applicable to passenger, heavy freight and tender service.

Atlas Safety Guard and Third Point Support

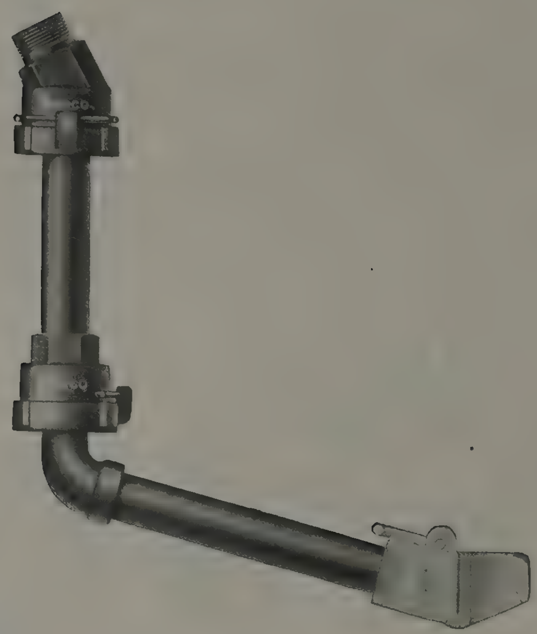
The leveling spring or third point support of the Atlas device maintains the brake beam in the proper position to obtain even and economical brake shoe wear. The bracket end of the leveling spring supports an additional safety bar of ample strength. With the Atlas Guard and Support the brake beam can be removed without cutting rivets or dismantling the device. The safety bar can be removed by pressing down a spring and the leveling spring disconnected by removing a pin.

Steel Castings

Driving-wheel centers, engine frames, striking blocks, center plates, piston heads, stuffing boxes, frame braces, etc., are among the steel castings for car and locomotive use which are constantly passing through our foundries. We also have a fully equipped foundry for the manufacture of electric steel castings. Crossheads, valve links and other reciprocating parts, can be made stronger without an increase in weight, by making them of electric steel. With our varied experience in making railway castings, battleship castings, hydraulic cylinders, dredge castings and various castings for industrial use, we concentrate on your steel castings the expert knowledge of our nine plants.

Barco All-Metal Car Steam Heat Connections

(Patented—Patents Pending)



Use

The Barco all metal Car Steam Heat Connections have been in constant use for the past four years with the greatest success. During the greater part of this time they have been under observation in test, and they have passed the closest scrutiny successfully. They are recommended for Passenger Cars wherever the piping location and end valves conform to M. C. B. Standards, and are properly maintained.

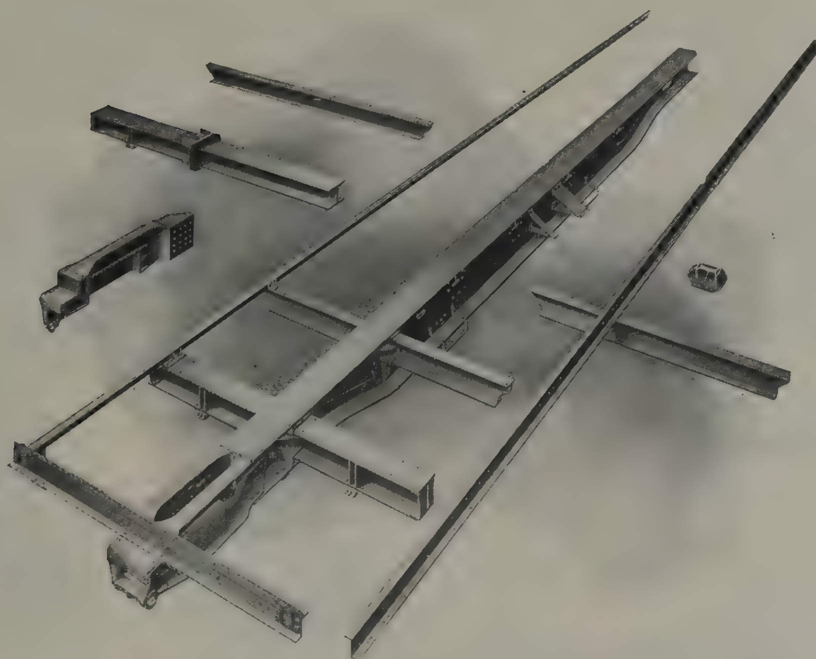
Adaptability

These all metal Steam Heat Connections will work in connection with any standard coupler head, although special pipe dimensions may be necessary for different types of Heads. They couple readily with hose on other cars, even coupling more easily than heavy hose, if properly installed. They never come uncoupled under ordinary service conditions, and they will stand full boiler pressure if such a demand should be made upon them.

Economy

In the long run they are much cheaper than hose from a material standpoint, but if freedom from train delays is considered, they are very much cheaper than hose. They will last an entire season without repairs due to normal usage, and they cannot lose off or have a serious leak from ordinary service. The repairs which they will eventually need are very slight, and all of the piping and most of the joint parts will last indefinitely.

Bettendorf Underframes and Trucks



The Bettendorf Underframe—Partly Assembled

Bettendorf Underframes: Advantages

Bettendorf Underframes for 5 different classes of cars on one of the largest railroads demonstrate the following average merits, compared with other makes of Steel Underframes:

Increased Strength	12.3 per cent.
Increased Buffing Area	36.6 " "
Reduction in Number of Parts	53.7 " "
Reduction in Parts and Rivets	61. " "
Reduction in Weight	17. " "

In addition to the above, the Bettendorf Underframe *absolutely eliminates* draft sill *troubles* by the use of the Cast Steel Draft Sills having the necessary stops and pockets cast integral to accommodate the draft gear. It is the *only Underframe possessing this feature.*

Other important features are the needle beams and body bolsters, which are one-piece construction and are continuous from side sill to side sill, and do not depend on workmanship or rivets to sustain the load. The Increased Strength and Buffing Area will lengthen the life of the car. The reduction in number of parts greatly facilitates inspection and also reduces weight.

Statistics show: The average cost of hauling dead weight is approximately $25.00 per ton per year.

An Underframe weighing 5 tons, substituted by Bettendorf Underframe of greater strength would weigh 4.15 tons, or a saving of 1,700 lbs. per car in dead weight, figured at $25.00 per ton per year for 1,000 cars results in a saving of $21,250.00 per 1,000 cars each year for life of a car.

Would this saving not help to maintain a large number of cars on your road?

Bettendorf Trucks: Statistics

The Bettendorf Truck has proven by Service to be a Dividend Earner. The following statistics show the cost of maintaining Arch-Bar Trucks per 1,000 cars. Repairs to Arch-Bar Trucks:

524 Journal Box Bolts	$65.10
992 Column Bolts	139.75
895 Spring Plank Bolts	23.80
108 Journal Boxes	288.00
39 Malleable Iron Columns	34.95
160 Arch Bars	424.40
$1.00 labor for each 5 pieces replaced	543.60
	$1,519.60

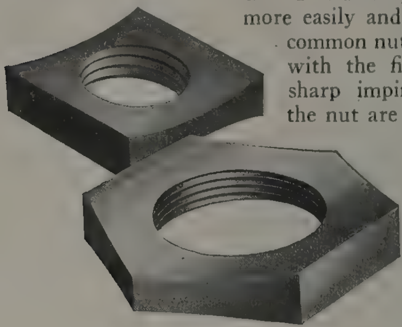
1,000 lbs. per car for 1,000 cars at $25.00 per ton per year for saving in dead weight by use of Bettendorf Trucks.....$12,500.00
Saving per year by use of Bettendorf Trucks.............$14,019.60

This is equivalent to 5% on an investment of $280,392.00 for each year the cars are in service.

The Boss Lock Nut

Construction

The Boss Lock Nut is a single piece of steel made into an auxiliary nut with top and bottom surfaces concave and identical. It is tapped with a natural thread and is applied to a bolt more easily and quickly than a common nut. When turned with the fingers until the sharp impinging edges of the nut are in contact with the outer edges of the holding nut, one-half to three-quarters turn with a wrench causes the bolt, the holding nut and the auxiliary nut to become a unit, all parts of which are held in non-rotatable relation to each other so that no shock or vibration will cause the Boss nut to release its hold. It is possible to use the Boss nut alone, but this is recommended only on bolts subject to shearing strains. The various sizes of Boss Lock Nuts possess from 50 to 90 per cent of the strength of the bolts on which they are used.

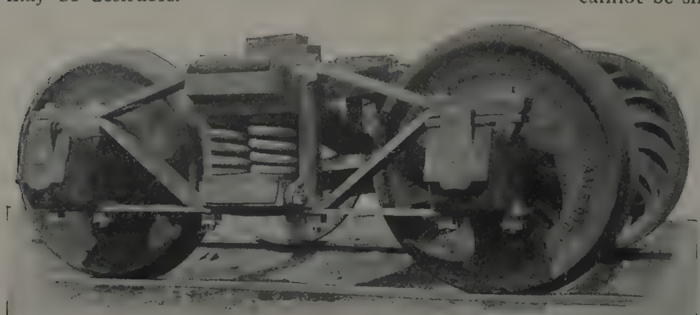


Boss Lock Nuts

Application of Boss Lock Nuts to Passenger Truck and Axle Light Suspension.

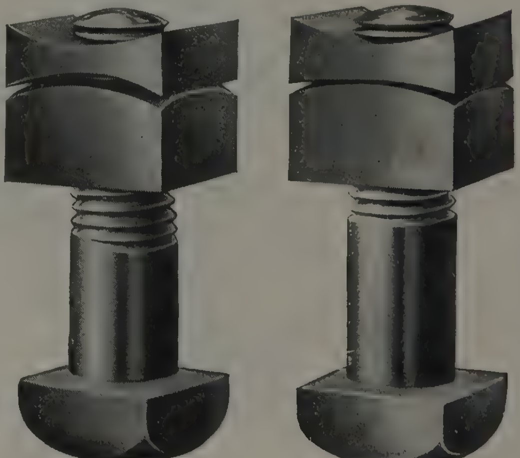
Ease of Application

The only tools needed for the application of the Boss nut are the fingers and a wrench. The nut may be applied either side up. There is no wrong way of applying it. When turned down to the holding nut a part turn with a wrench locks it fast. If the bolt is under size a full turn may be desirable.



Application of Boss Lock Nuts to Arch Bar Truck

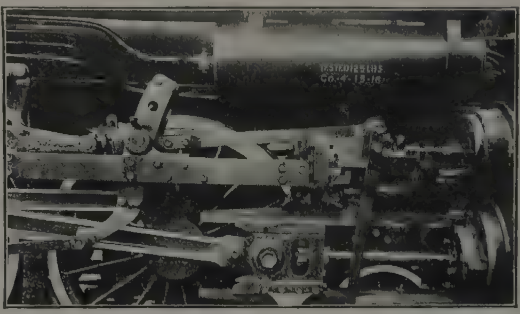
As shown in the illustration, when the nut is drawn tight the arch is drawn downward, causing the threads of the Boss nut to register deeply and closely into the threads of the bolt, while the sharp edges of the Boss nut seize the primary nut firmly and prevent any of the three members from turning in relation to either of the others.



Boss Nut—Not Locked   Boss Nut—Locked

Exclusive Features

An important characteristic of the Boss nut is that it locks securely to undersize or defective bolts, rolled or cut threads. It does not destroy or injure bolt threads. It may be used repeatedly without appreciable loss of holding power. No instructions are necessary for its use. Because of the hold of its sharp edges upon the holding nut it cannot be shaken off, and because of its natural thread it is not necessary to hold the bolt head when applying.

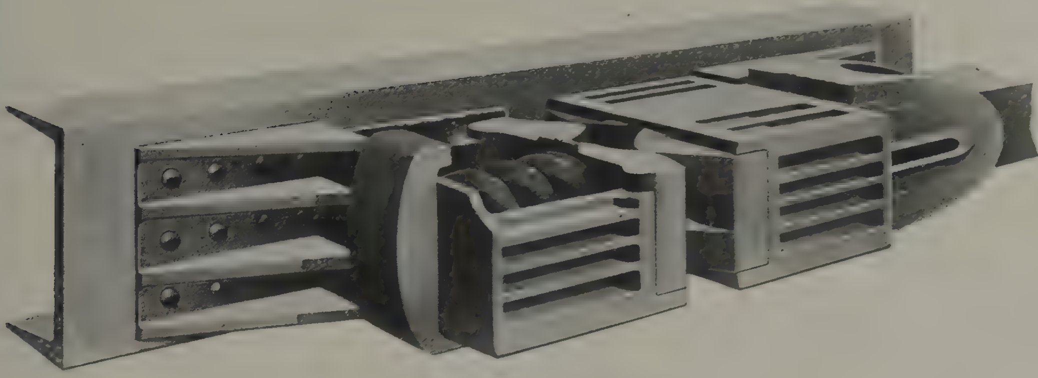


Application of Boss Lock Nuts to Motion Work of a Passenger Locomotive

Because of these characteristic features the Boss nut is especially useful for application to motion work of locomotives, to locomotive trailing trucks, to car draft rigging and trucks or in every place where the bolted parts are subject to vibration.

On account of their special construction the use of Boss nuts result in a considerable saving of weight and material as compared with the use of two common nuts, and in addition thereto gives absolute security to all bolted parts.

Bradford Friction Draft Gear
Type "K"



Bradford Friction Draft Gear

Description

The Bradford Rocker Type "K" Draft Gear is composed of two spring housings, four Rockers and two M. C. B. Class "G" springs on each end of car. The above cut shows the relative action of the Rockers, one end of which bears against and rotates on the housing, while the other moves freely against the end of each spring, thus multiplying the capacity up to 300,000 pounds with a movement of 2½ inches before the gear becomes solid. The gear is designed to take the U. S. Standard pocket space 24⅝ x 12⅞ x 9⅛ inches and is carried by the yoke, supported by U. S. Standard carry iron. Drawing No. 1302.

Eliminates Slack Action Caused by Wear

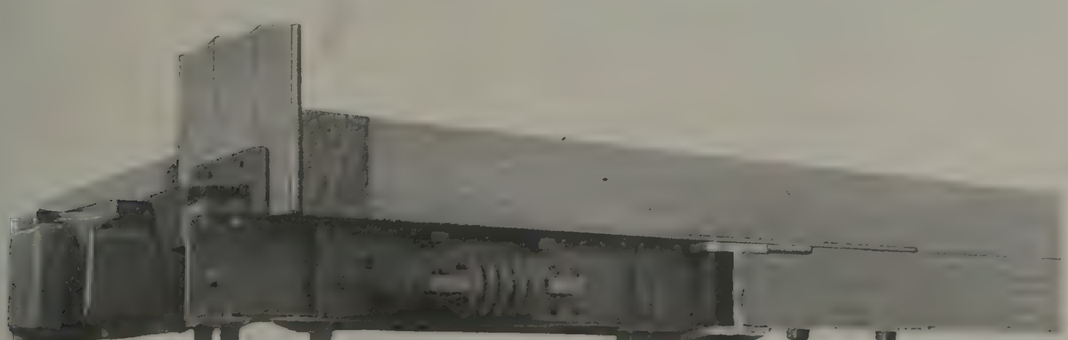
While this is a friction draft gear, the actual friction is reduced to a minimum, because where there is friction there is wear and the higher the capacity, the faster the wear. Our aim is to eliminate slack action caused by wear of friction surfaces.

Metal Draft Arms

Our *Metal Draft Arms* shown in the text pages are well known. They are made of either cast steel or built up structural steel of standard sections, both of which have stood the test for many years. We recommend the structural type because it is cheaper in first cost and also in maintenance and can be made to suit any old-type wooden car, regardless of sill spacing. The draft lugs are made to suit draft gear of any type, including U. S. R. A. standard spacing of 24⅝ x 12⅞ x 9 inches.

Spring Draft Gears

Our high capacity *Spring Draft Gears* are also shown in the text pages. They are so arranged that the standard draft springs, yokes and couplers now on old cars can be used and by adding one or more springs to each end of car, the capacity can be brought up to meet the requirements of modern train service. They will take either the M. C. B. Class "G" 8 x 8 inches or the 6¼ x 8 inches standard; or a combination of one Class "G" and two 6¼ x 8 inch springs.



Bradford Structural Draft Arms, Channel Type and 3-Spring Draft Gear Applied to Car

Advantages

Either of the above mentioned types will outwear any type of wooden sill car and will maintain a higher five-year average capacity than any friction draft gear now on the market. Their long service and low cost of upkeep is the last word from all users.

Locomotive Cranes

Brownhoist Locomotive Cranes

These cranes are made in following sizes: 3, 10, 15, 20, 30 and 40 tons, and there are several types of each size. They can be operated by steam, electricity or gas engine. The 3-ton and 10-ton sizes are equipped with 4 wheels and the larger sizes are mounted on two M. C. B. standard 4-wheel trucks. Various lengths of booms can be used on the various types.

Uses

The cranes can be used for practically all kinds of hoisting work and for handling materials. Some of the uses are handling coal, ore, coke, cinders, gravel, crushed stone, etc., with grab bucket; excavating with dragline or orange peel buckets; driving piles; pulling piling; handling materials with lifting magnet; and with bottom block for handling tubs and miscellaneous loads, and switching cars.

Speeds

The cranes are equipped with a pair of high speed engines of large diameter and short stroke. Locomotive crane service requires almost constant starting and stopping of the engines, and the engines on Brownhoist cranes develop full power much quicker than the small diameter engines with longer stroke. Under working conditions the engine speeds run from 100 to 700 r.p.m. On a 15-ton steam crane with fully loaded bucket, the hoisting speed is approximately 200 f.p.m. Hoisting or lowering empty hook on one part line on this crane is about 500 f.p.m. Maximum rotating speed with full load is about 3 to 4 r.p.m. Travel speed with full load on straight level track is approximately 600 f.p.m. Speeds under various conditions will be given on request.

Capacities

Capacities vary for the different types, and in the table in the next column are given capacities at various radii for one type crane of each size. Larger and smaller capacities are obtained with different type cranes and different length booms. The cranes can be overloaded anywhere from 15% to 60% of the figures given before the crane will tip. With outriggers the overload is a still greater percentage of the rated capacity given in the table.

15-ton Crane Equipped with Dragline Bucket

CAPACITIES, WEIGHTS AND WHEEL LOADS

Crane	Radius, ft.	Capacities, lbs. Without outriggers	Capacities, lbs. With outriggers	Total weight of crane, lbs. With block and full load	Total weight of crane, lbs. With bucket and full load	Max. wheel loads boom at right angle to tracks, lbs. With block and full load	Max. wheel loads boom at right angle to tracks, lbs. With bucket and full load
3-ton 26-ft. boom	12	9100	.....	38300	33500	18000*	16000*
	15	7100	.....				
	26	3600	.....				
10-ton Type G 35-ft. boom	12	28,000	.....	122000	101500	58000*	48500*
	20	16300	.....				
	30	9600	.....				
	39	6700	.....				
15-ton Type J 40-ft. boom	13	39300	40000	160500	136500	38000	32500
	20	23000	27300				
	30	13800	17300				
	40	9500	12300				
	44	8300	8800				
20-ton Type A 40-ft. boom	13	42000	44600	170500	138500	40500	33000
	20	24400	27800				
	30	14400	17300				
	40	9700	12100				
	44	8000	8000				
30-ton 45-ft. boom	12	60000	90000	231,000	181000	50000	40000
	15	46000	77000				
	20	32000	56000				
	30	18000	36000				
	40	12000	25000				
	49	10000	19000				

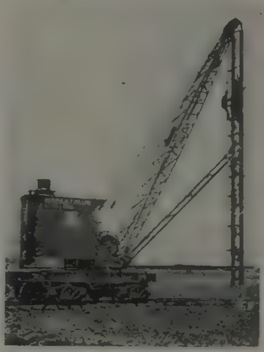
*Max. wheel loads with boom over one wheel and all wheels supported.
3-ton—24300 lbs. with block—21300 lbs. with bucket.
10-ton—66000 lbs. with block—55000 lbs. with bucket.

Traveling Mechanism

4-wheel cranes are supplied with traveling shaft connected to both axles. On 8-wheel cranes the traveling shaft is connected to one axle on each truck. The shaft is jointed with universal couplings which insure a good mesh of the gears when the crane is traveling on a curve. The cranes will operate on 60° curves, and also up grades.

Boilers

The steam cranes are supplied with vertical tube boilers having quick steaming qualities. Each boiler is made to comply with the strictest state boiler laws. The size depends upon the size of crane. Boilers are supplied for coal, coke, wood or oil firing.



15-ton Crane Equipped with Leads and Steam Hammer for Driving Piles

Operation

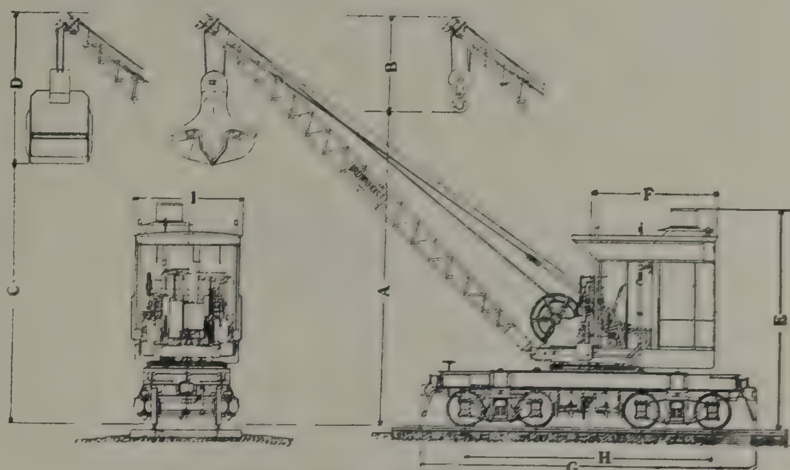
All cranes are operated and fired by one man. A platform is provided for the operator where he can easily reach all levers and brakes necessary for operation. The platform is elevated so that the operator can have a full view of the work at all times.

Locomotive Cranes

CLEARANCE TABLE

With same lengths of boom as given in table on preceding page—booms at 45° angle.

	3-ton	10-ton	15-ton	20-ton	30-ton
A	19′	24′	29′	29′	31′
B	6′	7′	7′	7′	9′
C	17′	22′	27′	27′	29′
D	8′	9′	9′	9′	11′
E	14′-10″	16′	17′- 2″	17′- 2″	17′- 3″
F	8′- 8″	9′-10″	9′-10″	9′-10″	12′- 6″
G	7′- 2″	12′	26′	26′	28′
H	5′- 6″	8′	19′- 2″	19′	20′
I	7′- 7″	10′	8′- 8″	8′- 8″	10′



Clearance Diagram of 15-Ton Crane

Prices and Other Products

Prices will be given on type crane to fulfill required conditions.

Products:—Brownhoist Locomotive Cranes, Bridge Tramways, Fast Plants, Cantilever Cranes, Overhead Traveling Cranes, Dock Cranes, Work Car Cranes, Jib Cranes, Pillar Cranes, Bridge Cranes, Electric Hoists, Tramrail Systems, Trolleys, Crabs, Winches, Tubs, Furnace Hoists, Pig Iron Breakers, and Coal and Ore Dumping Machines; Transfer Cars; Floating, Gantry and Portal Cranes; Dragline Excavators; Monorail Hoists; Grab Bucket Trolleys; Car Loaders and Unloaders.

Organization

Our main office and plant is located in Cleveland, Ohio. Branch offices are as follows:

New York...50 Church Street
Chicago, 208 So. La Salle St.
Pittsburgh ....Oliver Building
San Francisco................Monadnock Building

Brownhoist 15-ton Steam Crane with 54 cubic feet Brownhoist Coal Bucket. Handles 75 to 90 tons of coal per hour.

Brownhoist Electric Wharf Cranes for handling miscellaneous freight.

Brownhoist Portal Pier Crane can be used with grab-bucket, hook or lifting magnet. This crane spans the railroad tracks.

Brownhoist 30-40 ton Locomotive Crane equipped with lifting magnet. Electric current for magnet can be generated in crane or obtained from outside source.

Jacks for Car Repair Work

Product

Nearly thirty years' experience in jack building only—a carefully trained organization skilled in this line of work together with a thorough knowledge of the exacting requirements demanded of jacks has enabled this company to produce jacks for the various classes of railroad work of exceptional strength and durability and in which are many dominant features not usually found in ordinary jacks. Compound—Lever—Track and Automatic Lowering Jacks are produced by the company.

Construction

The Buckeye Jack combines all the essential qualities of a first class jack. The movements are easy and positive. Only the best materials obtainable are used in its construction. All Buckeye Jacks are constructed of the following materials:

Frame or Base—Malleable Iron.
Rack—Forged Steel, machine cut teeth.
Pawls—Drop Forge Open Hearth Steel of High Carbon.
Fulcrum Pin—High Carbon Rolled Steel, machined.
Bearings—Hardened Steel.
Handles—Selected Oak or Rock Maple.

The large rectangular shaped base gives great lifting strength and admits of the jack being used in close quarters, affording an advantage over round or bulky standards. The ribs on the base combine great strength with comparative light weight. These jacks are adapted to high or low set loads by using either the top of the rack or the projecting foot at the lower end. All working parts are accurately machine finished and can be removed and replaced at slight expense. The illustrations will serve to give a general idea of the standard types made by this company.

Figures 3 and 4 illustrate Buckeye Screw Jacks constructed to contain a quantity of oil in the base. In four sizes. Capacity in tons 10 to 24.

Figures 1 and 2 show two views of Buckeye Improved Special. No. 1 has no adjustable feature, but No. 2 has. Capacity in tons 15.

Height of top.......22 in.		Particularly useful in raising low set loads.
Height of toe....... 4 in.		
Raise ....10½ in.		
Weight ....100 lbs.		

Figure 5 illustrates Automatic Lowering Jack. Capacity 10 tons. Operates at any angle.

Figure 6 shows No. 19 Automatic Lowering Jack. Capacity 15 tons. Raise of bar 17½ inches. Particularly useful in car repairs.


Fig. 2

Fig. 1


Fig. 5

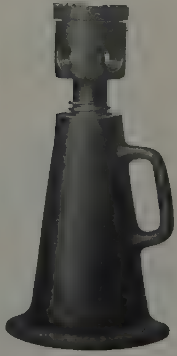


Fig. 3

Fig. 4

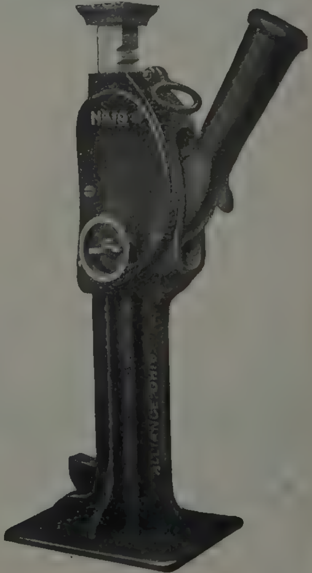


Fig. 6

Buckeye Cast Steel Truck Bolster

Description

The Buckeye Cast Steel Truck Bolster is designed to meet the exacting requirements of modern railway service. It is made in one piece of cast steel and the metal is distributed so as to give maximum and uniform strength. Side flanges on the top and bottom sections make it very strong transversely. The center plate is well supported by the center post and the side bearings are supported by the complete box section at each end of the bolster.

Advantages

The Buckeye Cast Steel Truck Bolster is practically indestructible in service. Being an integral steel casting eliminates the possibility of parts jarring loose as in the built-up type, thus reducing the inspection cost and making the maintenance charges negligible.

The methods of manufacture, together with the use of a uniform section of metal throughout, eliminates

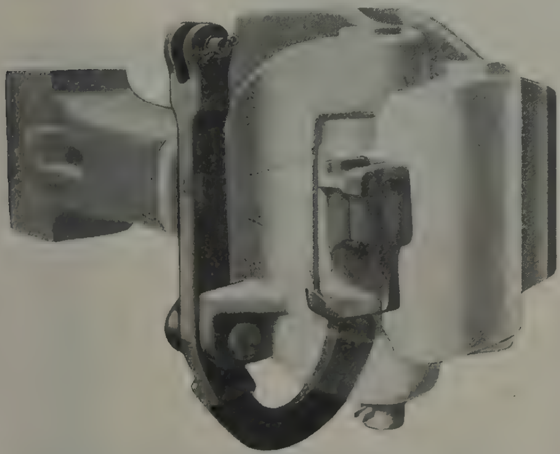
any possibility of excessive shrinkage strains occurring and insures that all bolsters shipped will give satisfactory service.

Major Coupler

Description

There are many more Major Couplers in freight service than any other type. This coupler is made for either the top or underlift operation. The underlift coupler is the same coupler as the standard toplift except that the hole in the top of the coupler is omitted and the lock is lifted from below by a bell crank lever. This coupler is made with any style shank desired and is adaptable to any type of operating mechanism.

The Major Coupler is also made for passenger cars and engines, these couplers using the same lock, knuckle and pin as the freight car coupler.



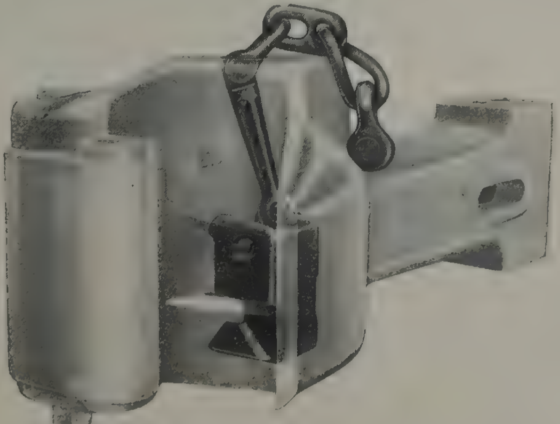
The Major Coupler is of the one-piece lock type, as distinguished from couplers having kickers or extra parts for opening the knuckle. The operation is as follows: The first raising of the lock disengages the knuckle; further raising puts the lock on the lock-set and further lifting of the lock throws the knuckle to full open position. When the operating lever is now allowed to fall to normal position, the lock rests on the upper surface of the knuckle tail and in position to positively lock the knuckle, whenever the knuckle is closed. The lock, which is simply a short block contained entirely within the coupler head, thus performs all the functions of lock, knuckle opener and lock-set.

The pivot pin is relieved of the heavy pulling strains and corresponding shoulders on the knuckle and coupler head take the buffing strains.

Advantages

The one-piece Major Lock, combining all functions, permits of the maximum strength for coupler head and knuckle and the greatest ease of operation. The lock being a short block entirely within the lock housing at all times, cannot bend, and when in locked position is always in compression only. In the design of this coupler the distribution of metal is such as to give a strong efficient coupler and yet keep within the M. C. B. dimensions.

In the underlift coupler the release rigging is entirely below the top of the coupler. This is advantageous on flat, end door automobile and ballast cars

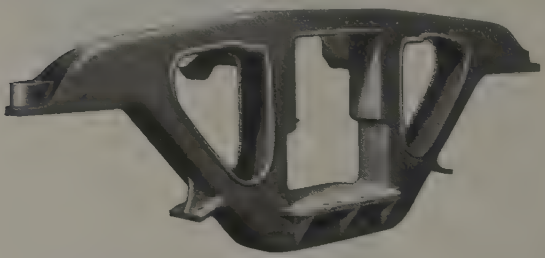


where top-lift rods are liable to damage by lading. The underlift type of coupler, on account of its closed top, is free from interference in operation from collection of dirt, snow, ice, etc. This type of operation also entirely eliminates any trouble with chains or clevises. The trainmen cannot operate it while between the cars, thus making it especially safe.

Buckeye Cast Steel Truck Frame

Description

The Buckeye Cast Steel Truck Frame is designed for use on heavy freight equipment. It is made in channel section which gives 100 per cent. more strength transversely, while having the same vertical strength and weight as the ordinary T-section frame. The sections are uniform throughout, thus insuring sound castings. The brake hangers and journal box tie bar supports are cast integral with the frame.



As illustrated, two designs of these frames are manufactured. One uses the bolted type journal box, while the other uses a special pedestal type box. The pedestal type frame has jaws at each end that engage with slots in the journal box, the weight of the frame being all that is required to hold the box in place in service. To keep the frames and boxes together in case of derailment, a safety bolt at the bottom of the jaw engages a lug cast on the box and effectually prevents their separation.

Advantages

The Buckeye Cast Steel Truck Side Frame conforms to M. C. B. requirements both as to limiting dimensions, weight and strength. This frame was tested by the M. C. B. Association (M. C. B. proceedings, Exhibit P, Test 43), and the results show that this frame has an ultimate strength, twice that of a similar capacity arch bar construction.

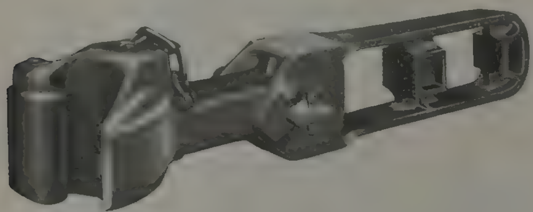
The one-piece construction greatly reduces the cost of inspection and repairs as there are no parts to wear or jar loose.

The use of the pedestal type truck permits easy replacing of the wheels. Removing one bolt in each journal box and jacking up the frame permits replacements without disturbing any other part of the truck.

Buckeye Cast Steel Coupler Yoke

Description

The Buckeye Cast Steel Coupler Yoke is a one-piece steel casting with a distribution of metal that gives uniform strength throughout. Being an integral casting, it entirely eliminates all troubles due to rivets, and this reduces to practically nothing the maintenance cost of the draft gear attachment. The coupler butt fits into a hooded head provided at the front end of the yoke and is held in place by a standard M. C. B. key.



This coupler yoke is so designed that it permits the use of any type of spring or friction draft gear and of couplers with any size butt. The use of couplers with the smallest size butt reduces coupler cost.

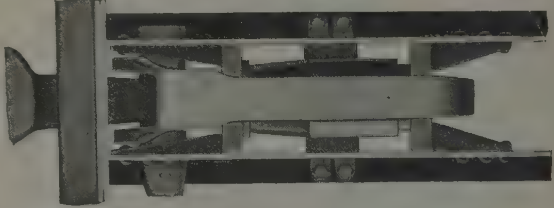
Advantages

The key connection to the coupler is over 100 per cent. stronger than the riveted connection.

The connection to the coupler is flexible, allowing lateral and radial movement.

If a coupler is broken on the road, the key may be withdrawn and a new coupler applied in a very few minutes, without disturbing the yoke or draft gear.

The use of this coupler yoke eliminates cutting cars out of the train to replace couplers.



Heavy Friction Yoke

The heavy friction yoke shown below is that furnished by this company for over 50,000 freight cars ordered by U. S. Railroad Administration, and is used exclusively on the U. S. Standard Locomotive Tenders. It is designed to have an ultimate strength 15% to 20% higher than the standard Type "D" coupler and provides for the large key of 6 x 1½-inch cross section.

Buckeye Cast Steel Six-Wheel Truck

Description

The truck illustrated below meets the requirements of efficient high capacity freight equipment.

The wheel base is much shorter than the standard six-wheel passenger truck, and equalization of the load is taken care of through side frames proper, and so avoids complicated construction, and eliminates equalizer bars, hangers, pins, and small parts.

The load is distributed through the bolster to the side frame so that it will be impossible for one or more journals to receive excess loading under any condition.

The castings are kept down to such sizes that the present foundries can manufacture them in large quantities with their present facilities, and in repairing of same the trucks can be handled with the present facilities of the railroads.

Trucks of this type have been in daily use since 1914, and have given excellent service in more than 60,000 miles of travel.

M. C. B. Standard "D" Coupler

The M. C. B. Standard Coupler, Type "D," fully illustrated on pages 492 and 1210 to 1213, represents the culmination of years of painstaking joint effort on the part of the Association and the coupler manufacturers. Our familiarity with this coupler, and our experience as coupler manufacturers for the past twenty-five years assures the rendering to our customers the highest service in every way. The Buckeye Steel Castings Co. has been furnished by the Coupler Committee official drawings, etc., and with license for manufacturing the coupler. This company has full equipment to manufacture and has been producing these couplers in large quantities for the past two or three years.

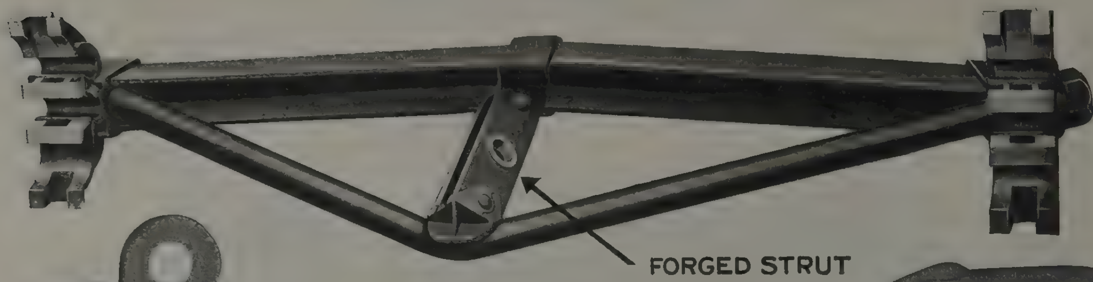
General

This company has produced large quantities of truck side frames, truck bolsters, Type "D" Couplers, and Buckeye draft yokes for a great many of the freight cars ordered by United States Railroad Administration.

Sales Organization

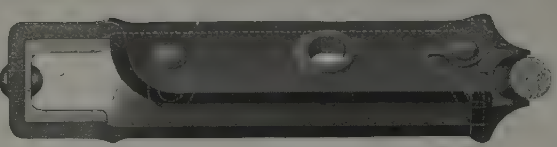
This company also maintains sales offices at the following places: Chicago, 619 Railway Exchange; St. Paul, 817 Merchants Bank Building; and New York, 50 Church street.

Buffalo Brake Beams

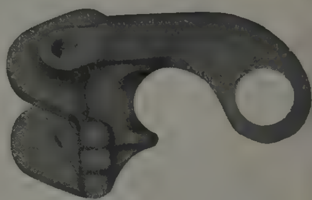


Beam for Freight Equipment

Strut End for Top Suspension



Forged Strut Showing Plain End



Strut End for Third Point Support

Description

Buffalo Brake Beams for freight service are manufactured in any capacity desired. Requirements for high speed passenger and tender service as well are met with a construction of the highest grade of material and workmanship and tested with the latest modern appliances.

Adjustable Brake Head

The passenger brake beams for heavy equipment have adjustable heads with safety locking device insuring against accident even though broken, or by breaking or loss of bolt or nut, the beam continues in service without danger of dropping to the tracks, being held in place by remaining broken part.

Center Hung Adjustable Brake Head

Advantages

The unbreakable continuous piece forged strut when bent or distorted by accident can easily be restored to its original state. Another desirable feature is the interchangeability of the end which makes it adaptable for top suspension hanger and third point support as well as without.

Sales Organization

This company maintains sales offces at the following places:

General Offices, 32 Nassau St., New York, N. Y.

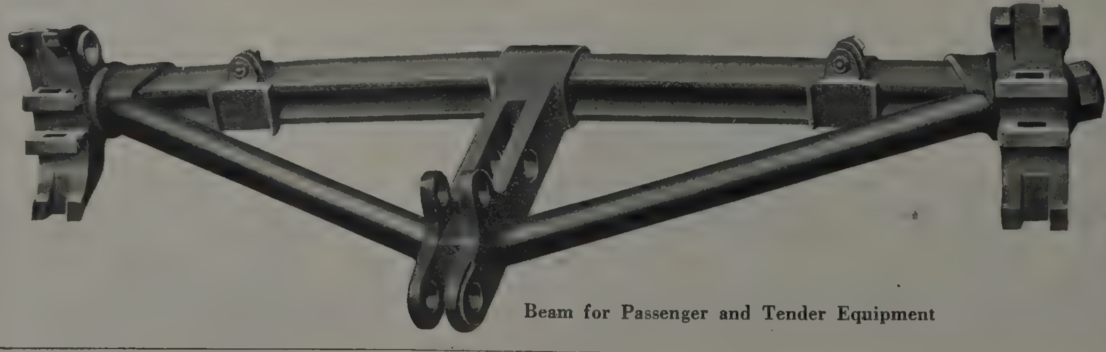
Montreal, Quebec—O. W. Meissner, 10 St. Antoine St.

St. Louis, Mo.—E. Strassburger, 1443 Syndicate Trust Bldg.

Washington, D. C.—A. Gordon Jones, Union Trust Bldg.

Works: Buffalo, N. Y., and Hamilton, Ont.

Top Hung Adjustable Brake Head



Beam for Passenger and Tender Equipment

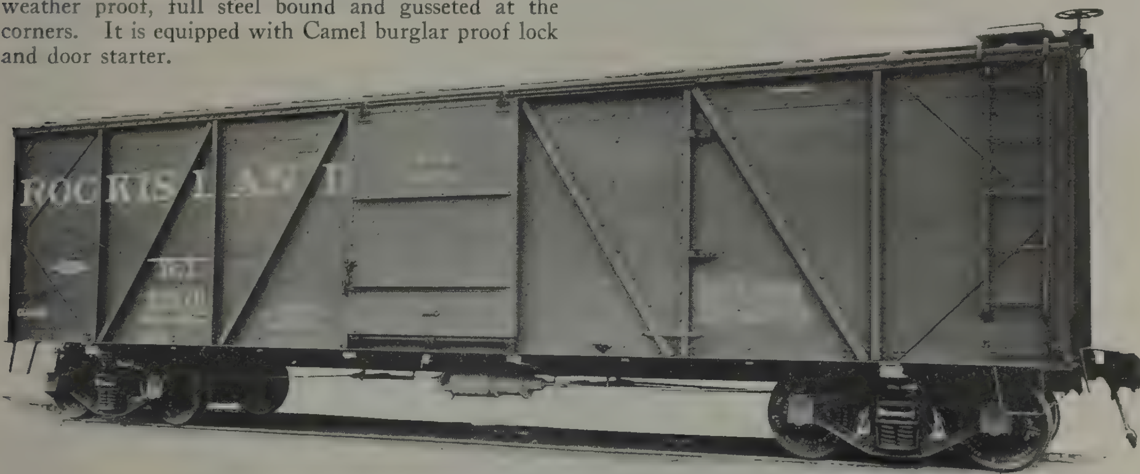
Freight Car Door Fixtures

Camel Door No. 50

Camel Bottom Hung Door No. 50 is shown (Illustrated Section, Fig. 825) as applied to U. S. R. A. single-sheathed box cars. This is a bottom hung door supported by a continuous channel section door track. It is spark and weather proof, full steel bound and gusseted at the corners. It is equipped with Camel burglar proof lock and door starter.

Camel Door No. 27

Camel Door No. 27 (Illustrated Section, Fig. 823) is shown as applied to double-sheathed box cars. Top hung door supported by Channel Z-Bar Track. Rollers operate between flanges of track, which insures freedom of movement. Door full steel bound; spark and weather proof. Equipped with Camel burglar proof combination stop and lock, door starter and burglar proof bottom guides.



Camel Door No. 50

Camel Door No. 50 is shown (Illustrated Section, Fig. 827) as applied to U. S. R. A. double-sheathed box cars. This door is supported at the bottom by a continuous channel section door track. It is spark and weather proof, full steel bound and gusseted at the corners. It is equipped with Camel burglar proof lock and door starter, and also with safety hangers at the top.

Camel Door No. 30

This door (Illustrated Section, Fig. 821) is shown as applied to steel super-structure single-sheathed box cars. Top hung door supported by rolled steel door track riveted to angle side plate. Full steel bound. A spark and weather proof application. Door equipped with Camel burglar proof lock, door starter, and double lip guide, which prevents door striking side braces. Door hangers provided with auxiliary anti-friction roller to insure free movement.

Camel Door No. 32

Camel Box Car Side Door No. 32 is a top hung door supported by rolled steel T-Bar Track, which gives absolute water protection at top. Hangers provided with double rollers, which insure free operation. Door full steel bound, spark and weather proof and equipped with Camel burglar proof combination stop and lock, and door starter.

Camel Combination Stop and Lock

This device is burglar proof. (Illustrated Section, Fig. 820) Prevents splitting of door stop and front portion of door. As it is reversible, it may be applied to either a right or left hand door.

Camel-Gilroy Door

The Camel-Gilroy Door (Illustrated Section Fig. 824) is shown as applied to double sheathed box car. Bottom hung door supported by continuous angle track. Full steel bound; spark and weather proof. Equipped with Camel burglar proof lock, starter and heavy rolled steel Z-Bar front stop, which co-operates with front edge protection strip to make a water-proof joint.

Camel-Gilroy Automobile Car Door

The Camel-Gilroy door as applied to double-sheathed automobile cars (Illustrated Section, Fig. 822) is a bottom hung door supported by continuous angle track. Door full steel bound; spark and weather-proof; equipped with Camel burglar proof locks and door starter. Small door has an auxiliary post bolted to it, which becomes a rigid support between plate and side sill, by means of interlocking castings when door is in closed position. This makes car suitable for either single or double door loading.

Jones Peerless Car Door

The Jones Peerless Car Door (Illustrated Section, Fig. 826) is shown as applied to a single-sheathed car. Top hung door carried by rolled steel channel-track. Rollers operate between horizontial flanges of track insuring freedom of movement. Door full steel bound; spark and weather-proof. Cross section showing deflector in track illustrates method of holding door tight when in closed position.

Freight and Passenger Cars

Plant

Canadian Car and Foundry Company, Limited — with its subsidiaries, Canadian Steel Foundries, Limited, and the Pratt and Letchworth Company, Limited—is composed of eight plants. Of these, four of the main plants together with the main offices of the Company are located in Montreal, Quebec.

For convenience in operation the work is divided among the eight plants as follows: Four plants are devoted to the manufacture of freight and passenger cars as well as a very complete line of our specialties, including bolsters, side bearings, brake-beams and other appliances. Three plants are devoted to the production of steel castings, including cast steel bolsters, wheel centers, couplers and other steel specialties. One plant is devoted exclusively to the production of malleable iron castings. In addition, there are two rolling mills in connection with the plants.

From the foregoing it will be seen that the Company is in position to manufacture in its own plants a large proportion of the materials entering into car construction, and is, therefore, not dependent to any large extent on procuring raw materials outside.

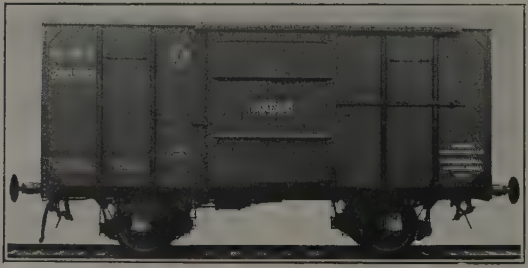
The capacity of the Company's plants for building railway cars is approximately 110 to 125 completed freight cars per day, either steel or wood, and approximately 245 passenger cars per annum.

Resources and Facilities

This Company is advantageously situated to handle export business, having one plant at Amherst, Nova Scotia, which is well located for ocean shipping at all times of the year either from St. John or Halifax, both of which ports are open the entire year. All four of the main plants are located at Montreal, from which export business is handled directly into ships at that point during the period of open navigation.

Naturally, enormous quantities of raw material are required. Of these it is still necessary to procure a small percentage outside of the country not now manufactured here, but the Canadian mills and other industries are rapidly putting themselves into condition to supply all classes of material which are required for railway cars, and it is confidently expected that, in the very near future, practically everything entering into the construction of car equipment will be procurable in Canada.

1200 Pood (43,338 lbs. Capacity) Covered Goods Wagon with Steel Underframe and Wooden Body Without Brake Platform, Built for the Russian Government



GENERAL DIMENSIONS

Length over headstock	22′ 11⅝″
Wheel base	13′ 1½″
Width, inside	9′ 0″
Length, inside	22′ 9″
Width over roof at eaves	9′ 8″
Height from rail over roof	12′ 5 15/16″
Length over buffer	26′ 10½″
Journals	5½″ x 10″
Gauge	5′ 0″
Tare, complete	22,600 lbs.

DETAILS

Wagons equipped with cast iron chilled wheels 39⅜ in. diameter, Westinghouse automatic air brakes, Russian standard type, standard M.C.B. journal brasses and wedges, forged steel buffer stems, forged draw bar hooks and screw couplings. Each wagon fitted with two side doors with top rollers.

These wagons are designed to carry general merchandise; also equipped with military devices, making wagons suitable to handle troops and horses when required by the Government.

1200 Pood (43,338 lbs. Capacity) Covered Goods Wagon with Steel Underframe and Wooden Body with Brake Platform, Built for the Russian Government

GENERAL DIMENSIONS

Length over headstock	24′ 11 5/16″
Wheel base	13′ 1½″
Width, inside	9′ 0″
Length, inside	22′ 9″
Width over roof at eaves	9′ 8″
Height from rail over roof	12′ 5 15/16″
Length over buffers	28′ 10 3/16″
Tare, complete	23,900 lbs.

DETAILS

Wagons equipped with cast iron chilled wheels 39⅜″ diameter, Westinghouse automatic air brakes, Russian standard type, and screw brakes operated from brake platform; standard M. C. B. journal brasses and wedges; forged steel buffer stems; forged draw bar hooks and screw couplings. Each wagon fitted with two side doors with top rollers.

These wagons are designed to carry general merchandise; also equipped with military devices, making wagons suitable to handle troops and horses when required by the Government.

15 Metric Tons Capacity Covered Goods Wagon with Steel Underframe and Wooden Body, Built for the British Government for Use in France

GENERAL DIMENSIONS

Length over headstock	7360 mm
Wheel base	4000 mm
Width, inside	2550 mm
Width over roof at eaves	2850 mm
Length, inside	7300 mm
Height from rail over roof	3622 mm
Length over buffer	8510 mm
Journals	110 x 205 mm
Gauge	1435 mm
Tare, complete	9875 kg

DETAILS

Wagons equipped with 965 mm solid rolled steel wheels; hand brakes, shoes acting on two wheels operated with lever from side of car; continuous forged drawbars and screw couplings and self-contained cast steel buffers.

20 Metric Tons Capacity Open Goods Wagon with Steel Underframe and Wooden Body, Built for the French State Railway

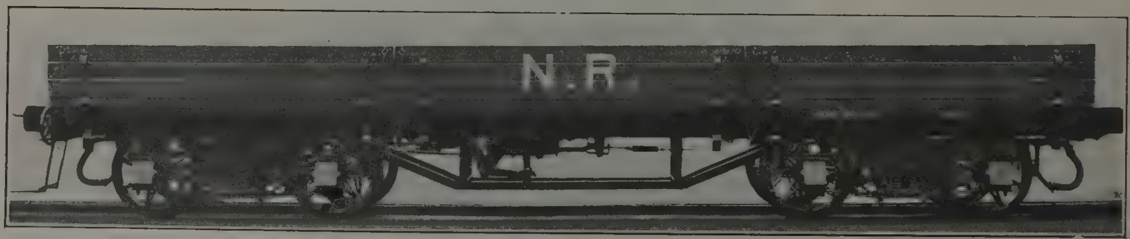
GENERAL DIMENSIONS

Length over headstocks	7299 mm
Wheel base	3600 mm
Width, inside	2500 mm
Width, outside	3064 mm
Length, inside	6600 mm
Height of sides and ends	1449 mm
Length over buffer	8448 mm
Journals	140 x 250 mm
Gage	1435 mm
Tare, complete	11150 kg

DETAILS

Wagons equipped with brakeman's cab and screw brake, acting on all wheels; rolled steel wheels 1050 mm; cast steel buffers and forged drawbar hooks and screw couplings.

20 Tons Capacity Arch Bar Bogie Low Sided Goods Wagons with Steel Underframe and Wooden Body, Built for the Nigerian Railway, West Africa



GENERAL DIMENSIONS

Length over headstock	30′ 7″
Wheel base	20′ 0″
Width, outside	8′ 2″
Width, inside	7′ 10½″
Length, inside	30′ 3½″
Height of Sides and Ends	1′ 6″
Journals	4¼″ x 8″
Gage	3′ 6″
Tare, complete	20200 lbs.
Capacity, level	357 cub. ft.

DETAILS

Wagons equipped with 33½″ diameter wrought iron boss and spoke steel tired wheels; also combination Vacuum Automatic air brakes and screw brakes; A. B. C. couplers and draw bars.

60 Tons Capacity Flat Cars with Arch Bar Bogie Trucks, Steel Underframe and Wooden Floor, Built for the South African Ry. for Use at Coal Station at Durban

GENERAL DIMENSIONS

Length over headstock	40′ 0″
Centers of bogies	26′ 0″
Width over floor	8′ 0″
Journals	5″ x 9″
Gage	3′ 6″

DETAILS

Cars equipped with cast steel drawbars and forged links. Screw brakes operated from side of car. 24″ diameter steel tired wheels with cast steel centers and six (6) coal buckets per car.

20 Metric Tons Capacity High Sided Goods Wagon with Steel Underframe and Wooden Body Built for the Paris & Orleans Ry., France

GENERAL DIMENSIONS

Length over headstock	6500 mm
Wheel base	3050 mm
Width, inside	2580 mm
Width, outside	2808 mm
Length, inside	6420 mm
Height of Sides and Ends	1450 mm
Length over Buffer	7672 mm
Journals	120 x 230 mm
Gage	1435 mm
Tare, complete	8200 kg

DETAILS

Wagons equipped with hand brakes, acting on one wheel and operated with lever from side of car.

Also equipped with steel tired wheels cast steel centers, cast steel buffers, forged drawbar hooks and screw couplings and collapsible tarpaulin rods.

10 Tons Capacity End Tipping Coal Wagon with Steel Underframes and Wooden Body, Built for the Nigerian Ry., West Africa

GENERAL DIMENSIONS

Length over headstock	17′ 0″
Wheel base	9′ 6″
Width, outside	7′ 0″
Width, inside	6′ 7¼″
Length, inside	16′ 7¼″
Height of Sides and Ends	4′ 0¼″
Journals	4¼″ x 8″
Gage	3′ 6″
Tare, complete	12,200 lbs.

DETAILS

Wagons equipped with 33½″ wrought iron boss and spoke steel tired wheels; screw hand brakes; A. B. C. couplers and draw bars.

Chase Goat Brand Car Plush

Made by Sanford Mills

Made of Mohair

Chase "Goat Brand" Car Plush is made from the lustrous fleece of the Angora Goat and constructed by the unique "W" weave in which all the mohair strands are firmly embedded by three strong interlocking threads. Mohair has a lustre peculiarly its own, and because the oil is inside rather than outside the individual hair, a mohair fleece may be washed, scoured, steamed, dyed, and worked up into fabrics, and all these processes intensify rather than destroy the brilliant lustre. The surface of the individual mohair fibres is smooth and shiny like silk; whereas the wool fibre has a rough surface, covered with scales or barbs which cause the fibres to felt or cling to each other. Mohair, according to Government tests, has more than two and one-half times the strength of wool, and affords the longest wearing surface known to the textile world.

Wonderful Durability

That Chase "Goat Brand" Car Plush possesses remarkable wearing qualities is well known, but the usual conception of long wear is limited to a few years. Not so with "Goat Brand" Car Plush. Recently there was exhibited a seat upholstered in "Goat Brand" Car Plush, which had been in constant service for over 25 years. The reason for this wonderful service, is that Mohair is more elastic than any other fibre. All wear comes on the top ends of the pile. In any smooth-surface fabric the wear comes directly *on the sides* of the individual fibres, so that a moderate service friction soon causes the fabric to break out fuzzy or show wear in spots.

Its Great Elasticity

After the weight of a hydraulic press has made it as flat as a piece of paper, soaking in warm water brings the pile of "Goat Brand" Car Plush back again into a standing position. No other fabric known to the textile world can stand this test.

Comfort and Beauty

This quality of elasticity makes it by far the most comfortable of upholstery fabrics. The surface has the appearance of being smooth, yet it prevents the rider from slipping from side to side when traveling. This together with rich appearance, beautiful and unfading colors, and scores of frieze designs, give a unique distinction.

Fast Colorings

The first beauty and brightness of "Goat Brand" Car Plush remains unchanged through years of use. Nothing but the finest of dyes are used. Clothing is never soiled by contact unless some harmful chemical has started the color.

Permanent Economy

Like many other products of enduring value, the length of service makes Chase "Goat Brand" Car Plush economical. It lasts according to grade from eight to twenty-five years.

Sanitary

Careful, scientific tests carried on through many months, by one of America's leading railroads, proved Mohair Plush the most sanitary of upholstery fabrics. Dust does not remain on the surface to come off on the rider's clothing, but enters the pile, and can readily be removed by vacuum cleaning or rattan beating.

Popularity of "Goat Brand" Car Plush

Chase "Goat Brand" Car Plush has been standardized by railways of America. This came about after these roads had carefully tested out every known upholstery fabric. Hotels and steamship lines also endorse it.

Railway Coach Upholstery of "Goat Brand" Car Plush

The "Chase" Trademark

For nearly three-quarters of a century, the production of strictly high-grade materials has established a reputation for Chase Products. Our carefully developed and established quality standards are jealously maintained under all conditions of raw material price variations. The name "Chase" on any fabric is the best guarantee of its service, quality, and expert workmanship.

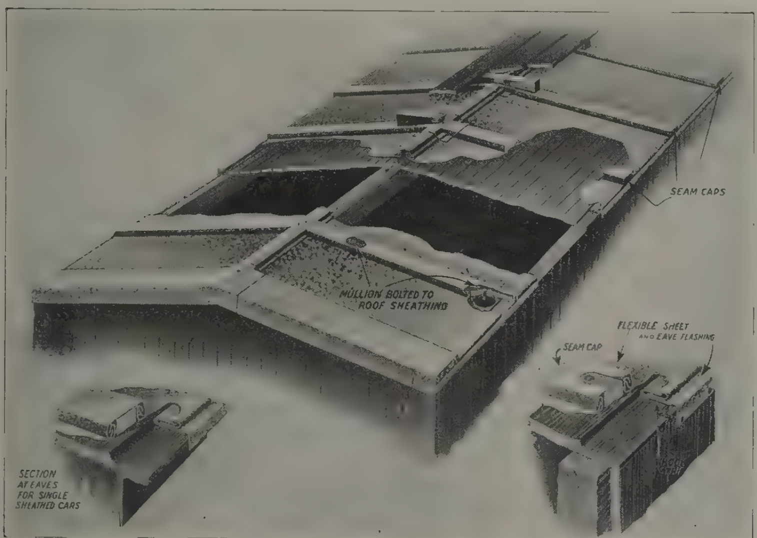
Patterns and Samples

There are scores of wonderful patterns in about any shade imaginable; also various weights to choose from. If samples are not available through your regular supply channels, write to us.

Car Roofing, Steel Ends and Steel Reinforced Ends

National Flexible Outside Metal Roof

This roof is absolutely waterproof and at the same time is sufficiently flexible to absorb all strains caused by the twisting motion of the car on rough track or from rough handling. The sheet is held at the eaves by a hook engaging the eave



National Flexible Outside Metal Roof

strip, allowing it to move with the twisting of the car, also preventing it from raising up. At the sides of the sheet an extremely flexible joint in connection with the mullion caps gives free play to each sheet. The sheet is also freely movable at the ridge. A shoulder at the ridge end of the sheet engaging a shoulder of the ridge cap permits free play at this point, the broad bearing surface overcoming all possibility of cutting through the metal of either the sheet or the cap. Free play at eaves, sides and ridge make a perfect roof, flexible and water tight.

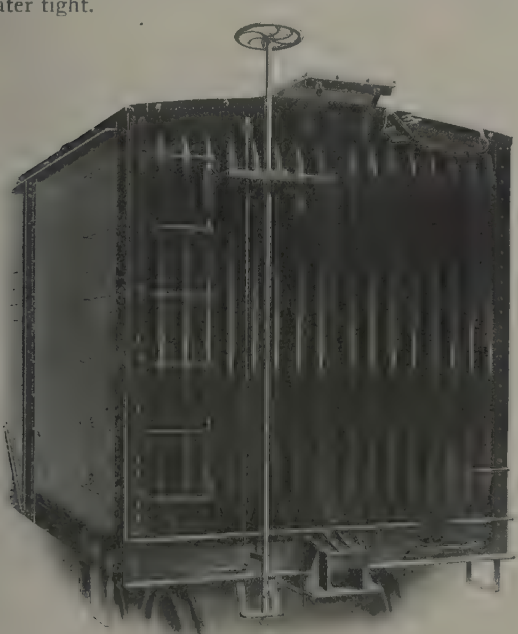
Vulcan Steel Car End

The Vulcan All-Steel End has sixteen vertical corrugations pressed in the end closure plates. Each corrugation is in effect a steel end post securely anchored to the top framing of the car and to the underframe.

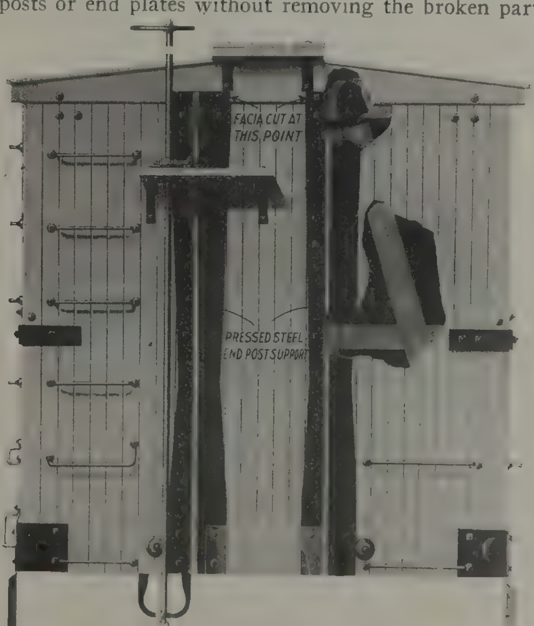
The corrugations are pressed to a greater depth for one-third of the distance from the floor, giving the greatest strength where there is the greatest shock from shifting loads. As the corrugations are vertical the entire end offers resistance to a shifting load regardless of its height in the car. In other constructions the number of corrugations offering resistance to shifting load varies according to the height of the load, and a heavy load, as steel for example, is offered less resistance than a lighter commodity loading higher in the car.

Reinforced Steel End

The Chicago Reinforced Steel End is designed particularly to strengthen old cars. It is applied outside the sheathing. The reinforcement consists of pressed steel shapes with a broad flange on either side, bolted at the bottom through the end sill and at the top through a heavy pressed steel end plate stiffener having at each end riveted gussets which are bolted through the side plates. The corners are thus braced and the car held square. The corrugation of the stiffeners is increased in depth from each end to a point about one-third of the distance from the floor to the top of the car, thus offering the greatest resistance to heavy loads loading low in the car. The same reinforcemetnt may be used in case of broken end posts or end plates without removing the broken parts.



Vulcan All Steel End



Chicago Steel Reinforced End

Creco Brake Beam Support and Safety Device

Creco Third Point Support and Safety Device

This device, which can be used on all types of brake beams, consists of an underhung spring or a combination of angle, "T", channel, etc., and spring, attached to the center of spring plank, extending under and beyond the brake beam, and a sliding chair casting attached to the brake beam strut extension ears, supporting the front end of the

Creco Third Point Support.
All the 1918 U. S. Railroad Administration cars were equipped with this support.

beam and preventing it from tilting downwardly and maintaining the brake shoe in its proper relation to the wheel, thus insuring uniform wear of brake shoes, safety and economy. It serves as a positive brake beam safety device and keeps the beam from falling to the track through any failure of the brake rigging, and has all the desirable features of an ideal support and safety device and is peculiarly free from faults.

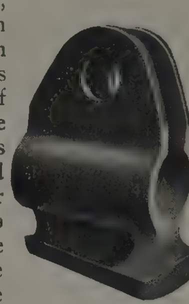
Creco Sliding Third Point Support Chair

Previous designs of third suspension often pull or push the beam downward when the spring gets out of position; they also wear very rapidly and increase the cost of brake beam renewals. The Creco Support does not interfere with the forward movement of the beam when brakes are applied with badly worn shoes. It maintains a proper relation to the brake beam hangers at all times; is operative for beams of different strut depths on the same truck; does not prevent the beam from having such lateral movement as the brake hangers allow; does not throw the beam out of alignment in case the underhung spring is bent and does not get twisted out of place by beam action. It has the essential flexibility, broad bearing areas, economical features and allows quick application or removal of beams. It provides for the use of the economical and single spring construction. It takes care of unlimited beam movement, shoe wear and the reduction in diameter of rolled steel wheels.

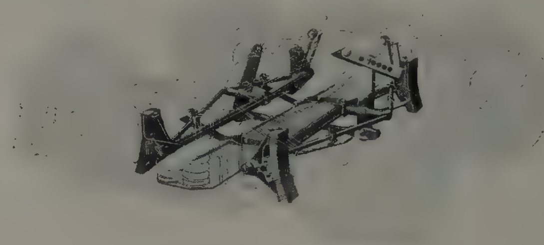
The Creco Third Point Support and Safety Device eliminates the use of brake beam safety clips and the universally unsatisfactory safety chains, and in obtaining full and proper release of the brake shoes from the wheels the full life of the brake shoe is secured and a reduction of 10 to 15% is effected in train resistance, as shown by dynamometer tests on one of the large railroads.

Creco Four Point Support and Safety Device

This device, which can be used on various types of brake beams, has two underhung springs attached to the spring plank and two wear plates, either cast or forged, called "chairs" attached to the tension member of the brake beam at points intermediate of the strut and head, instead of in the center, supporting the beam and performing the same function as the Third Point Support and Safety Device, excepting that the springs provide two safety arms instead of one. Creco Third and Four Point Supports and Safety Devices are giving satisfactory results on over a quarter of a million cars.



Creco Four Point Support Chair



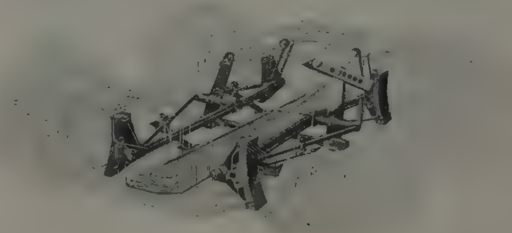
Creco Four Point Support

Creco Combination Support and Safety Device

The service of the Creco Supports with the springs alone has been found to be entirely adequate, but for application where it is thought desirable to supplement the spring, the combination Creco Support and Safety Device as shown is used. This design is in satisfactory service in the

Creco Combination Third Point Support and Safety Device

heaviest and severest locomotive tender service where broad wheel bases have called for unusual spring extension.



Creco Combination Four Point Support and Safety Device

Creco Brake Beams

The Drexel Brake Beam, illustrated below, is built to Nos. 1, 2 and 3 M. C. B. capacities, with or without safety chain or finger guard clips. Strut shown with third suspension ears for use with Creco Third Point Support, as applied to United States Railroad Administration cars.

Drexel Brake Beam for Freight Equipment

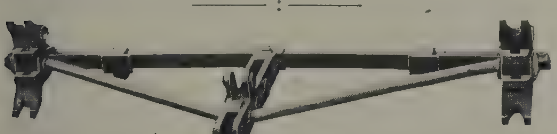
Creco Brake Beam for Light and Heavy Freight Equipment

Built to Nos. 1, 2, 3, 4 and 5 M. C. B. capacities, with or without safety chain or finger guard clips.

National Hollow Brake Beam

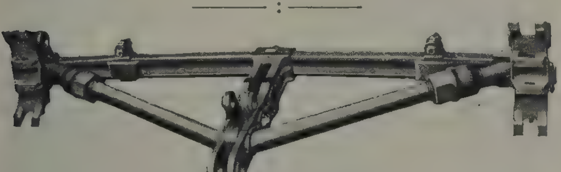
Built to Nos. 1, 2, 3 and 4 M. C. B. capacities, for use under freight or four or six wheeled passenger equipment. Made with either rigid or adjustable brake heads.

Six wheel passenger brake beam here shown. Old "Pullman Standard" from 1892 to 1901.



Diamond Special Brake Beam

Built to No. 4 M. C. B. and 28,000 lbs. capacities at 1-16" deflection, for use under four and six wheel heavy passenger equipment. Equipped with automatically adjustable brake heads which insure uniform shoe wear. "Pullman Standard" until advent of all-steel cars in 1910. Over 370,000 in service.



P. C. Creco Triple Brake Beam

Built to take a load of 40,000 lbs. at 1/16" deflection for use on heaviest type of passenger equipment. Made to interchange with a Diamond Special Brake Beam and to go into as equally a limited space. Is made for both four and six wheel equipment. Takes Creco Standard automatic adjustable brake head used on Diamond Special Brake Beam.

Six wheel type of brake beam here shown. "Pullman Standard."

Creco Reversible Strut

The well known Creco Reversible Strut can be used for either right or left hand brake beams by simply placing lever slot in position desired. Over one-half million used.

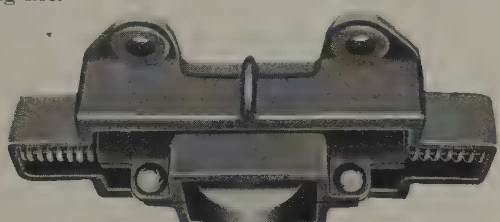
Total number of Beams Sold—8,000,000.

Creco Side Bearings

The Economy Roller Side Bearing gives unlimited travel. Its simplicity of design, strength and durability make it especially desirable where an efficient and inexpensive Roller Side Bearing is required.

Economy Roller Side Bearing

It is made with malleable iron base, which can be adapted for application to practically all standard conditions. The axles are made of cold rolled steel case hardened. Its special rollers have the bearing surfaces case hardened and this together with the fact that these rollers are arranged to hold and retain a lubricant, insures an exceptionally long life.



Drexel Single Roller Side Bearing

Although limited in movement, bearing permits of increased travel, in that the roller at end of movement is free to turn as far or as often as is necessary.

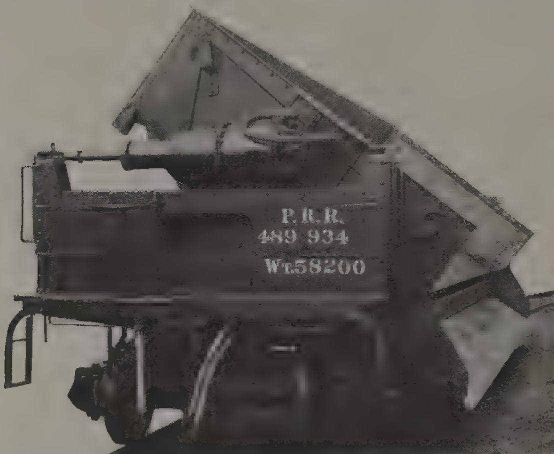
Drexel Multiple Roller Side Bearing

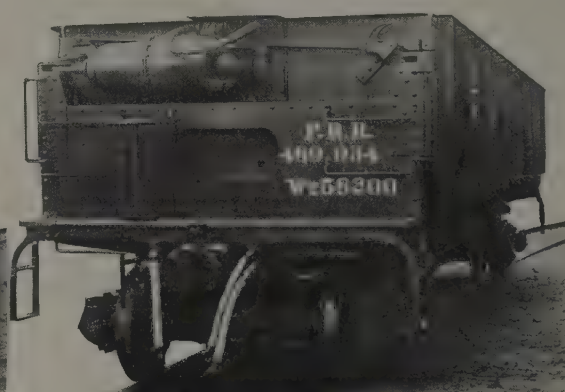
This side bearing has the multiple roller contact bearing features so desirable for passenger equipment, hence can be used under the heaviest passenger and Tender equipment. The bearing being of the inverted type, never becomes inoperative through accumulation of dirt or cinders. This type of bearing has given unusual satisfaction and is to be highly recommended for use under the heaviest type of equipment.

Clark Extension Side Dump Car

Description

The body of the car is supported on rockers located over the bolsters, thus entirely relieving the underframe of the load. The rocker construction produces a balanced condition of body, sides and load such that, when loaded, the body is overbalanced and, if pushed off normal upright position, will dump itself. This overbalanced condition decreases as the load is discharged, becoming reversed





when the body is fully dumped. The car therefore opens easily and without excessive shock. During the dumping movement, the body is raised sufficiently to return to closed and locked position by gravity when released from open position. Obviously, a minimum of external power is required to operate the dumping functions of the car.

The car sides are hinged to the body in a number of places along the bottom edge. They are connected to the underframe by a series of link motions which both lock the car in upright position and operate the car sides coincident with the dumping of the body. The sides turn down and out as the body dumps, forming a chute over which the load is discharged

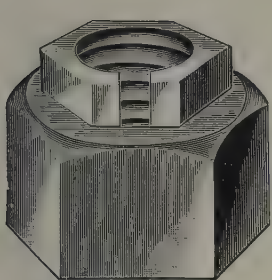
and protecting both trucks and track from back fill. The load is discharged well out from the track, so that dump tracks on a fill may be located back from the edge on solid ground. Track labor is reduced to a minimum since the tracks do not have to be moved frequently and the solid foundation prevents warping of the rails. When dumping to track level the car can be pulled away from the load and train clearance is always maintained. No obstruction is presented to the load as it is discharged, and the cars will literally dump anything that can be dumped.

Operation

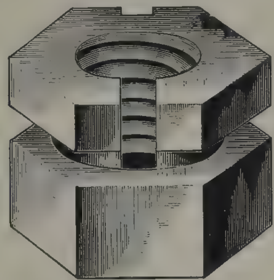
The cars are equipped for dumping by air, either in trains or singly. The automatic return feature requiring no power to close and lock, has made this apparatus extremely simple. Usual service conditions allow dumping for long periods on one side. Instead of carrying duplicate devices to dump to either side, one equipment is used with a mechanical change-over. This simplifies the piping and reduces the weight and complexity to a minimum. The change-over can be made in a few minutes. Where air reservoir capacity is supplied on the locomotive, only one train line is required for dumping. Where trains are large and reservoirs are supplied on individual cars, an additional train line is provided to control operating valves on each car. In either case, the operator simply turns on the air to dump and turns it off to close and lock. There is no danger of having the car dump the wrong way.

The cars are built in strict conformance to the rules and recommended practice of the Master Car Builders' Association and to the orders of the Interstate Commerce Commission. They are acceptable for interchange under load by all the railroads of the country. When not in use as dump cars they can be used in any service in which a gondola would ordinarily be used.

Columbia Lock Nuts and Columbia Gib Nuts



Showing the Original Columbia Lock Nut Assembled.



Showing the Improved Columbia Lock Nut Assembled.

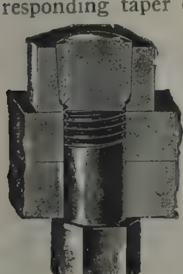
Advantages

The Columbia Lock Nut is a perfect fastening as it grips the thread at all points thus making a perfect bearing to the complete thread. They are easily applied, turn without binding and grip without grinding or distorting thread contour. The locking principle of the Columbia Lock Nut insures the nut gripping the thread and staying locked in that position. It will not rattle off as any such movement tends to tighten the nut, thus preventing its loss.

In the Improved Columbia Lock Nut, we have combined the Original type of Columbia Nut with the ordinary nut. This nut is unexcelled for places where unlimited draw bolt strains and tight fastenings are required, such as column bolts, journal box bolts, frogs, switch and crossing work. Being threaded in both parts permits of its being locked on a bolt without having it against any bearing as on brake rods, rail points, etc. In fact, our Improved Nut can be used in any place where an ordinary nut is used, and in addition to having the locking features of the Original Columbia Lock Nut in squeezing the tapered cone into the recess, and closing the slot, it has the cross thread lock which is obtained by placing two nuts on the same bolt in jamb nut style.

How It Locks

This nut consists of two parts which combine in a perfect unit. The inner part is threaded to receive the bolt, also slotted throughout its length and tapered downward to fit a corresponding taper on the inside of the outer part.



When the wrench is applied to the outer part, or binding nut, the inside part travels down the tapered sides, closing the slot and firmly imbedding the threads of the nut in the V's in the thread of the bolt. The inner part pinches and clinches at the same time. When it is drawn down flush with the top of the binding nut, the two parts are united in a deadlock of security.

Columbia Gib Nut

To meet the growing demand for a three thread nut lock, we are making the Gib Nut, both in Hexagon and Square shapes. The problem in the nut lock question has been to get a nut that would hold and at the same time be economical in cost and application. Three vital points, and all necessary for a successful nut lock.

We claim that in the Gib Nut we have these points fully covered and that it has many other points of superiority over other three thread nut locks.

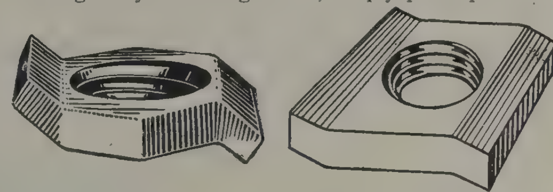
It is cheaper.

It is the simplest and quickest to apply, the threads being cut straight through the nut and cut the same as the threads on the bolt.

It can be applied with the fingers, up to the holding nut—a big saving in time, and time is money.

Wrench only required to set it tight.

It can be used either side up, another advantage. No hunting for just the right side, simply pick up the nut



and apply it as picked up—a very important feature and a big saver in cost of application. Owing to its shape it will not injure or mar the threads of the bolt or nut in any way.

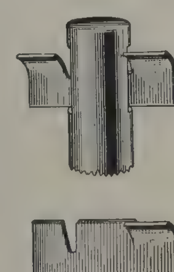
The bent down edges of the Gib Nut causes the lock—coming in contact with the surface of the holding nut, the Gib Nut tips over at an angle, which forces its threads into the threads of the bolt and forms a jam.

We make the Gib Nut in all sizes from ⅜″ up to and including 2″ in both Square and Hexagon. U. S. Standard threads, unless ordered otherwise.

We believe that the Gib Nut is sold at a lower price than any other nut lock of this type, which is a saving in first cost, while the feature that appeals strongly to the user, is the big saving in the cost of application, owing to the finger fit, elimination of breakage, wrenching labor and injury to threads. Where efficiency is sought the Gib Nut is the answer.

The Simplicity Cotter Key

Simplicity Cotter Keys are aptly named. They are simplicity itself and excel the old fashioned riveted split key, both as to first cost, for they are cheaper, and in the saving of time in application, to say nothing of their effecting a more satisfactory fastening.



The Simplicity Cotter Key

One end of the Simplicity Cotter Key is bent down in manufacture. Application requires only insertion of the key through the bolt, after which, with a hammer or wrench bend down the straight end.

Another advantage in the use of the Simplicity becomes evident when necessity calls for removal, simply bend back one of the bent edges and key can be readily withdrawn. No trouble—and quick. There is no call for a cold chisel and other tools, as is necessary to open the old fashioned split key. These are distinctive features and advantages of the Simplicity Cotter Key over the split key.

We have standard sizes for standard diameter bolts, having figured what we considered to be a key proper for such use, but knowing the varied conditions that exist where keys are used, we are prepared to quote on any particular length, width and thickness that may suit your special condition.

Devices for Passenger Equipment Cars

Commonwealth Trucks

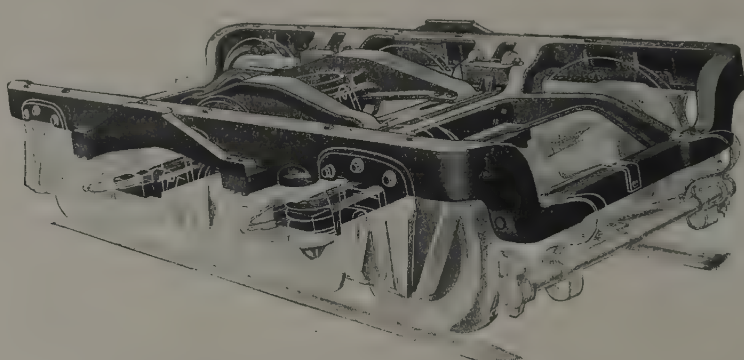
Commonwealth Trucks, like other Commonwealth devices, represent the highest art of the foundryman and the foremost experience and skill in mechanical design, this Company being a leader in the successful development of Open-Hearth Cast Steel in car and locomotive construction; its special steel, being peculiarly adapted to this exacting class of work.

Construction

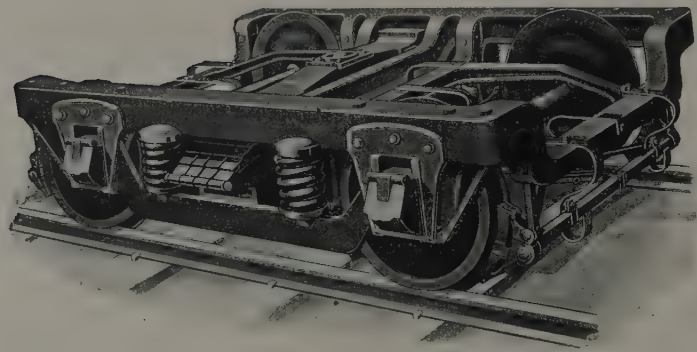
The truck frame, the bolsters and sand planks are each cast in one strong piece, eliminating over 1,200 pieces per truck, as compared with built-up construction, the cross sections of all members being correctly proportioned to correspond with stresses, thereby providing an exceptionally strong, flexible truck with no excess weight. This is a very economical truck as there are no rivets to work loose. The wheel pieces are machined and this gives perfect alignment to pedestals, causing even wear of pedestals, boxes, journals, etc.

In the top equalizer type the inside brake shoes and heads are in full view and are easily inspected, applied or removed. The pedestals are cast steel and have hardened wearing surfaces.

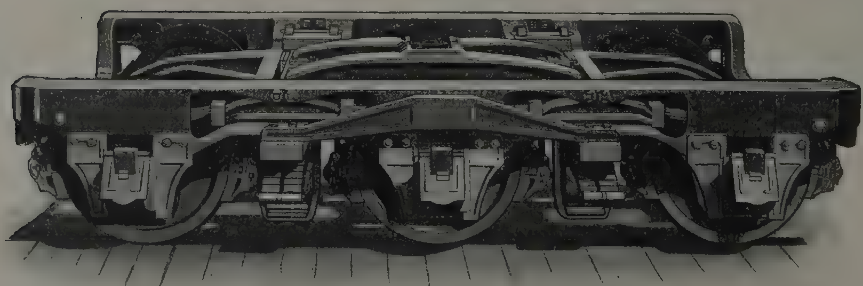
These trucks are made in either the four-wheel or six-wheel type and designed for single or clasp brakes.



Commonwealth Six-Wheel Passenger Truck



Commonwealth Four-Wheel Clasp Brake Passenger Truck



Commonwealth Six-Wheel Top Equalizer Clasp Brake Passenger Truck

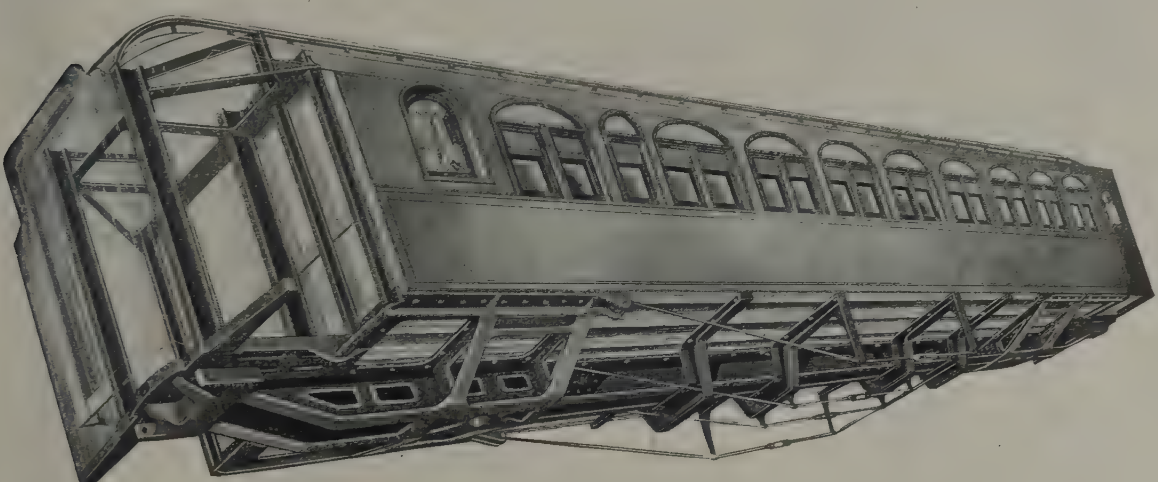
Devices for Passenger Equipment Cars *(Continued)*

Commonwealth Steel Underframe

The Commonwealth Steel Underframe for Platform or Blind End Wooden Passenger equipment cars, new or old, consists of our combined Double Body Bolster and Platform at each end of the car, connected by steel girders braced with cast steel cross bearers, and reinforces wooden cars for equal service with steel cars. This underframe alone is designed to stand all the live and dead loads and the full buffing force without considering the added strength of the wooden sill underframing, to which it is securely attached. This makes wooden cars as strong as steel cars, and meets the extensive demand for reinforced wooden cars, the cost of application being which absorbs the shocks, minimizes damage to cars, protects life and property, greatly simplifies car construction and has greater strength than fabricated material of the same weight.

Advantages

The Commonwealth End Frame, for wooden or steel cars, in one strong piece, attached to the well-known Commonwealth combined Platform and Double Body Bolster, prevents telescoping or over-riding of one car by another in collisions; in fact is the solution of the anti-telescoping problem and meets the urgent need for greater safety to life and property. It greatly reduces the



(Patented)

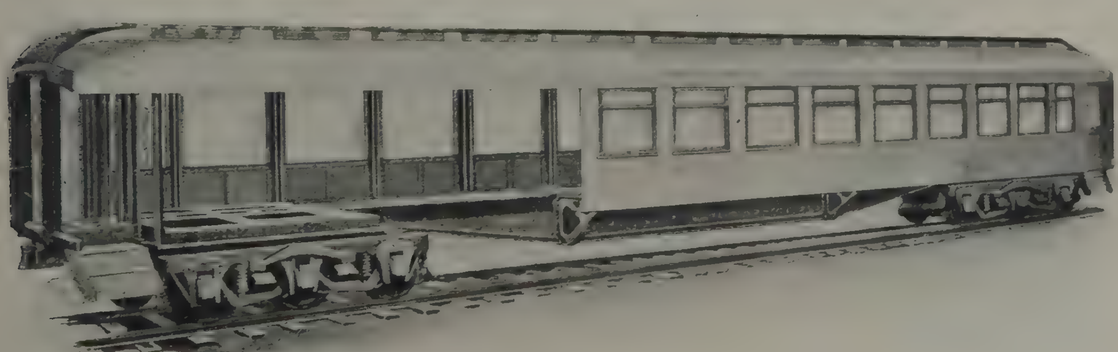
Commonwealth Steel Underframe for Vestibule Wooden Car

low, as the steel underframe is applied without altering the existing wooden construction or the height of the car from the track. This construction gives the strongest, most durable and economical underframe.

The Commonwealth Steel Underframe for steel cars also consists of the combined Double Body Bolster and Platform at each end of the car, but they are connected by a built-up steel column, braced with cast steel cross bearers, as shown in the cut below, making the simplest, strongest and most durable underframe.

number of parts as compared with the built-up end construction, presenting a solid front with the greatest possible absorbing effect where the collision impact occurs, as all parts act simultaneously. It is easily applied to new or old cars. The strong braces bear against lugs on the platform and it is otherwise firmly anchored.

To the already strong protection of the Commonwealth underframe is thus added strong protection to the superstructure.



Steel Car with Commonwealth Underframe and Trucks

Devices for Freight Cars

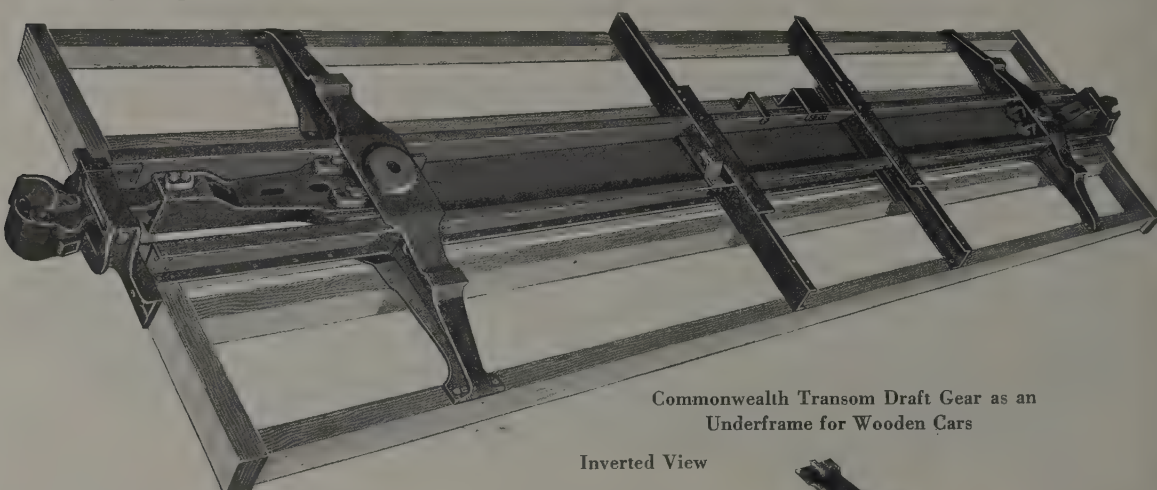
Commonwealth Transom Draft Gear

The Commonwealth Transom Draft Gear when applied to wooden cars eliminates draft timbers and buffs and pulls directly on a strong, specially designed cast steel body bolster, through which all shocks are transmitted to all the sills, and it provides the ideal pulling point for a car, as this is above the truck center pin which is the pivoting point of the car body. This reduces the pulling length of the car to the distance between the body bolsters. The flange and rail wear, drag at curves and strain on cars are greatly lessened, and the engine is enabled to pull more cars as the gear operates radially from the pivoting point.

The Transom Draft Gear is the cheapest to maintain, and the simplest in use, as it eliminates some 200 draft gear parts that require repairs costing the railroads very large sums of money.

Commonwealth Striking Plate and Carry Iron

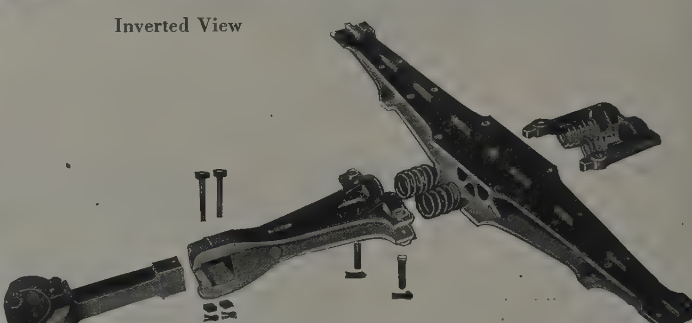
The well-known Commonwealth Striking Plates and Carry Irons reinforce the end sills of steel or wooden cars, stand the shocks of the hardest service and avoid maintenance expense. They are made to provide room for any coupler side play and to meet end clearance requirements. The Carry Iron is adjustable, having the original, unique feature of providing ¾-inch raise in height of coupler when turned upward and the elimination of bolts or nuts that loosen, and permit the coupler to drop. This makes it unnecessary to alter the height of car body. Time and expense are saved in changing coupler because the carry iron can be removed in an instant.



Commonwealth Transom Draft Gear as an Underframe for Wooden Cars

The Transom Draft Gear is applied to both steel and wooden cars, and takes any M. C. B. Coupler or Springs, which can be replaced in 15 minutes. There are only three strong cast steel parts at each end of the car, and the device, with continuous channels passing through bolsters and attached to striking plates, with cover plate extending between bolsters, forms a powerful underframe.

Inverted View

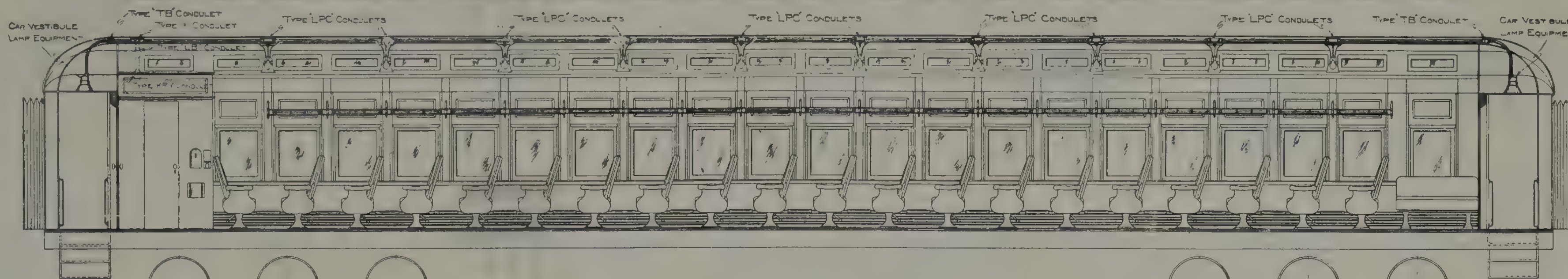


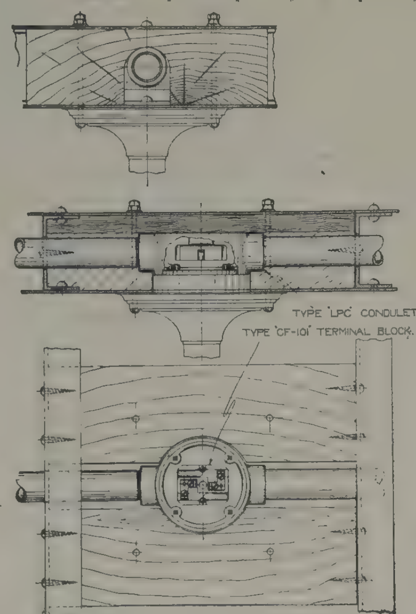
Detail View Showing Sill Key on Bolster. When Equipped with the Transom Draft Gear the "Drag" on Curves of Rigid Steel Cars is Greatly Reduced.

As Applied to Steel Car

Striking Plate and Carry Iron

Condulets and Conduit Installation for Interior of 70-Foot Day Coach





On the left are three views of Type LPC Condulet, as used in above wiring plan, embedded in wooden blocking.

Note the rigid foundation for the lamp fixture, with the four securing bolts going through the wood blocking to the outside of roof where they are made secure by being double nutted. Washers and rubber gaskets make the joint water-tight.

Type LPC Condulets make very suitable fittings for railway cars when the lighting fixtures are suspended from the center of the deck, and have been used extensively on numerous railroads. The Condulets are mounted between the roof and headlining.

Between the carlines, at places where it is desired to mount center lighting fixtures, the space is first filled up with wood blocking, with a hole bored in the center. In this hole the type LPC Condulet is placed. Channels are also cut in the blocking, to provide for the run of conduit through the carlines.

This filling in between carlines with wood blocking, where fixtures are to be mounted, provides a rigid foundation for the fixture.

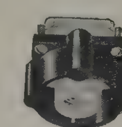
The above arrangement of the lighting units calls for 50-watt lamps and is based upon the report of the Committee on Illumination, appointed by the Association of Railway Electrical Engineers.

Write for larger drawings, also for Complete Condulet Catalog.


Type LPC Condulet


Type CF101 Terminal Block


Type KRY Condulet

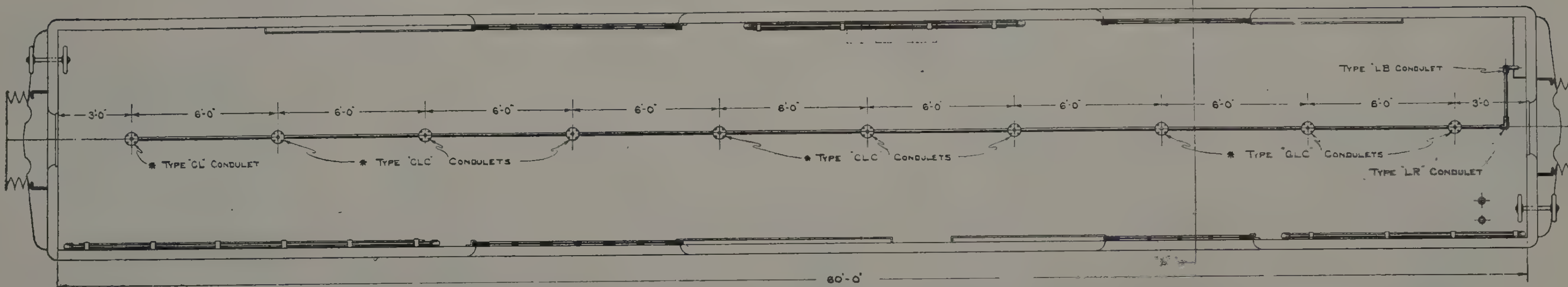

Type SRH3 Reflector Holder and Type C227 Receptacle

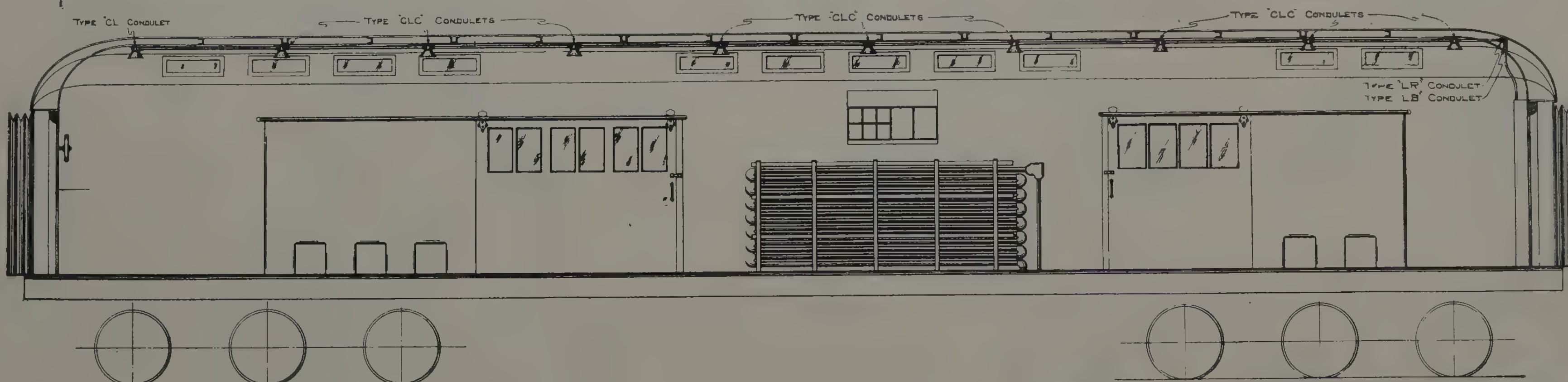

Type SH25 Reflector

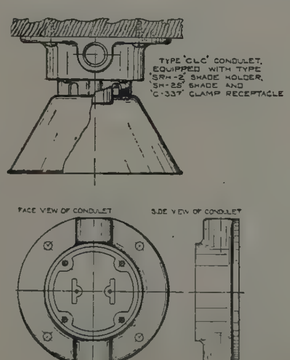

Type KRYA Condulet with Vestibule Lighting Equipment

Condulets and Accessories Used in Above Wiring Plan

Condulet and Conduit Installation for 60-Foot Baggage and Express Car







Condulets of the CL series are designed for use with exposed conduit and take any of numerous car lighting fixtures and pendants. These Condulets are neat in appearance and are easy to install. Four screw holes in its flange make it practical to fasten the Condulet directly against the headlining, and thus remove the need of pipe straps.

In this installation the aim was to secure the maximum head room, hence the shallowest lighting fittings consistent with proper construction were demanded. CL series Condulets with type C337 Clamp Receptacle, type SRH25 Reflector and Receptacle Holder and type SH25 Reflector met every requirement.

Write for larger drawings and Complete Condulet Catalog.

Type CL Condulet

Type SRH2 Reflector and Receptacle Holder

Type CLC Condulet

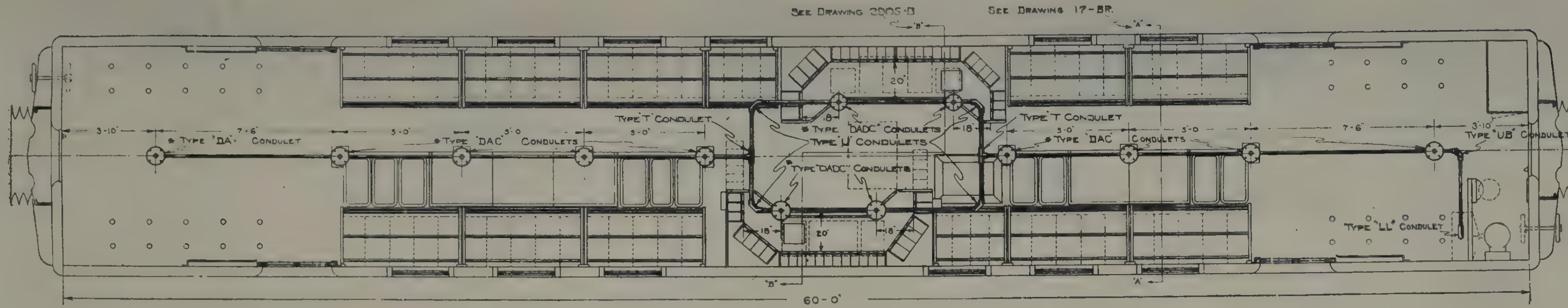
Type C337 Receptacle

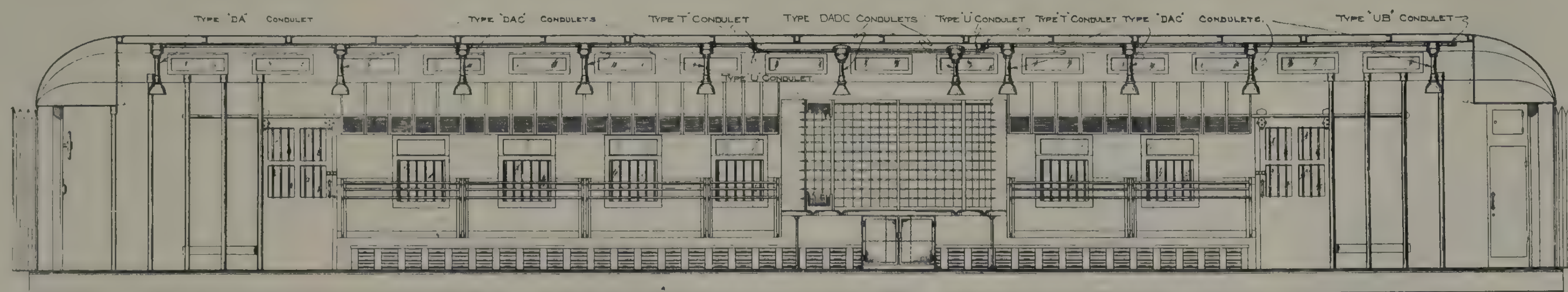
Type LB Condulet with Blank Metal Cover

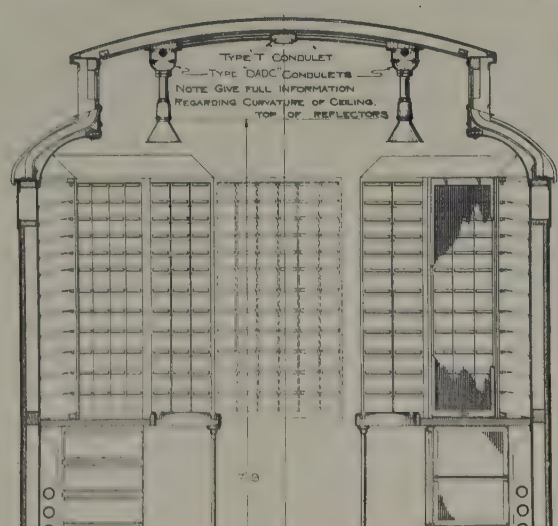
Type SH25 Reflector

Type LR Condulet

Condulet and Conduit Installation for Mail Car



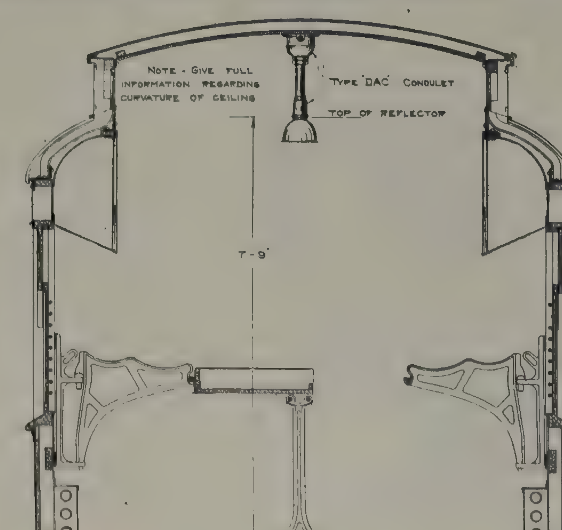




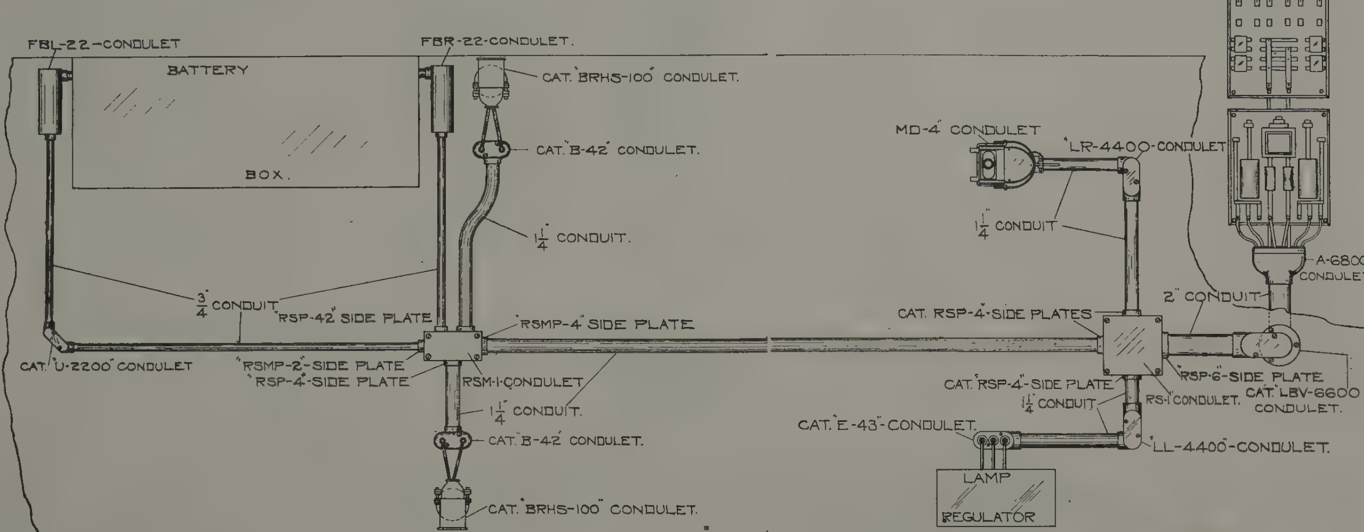

Type DADC Condulet

This installation calls for 50-watt lamps and meets the United States Railway and Mail Service specifications for Postal Car lighting. It also provides for a service depreciation in illumination intensity varying at different parts of the car between 50% and 65% before the service minimums allowed by the R. M. S. Postal Car Lighting specifications are reached.

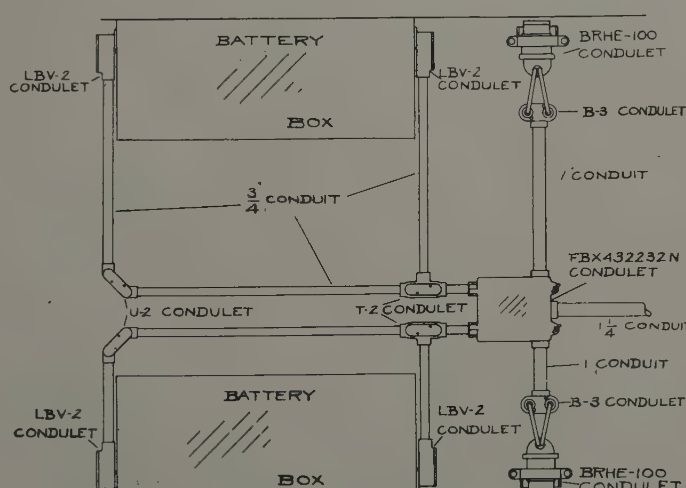
Write for enlarged wiring plans and for Complete Condulet Catalog.



Under-body Conduit Wiring for Car with Axle-generator Equipment



Arrangement for One Battery

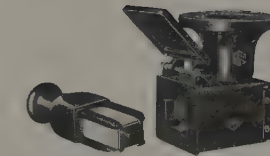


Arrangement for Two Batteries

These wiring diagrams have been adopted with but slight modifications by several of the country's leading railroads.

On the right are shown halftones of the principal Condulets used in these installations.

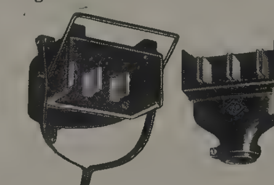
Write for enlarged wiring plans and for Complete Condulet Catalog.



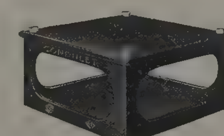
Type BRHS Battery Charging Condulet with Type BP100 Plug

Type BPA 100 Plug

Type BRHE Battery Charging Condulet (Has Improved M.C.B. Bracket)



Type MD Condulet (Generator Connection)



Type RS Junction Box

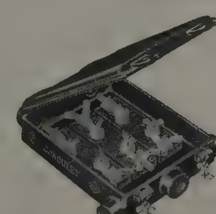
One-Hub Side Plate for Types RS and RSM

Blank Side Plate for Types RS and RSM

Type MDA Condulet (Generator Connection)

Type T Condulet

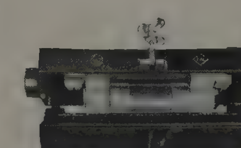
Type U Condulet



Type FBX Condulet for Battery Fuses

Type RSM Junction Box

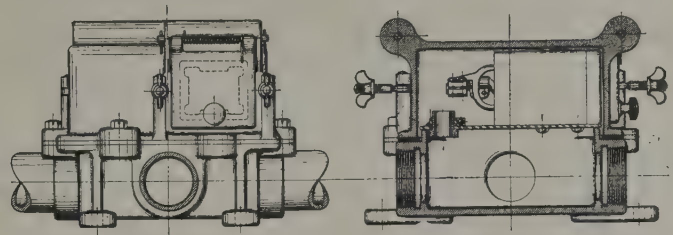
Type LBV Condulet



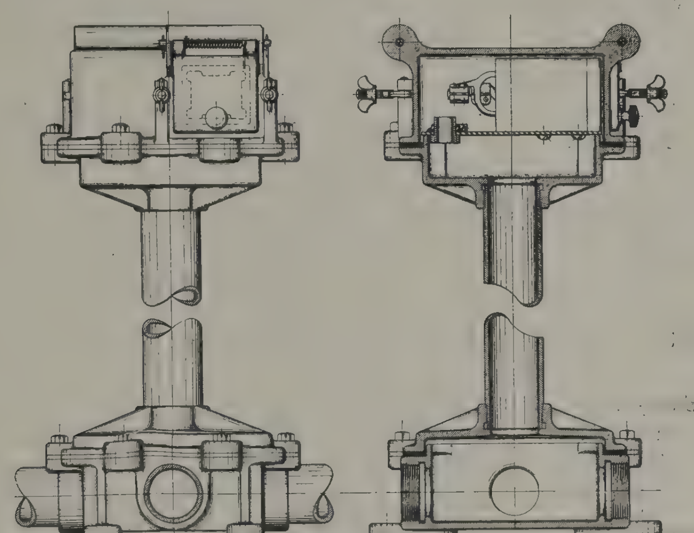
Type FBR Condulet for Battery Fuse

Yard Charging Condulet Equipments

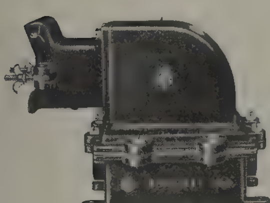

Type UGEM with Type QD Attachment

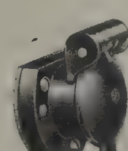

Type UGXF—Yard Charging Condulet—Surface Type—Double Outlet


Type UGEL

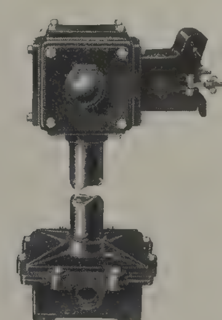

Type UGXD—Yard Charging Condulets—Underground Type—Double Outlet

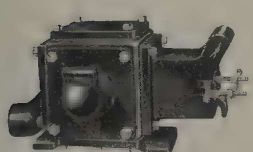

Type UGEN with Type QD Attachment


Type UGEL with Type UGC Body


Type QD (10-Amp.) Receptacle Attachment


Type BPFA Plug


Type UGE Underground Mounting, with QD Attachment


Type UGE with Type QD Attachment


Type BPB Plug


Type BPF Plug

These Condulets are especially designed for storage battery charging outlets in railroad terminal and coach yards.

It is not modern practice to use pole lines in this class of work. Therefore, wires should be run in conduit either under ground or on the surface, as conditions demand. This type of installation requires that the outlets be mechanically and electrically well made so as to withstand the hard usage and abuse to which they may be subjected.

Yard charging Condulets are designed for single and double outlets, and are suitable for surface and underground installations.

Receptacle housings are provided with two eyebolts and wing nuts to secure the plugs in position.

The receptacles furnished with these Condulet housings are of two types—rectangular and round—each of 100 amperes capacity. The round receptacle will take the present standard M. C. B. charging plug.

A spring door closes the receptacle opening when the plug is removed. Removable doors will be furnished in place of spring doors if desired. The latter arrangement is sometimes preferred when it is desired to have the Condulet water-tight at all times.

The usual practice is to locate these Condulets between every other track, thus leaving the alternate spaces between tracks free from obstruction.

Write for enlarged drawings and for Complete Condulet Catalog.

Ring Fixtures

Automatic

The Automatic action of the Ring Fixture (Figs. 1932, 1935, 1936, 1938, Illustrated Section) is the feature which has made it recognized by railroad men as the Ideal Curtain Fixture. The Rings which provide the holding means, are so designed and located in the fixture head, that the force of gravity assures their resting against the grooves at all times, automatically rocking into frictional engagement with and releasing from bottoms of grooves with upward and downward movement of curtain.

Self-Righting Self-Aligning Adjustable

The wheels at top and bottom of fixture heads acting in combination with the upward pull of roller give to the Ring fixture its self-righting and self-aligning properties.

Ring fixtures may readily be shortened or lengthened by turning the heads to the right or left, as may be required.

Rex Vestibule Curtain Outfit

Easily Applied Instantly Accessible

The Rex Vestibule Curtain Outfit Complete (Fig. 588, Illustrated Section) ready for application to car, includes Rex Vestibule Curtain—Rex Opening Shield and Adjustable Brackets—Rex Steel Roller—Rex Automatic Release Handle—Rex No. 6 Roller Bearing Hook.

Rex Opening Shield

Fig. 577, Illustrated Section, is formed of two semi-circular parts of heavy sheet steel, hinged together, held closed by spring latches at top and bottom and with edges rounded to protect the curtain.

Rex Steel Roller

Fig. 578, Illustrated Section. The barrel is made of 1¼" steel tubing with depressed groove. The ends are of heavy brass and all interior parts of steel. Furnished in one-piece continuous length for adjustable brackets, or when required, with locking adjustable steel sleeve for stationary brackets.

The Rex steel roller is provided with an automatically releasing bolt at top of roller which acts as a retention device for engaging and holding the spring tension when roller is applied to or removed from brackets.

Rex Release Handle

Fig. 583, Illustrated Section. With the Rex Release Handle a band of webbing is used short enough so that when it pulls tight and automatically releases the curtain handle, there is still at least a three-quarter turn of the curtain fabric around the curtain roller. The webbing is permanently attached to the face of the vestibule end post.

Rex All-Metal Rollers

All-Metal

Rex Rollers (Fig. 1931, Illustrated Section) are made of metal throughout, no wood whatever being used in their construction.

Metal Locking Extension Sleeve

Provides ample adjustability and locks firmly to roller barrel by means of a locking device. Rex metal locking sleeves are not affected by climatic or weather conditons and may be adjusted to varying roller lengths any number of times without injury or damage to sleeve or roller barrel.

Locked-Seam Barrel and Groove

The barrel is closed by a locked-seam. This construction gives to the roller exceptional strength and rigidity, absolute uniformity of diameter throughout its length, providing a groove with round edges which cannot injure the curtain fabric, matching perfectly with the groove in the metal extension plug.

Springs

Rex roller springs made in our own factory combine strength, smoothness of operation and long life, with minimum variation of lifting power throughout the movement of curtain.

Rex Sloping Top Diaphragms

Fire and Water Proof Treatment Throughout

Fig. 565, Illustrated Section. Impregnation of beltingthroughout its entire construction with our special fireproofing and waterproofing compound.

Sloping Top

Fits standard flat top face plate. Self-cleaning, sheds water, cinders, etc., does not require hood.

One-Piece Corners

One piece 45 degree angle corners have straight line hinge action and combine three vitally essential features at this point, ample expansion, strength and flexibility.

Angle Iron Truss

Made in one piece, galvanized and painted, passing all around diaphragm, and riveted securely by japanned brass rivets.

Rex Steel Diaphragms

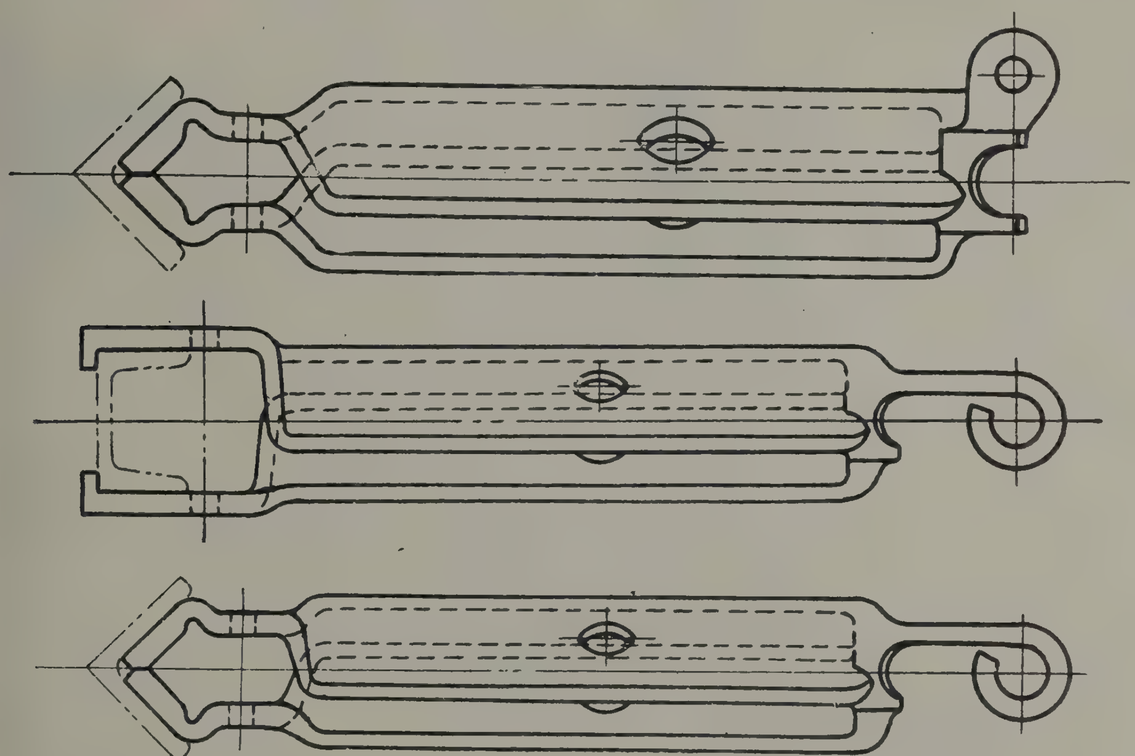
Steel Diaphragms For Steel Cars

Fig. 570, Illustrated Section. Simple—Connecting member and Two Flanged Plates spaced apart — Noiseless — Easily and Quickly Applied—Tight Vestibules—Fire, Burglar and Trampproof. Designed and constructed to last as long as the car body, of which they are integral and permanent parts.

Indestructible Brake Beam Fulcrums

Purpose

The Brake Beam Fulcrum is undoubtedly the most important member among those parts of the Brake Equipment known as the foundation brake gear. Functioning at a point of greatest stress in the operation of the brakes, the fulcrum is subjected to enormous pressure and shock strain, and it is of the highest importance that only durable and dependable fulcrums be used. The Damascus Brake Beam Company, have developed the indestructible one piece forged steel fulcrum illustrated here and in which is shown the adpatability of this fulcrum to all kinds and types of Brake Beams, and its superiority over malleable fulcrums. The Company is in a position to furnish these fulcrums to meet all capacities and conditions.



While the fulcrums illustrated herewith only show seat for round tension rod, fulcrums can be furnished to take care of any section tension member and fulcrums for channel compression member are made for inside as well as outside application.

Description

As its name indicates, the indestructible one piece forged steel fulcrum is made in one piece of highly developed steel that has successfully met the severe tests, both metallurgical and mechanical, to which all metal designed for this service is subjected. As a means of comparison with malleable iron castings—showing tensile strength of each, the following will be of interest.

Indestructible Forging 70,000 lbs. per square inch.
Malleable Iron Casting 37,000 lbs. per square inch.

The indestructible one piece forged steel fulcrum for passenger and tender service is suitable for all types of passenger beams—for Anglrod Freight and Tender Service with or without third point suspension; for Channel and Rod Construction—with or without third point suspension.

Advantages

The one piece forged steel fulcrum, combining all functions permits of the maximum strength where strength is vital and insures perfect ease of operation. In the design, the distribution of metal is such as to give the member efficiency where most needed.

Advantages of the indestructible one piece forged steel fulcrum are reflected in

Average replacement cost.
Average time cars out of service.
Earnings lost by car out of service.
Potential loss of business account of delays and car shortage.
Cost of switching to and from repair tracks.
Decrease in number as compared with malleable repair fulcrums purchased yearly.

All Damascus Brake Beams are equipped with this fulcrum. The elimination of repair cost—their interchangeability and the guaranteed increase in service and mileage of cars make efficiency and economy distinctive features.

A highly important fact and one which should not be overlooked is that indestructible one piece forged steel fucrums are removable by simply removing one bolt and can be replaced in a minute's time, thus making it possible and entirely practical to replace a right hand fulcrum with a left hand fulcrum if necessity requires this change to be made.

"Dayton" Passenger Car Trimmings

Products

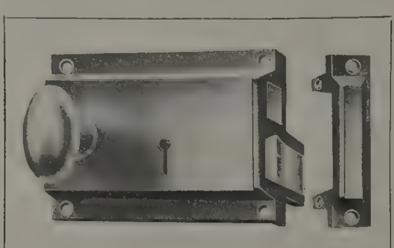
The Dayton Manufacturing Company of Dayton, Ohio, has made Railway Car Interior Hardware for over thirty-five years. Dayton Bronze Car Trimmings are standard on the Steam and Electric Railroads of America, and are well and favorably known, on railways all over the world. Over twenty thousand different patterns are available, making it possible to supply any character of interior fittings. All of these patterns may be had in any one of forty-six different finishes, and as there are numbers of different designs running through the different classes of fittings, it is possible to select from this line patterns to harmonize perfectly with any finish and character of car interior.

No. 32—Eckert Water Closet

The No. 32 Eckert Water Closet has an upper bowl of heavy vitreous earthenware, the lower part of the hopper being white enameled iron. The mechanism of brass heavily nickelplated, is simple and reliable. Maintenance expense is practically negligible.

No. 678—End Door Lock

No. 678 End Door Lock is fitted with our anti-friction swing latch. The interior parts are designed to stand up under heavy service. Exclusive of keeper it measures 3¾" x 4⅞" and may be fitted to any railroad key. With a thumb piece instead of keyhole on the face side this pattern



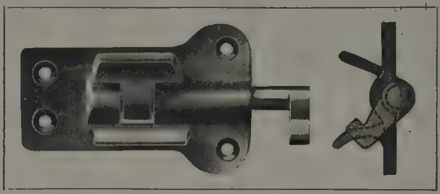
is known as No. 876 Saloon Door Lock. Each style will be furnished with either knobs or flush handles on the reverse side as ordered.

No. 115—Electric Chandelier

No. 115, four-light Chandelier is equipped with our patented Flex Shade Holder and is very substantially made. It may be ordered in any finish and for any drop. Bracket lamps of corresponding design are also furnished.

No. 185—Rock Shaft Sash Lock

No. 185 Rock Shaft Sash Lock, furnished with either cast bronze or crimped steel continuous stops, gives perfect control of the car window. The bolt is drop forged and ample bearing surface is provided.



"Flex" Patented Shade Holder

The Flex patented Shade Holder used where possible on all Dayton Electric and Gas Lighting fixtures, holds glassware securely under all conditions yet gives perfect freedom for expansion and contraction. Glassware may be readily removed or inserted.

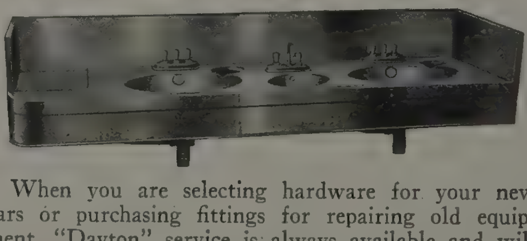
No. 192—"Rex" Basket Rack

No. 192 "Rex" Basket Rack has the bottom section assembled to the brackets with four swivel hexagon nuts. The longest continuous rack is easily installed and individual sections may be removed for refinishing without disturbing the

brackets or removing other sections. Like all "Dayton" fixtures ample strength for service is provided in the design.

No. 165—Solid Nickeline Washstand

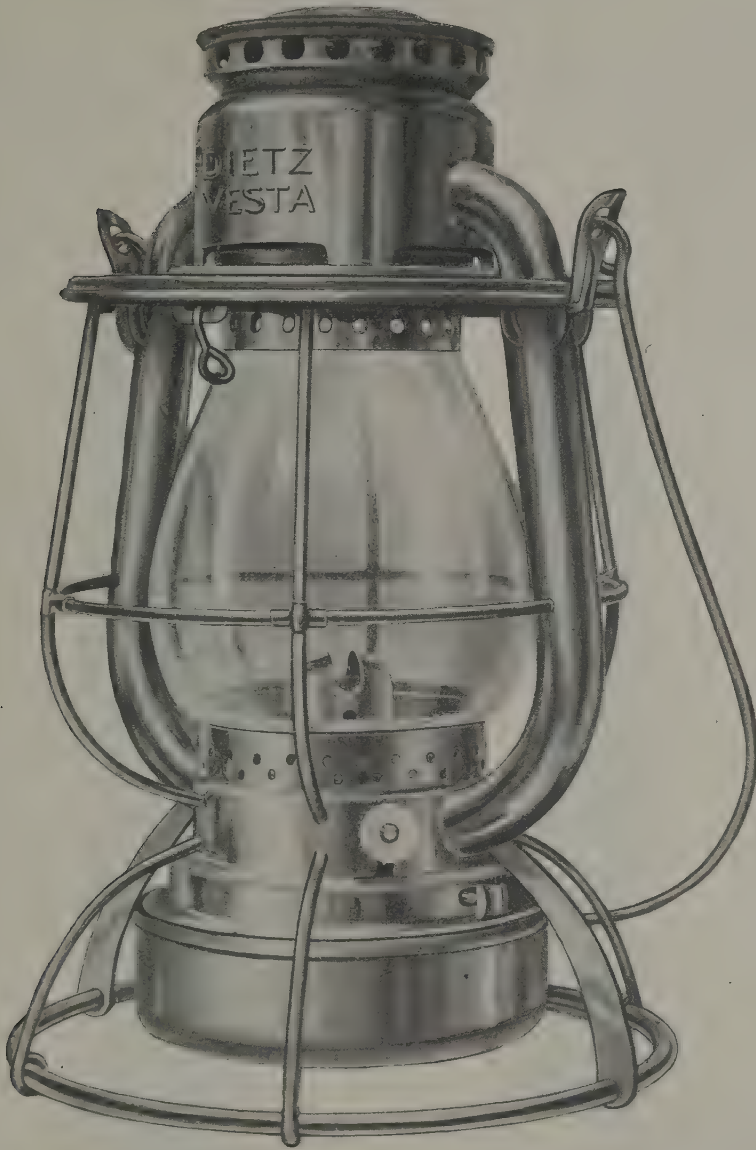
Our solid Nickeline Washstands are made of any dimensions, with any combination of bowls and fixtures required. They never need refinishing.



When you are selecting hardware for your new cars or purchasing fittings for repairing old equipment, "Dayton" service is always available and will save valuable time.

"Dayton" products also include Passenger Car Platform Trimmings, Oil, Gas and Electric Headlights and Headlight Turbo-Generator Sets, Railway Switch Locks, etc., etc.

Dietz "Vesta" Railroad Lantern



Burns Kerosene

The Dietz "Vesta" Railroad Lantern burning kerosene oil can be operated at a cost of 50 cents a month less for fuel than the old style railroad Lantern burning expensive signal oil.

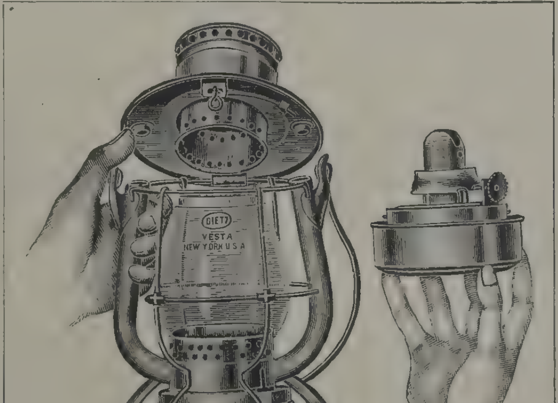
Exhaustive tests have proved that the Dietz "Vesta" Railroad Lantern will give effectively all the signals in the Manual, plus the "High-ball."

The Dietz "Vesta" Railroad Lantern is a cold blast tubular lantern that gives a pure white flame, and cannot be put out by the highest winds.

Saving

It has been estimated that one railroad using 30,000 Lanterns a year will save in 1919 $180,000, because it has substituted the Dietz "Vesta" Railroad Lantern burning kerosene oil for the old-fashioned railroad Lantern burning the unnecessarily costly signal oil.

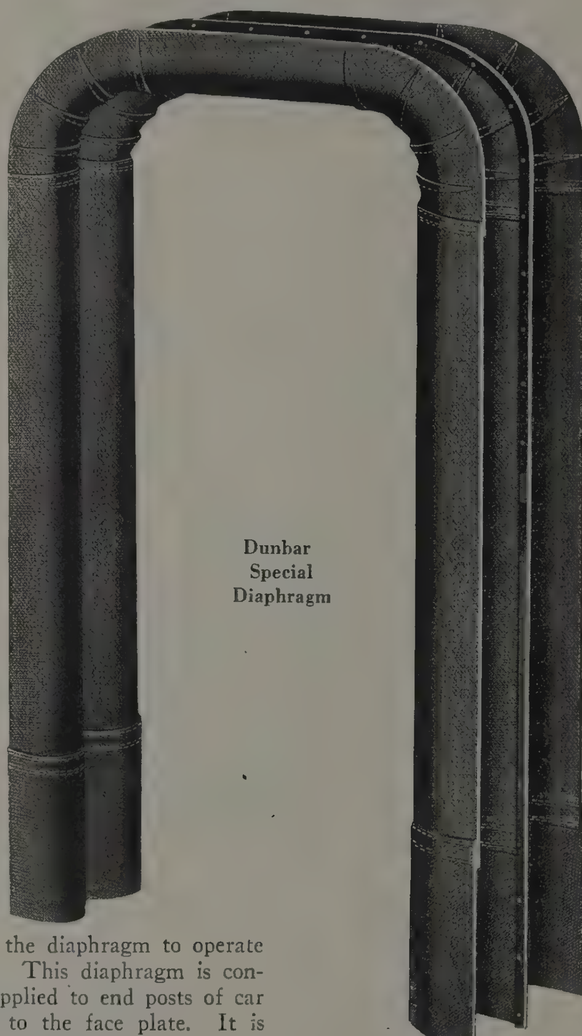
This illustration at the right shows the simple construction of the Dietz "Vesta" Railroad Lantern, and how easily it can be taken apart.



Car Appliances

Dunbar Special Diaphragm

The Dunbar Special Diaphragm is made in both two-fold and three-fold types to fit vestibule openings. The top section consists of one piece of belting corrugated to form the corners, overlapping and stitched to the side sections. The legs have an adjustable foot of transverse weave for strength and with three inch overlap for adjustment. The diaphragm is constructed by forming the belting in "U" shape folds securely fastened with steel rivets four inches apart to a continuous channel iron stiffener extending around the diaphragm. Three-ply cotton belting is used throughout, the top and corner sections being fire and waterproof treated and the sides waterproofed.



Dunbar Special Diaphragm

Dunbar Diaphragm Attachment

This attachment facilitates the application and removal of diaphragms and affords quick access to draft rigging when repairs are necessary.

Russum Steel Diaphragm

Steel throughout and equipped with silencer wearing strips which allow the diaphragm to operate easily and without rattling. This diaphragm is constructed with steel pocket applied to end posts of car with hinged sides attached to the face plate. It is absolutely fireproof and weatherproof. The construction is practical and substantial, thereby insuring long service.

Kass Safety Step Box

The "Kass Safety Step Box" is for use at Station platforms for the convenience of passengers when entering or leaving car. The top being of Kass Safety construction is anti-slipping and insures secure footing.

Kass Safety Step Treads

"Kass Safety Step Treads" insure secure footing and prevent passengers from slipping when ascending or descending car steps. They are superior to rubber mats and being made of steel plates they will last indefinitely.

Brake Step for Freight Cars

This Brake Step with Kass Safety Plate, for use on freight cars, is designed to eliminate the danger of brakeman slipping while applying hand brakes. Step can be furnished with or without brackets to suit any style of brake ratchet wheel and pawl.

Chanarch Steel Flooring

Chanarch Steel flooring is of special construction, the sheets being a multiple of arches and dove tail channels, for the purpose of securely anchoring the composition floor. This construction has sufficient strength to support the floor load between spans of sills and is superior to any other section of steel flooring now on the market, for the reason that it combines the desired anchorage for the composition floor, together with maximum carrying capacity and minimum weight.

Dunbar Steel Doors

"Dunbar Steel Doors" are constructed mechanically perfect in any type desired for passenger train equipment.

They excel in neatness of finish and durability, combining great strength with minimum of weight.

Anti-Pinch Door Shields

Positively prevent injuries to passenger's hands from being caught between door jamb and door.

Pressed Steel Shapes and Mouldings

Pressed steel mouldings and shapes of all kinds are made in various styles or sizes both for outside or inside steel car finish, and are furnished either plain or painted to match any kind of wood.

Car Appliances

Car Window Curtains and Fixtures

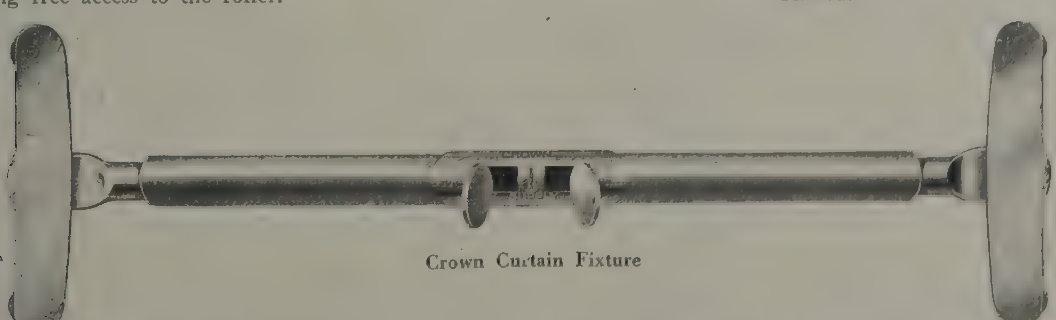
Curtains are made of various grades of Pantasote and Fabrikoid material to meet any specifications. Three types of fixtures are manufactured, Crown, Gem and Protected Groove. Principle of operation is same in first two, the only difference being in length of shoes. These fixtures consist of a rod passing through hem in bottom of curtain with pinch handle in center operating brass shoe at either end. The shoes carrying small wheels at top and bottom and friction surface at center press against bottom of groove by a spring sufficiently strong to hold curtain securely. When careless or improper handling moves the curtain out of horizontal the wheels come in contact with groove and friction shoes release the curtain then returning to proper position. The Protected groove fixture has flanged shoes bearing against metal strip and is so constructed that it will not creep, tilt, jamb or leave the groove. This fixture is without pinch handles, but can be raised or lowered by taking hold of bottom rod at any point.

Dunbar Vestibule Curtain Fixtures

One complete Dunbar Vestibule Curtain outfit includes pressed steel Curtain casing, steel revolving shield, which permits easy access to roller and curtain; all steel curtain roller provided with snap button releasing device, the curtain proper with handle, pull rod, and snap buttons ready for application to roller; Single or Double hooks for steel or wood vestibule posts and standard brackets to meet any requirements.

Regal Revolving Shade Box

The Regal revolving shade box is designed to obviate the necessity of removing the shade box or other finish to gain access to the shade roller. It consists of a casing with revolving shield, which carries the shade roller brackets. To remove the shade, the shield is revolved a quarter turn, thereby giving free access to the roller.



Crown Curtain Fixture

Sash Locks for Car Windows

The Dunbar type C sash lock is designed for application to the face of the sash in connection with a rack located on the window stops. A projection on the lever engages the rack and holds the window in a fixed position. It is operated by a thumb lever, which, when depressed, withdraws lock bolt, releasing the sash. This lock will not permit the window to be raised or lowered without operating the thumb lever. The Dunbar No. 3 sash lock is for use with an invisible rack located in the groove in which the sash slides. It locks the sash by means of a lever extending through the sash frame, engaging with the rack, and is released by a bell crank lever operated by a thumb pressure exerted on a projection of the bell crank which extends outward from the sash.

Duplex Weatherproof Windows

The sides of the sash are fitted with brass weather stripping which overlaps an outside steel stop attached to the window post. The meeting rail weatherproofing is a strip of velvet carpet, metal bound, bearing against the top rail of lower sash and effectually excludes all dirt and dust. The sill is equipped with a double lipped rubber strip, reinforced with metal and applied on the bottom of lower rail contacting tightly across the sill.

Gosso Sanitary Beds

The Gosso bed is constructed with a heavy canvas sheet tightly drawn over a frame of special metal tubing suspended by coil springs at each of the four corners of the frame and attached to chains which are secured to ceiling and floor and held taut by special patented expanders. It is simple in construction and provides a most comfortable sleeping arrangement, portable, economical and sanitary.

Sanitas Wall Beds

Similar in construction to the Gosso suspended bed, this type is fastened to and can be folded closely against the wall, allowing clear space in car whenever desired.

Folding Tail Gates

Substantial in construction, simple in design, neat in appearance, light in weight, no projection to tear clothing, and can be readily applied to platform of any car.

Duner Car Water-Closet

Foreword

The Duner Flush Hopper, or Car Water-Closet, has been in most successful use upon railway equipment, in different climates, and in many parts of the world (Europe, South America, China and Japan) as well as upon the sleeping cars and most of the first-class equipment in Canada and the United States, for more than 16 years. The Duner Hopper is of simple and durable construction; does not get out of order.

All Parts Standard

Many improvements which have been made since its first introduction are so designed that any part furnished now will fit the first hopper made. This means that every part is made to standard and applicable to all Duner Hoppers of its type.

Water Economy

The Duner Flush Hopper secures the most effective flush with the use of less water than any other closet on the market, which is most important on account of the limited water storage on cars. The Duner Hopper will not freeze from outside cold owing to the construction of the insulated pan which seals the lower extension of the hopper and keeps out the cold air as well as all dust from entering the car through the closet. Should the water supply fail while the car is running the closet need not be put out of service. The pan can be fastened back permitting the use of the device as an open hopper.

Double Bowls Facilitating Cleaning

The Duner Hopper is made in two parts, see illustration herewith, facilitating cleaning and also permitting the use of either porcelain (vitreous ware) or enameled cast-iron for the top bowl, as may be preferred. The bottom bowl or base, being made of enameled cast-iron, should never need to be replaced. Any type of Duner upper or top bowl will fit the standard bottom bowl.

Showing Bowls Detached for Cleaning Also Side Handle

See Illustrated Section

For information as to some of the different top bowls which are used on the same base or bottom bowl see Fig. 1785 which is shown on page 778 of this dictionary and cyclopedia.

Operating Mechanisms

There are several operating devices. If it is desired to have the operating lever attached to a part of the hopper itself, the "side handle" would be used. See illustration above, which also shows the bowls detached.

If it is desired to have the operating mechanism placed above the hopper and separate from it, the "side wall pull" should be specified. It is fastened to the side of the car or bulkhead. The hopper can be set in a corner, that is corner-wise, not square, and if so specified will be fitted with the proper corner lever.

Either of the operating mechanisms can be easily changed from right hand to left hand, or vice versa.

With Side Wall Pull

Overhead or Pressure Tanks Used

The Duner Hopper can be operated with water from an overhead tank (gravity system) or from a tank under air pressure (pressure system). This should be borne in mind when placing an order. There is a difference in valves and supply pipes.

Hopper Tubes

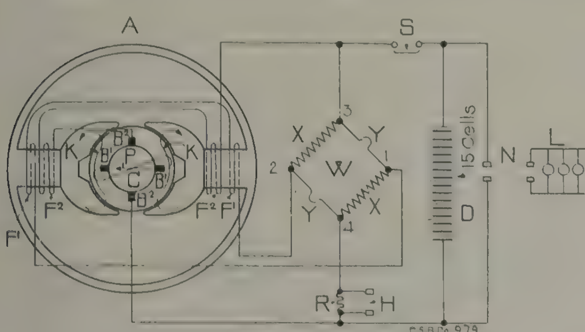
The Duner Company also furnishes when desired an enameled cast-iron tube to be used as an extension below the hopper, making a continuous enameled surface. It can be set at any angle desired. Galvanized sheet iron tubes in a very short time rust through causing damage to the floor and framing before the same is noticed. This enameled tube makes an effective, sanitary and permanent outlet.

E. S. B. Constant Voltage Axle Lighting System

Simplicity

The generator is of the Rosenberg type and develops the same polarity with either direction of rotation, requiring no pole changer.

Constant voltage field control is secured by means of resistance units having special temperature co-efficients, permanently connected into a



Wheatstone bridge. There are no moving parts, carbon piles, dash pots, pivots, levers, moving or vibrating contacts.

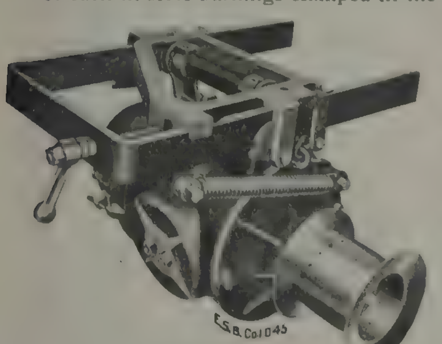
An automatic switch closes in response to very small difference of voltage between generator and battery, insuring positive action, absolutely free from arcing and chattering, causing not the slightest flicker at the lamps.

No lamp regulator is required, the voltage of the generator being held close to the normal floating voltage of the battery.

The switch board measures 18 inches by 15 inches.

The generator is carried either by the truck or the car-body.

The Truck suspension consists of two interchangeable loop bars suspended from two bearing pins, free to turn in steel bushings clamped in the bearing saddles, and adjustable longitudinally along the side bars. There is no wear except at these two bearings, and these (two pins and two bushings) are easily and cheaply renewed. There is no motion or wear at feet of machine which are solidly clamped to the loop bars. Permanent belt alignment insures long belt life (80,000 to 90,000 miles per belt.)



The body hung suspension consists of a cast-steel carriage adjustable longitudinally along two horizontal bars attached to the under-frame. From this carriage the generator is supported on a 1¾" diameter bearing pin passing through a tubular steel bushing 12" long carried by the supporting lugs cast integrally with the field frame. Belt tension is controlled by a tension spring and is adjusted by sliding the carriage along its supporting bars.

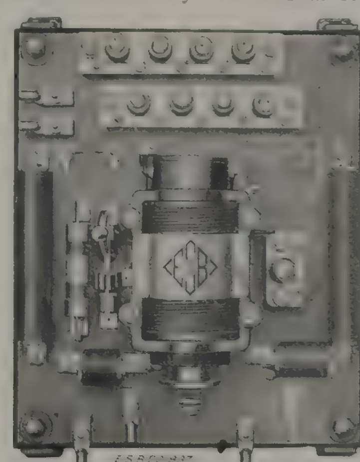
Points of Superiority in Operation

With this system no adjustments are necessary. The apparatus will automatically adjust itself to various conditions of load and service, the generator output varying to meet the requirements.

There is no excessive overcharging of the battery and no appreciable gassing. This prolongs the life of the plates and gives ideal conditions from the battery stand-point, insuring long plate life, infrequent flushing (twice a year), reduction in amount of sediment and frequency in cleaning (once in five years).

The cost of inspection is reduced to a minimum. The simplicity of the apparatus is such as to require but little attention. By throwing over the test switch on the switchboard, the inspector can determine in a few seconds the condition of the control circuits.

Reversal of polarity, whether caused by crossed leads from battery or generator or otherwise, is immediately and automatically corrected as soon as the generator starts up; the polarity of the machine, if wrong, being reversed by the battery when the automatic switch closes.

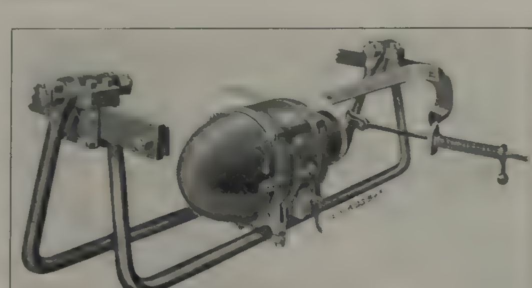


The charging rate is automatically adjusted to the condition of the battery. A considerably discharged battery will be rapidly charged at the maximum safe output of the generator. A fully charged battery will receive just sufficient trickling charge to keep it full, but will recharge rapidly for a few minutes after a short discharge until the current taken out has been restored.

There is no leakage of current from the battery when the generator is shut down. There are no polarizing or "teaser" coils taking current from the battery when the car is standing. The equipment may, therefore, stand idle for months and yet the battery will be ready for service when wanted.

The highest quality of material and workmanship are used throughout, insuring low maintenance costs and long life.

Details of this equipment are shown in the illustrated section of this dictionary and cyclopedia, pages 888-889.



The Edison Storage Battery

Principle

The Edison principle is totally different from that of all other storage batteries, which are based upon either the Planté or Faure theory; they use lead peroxide or spongy lead in an acid electrolyte. Mr. Edison chose nickel hydrate for the positive active material of his battery; iron oxide for the negative active material, and an alkaline electrolyte.

The main advantage of this radical departure from old-time methods is that the Edison principle permits an all-steel construction, and the production of a battery of superior ruggedness, longer life, lighter weight and absolute freedom from disease. There is nothing about it to bend, buckle or crack. It may remain in a charged or discharged condition indefinitely without injury. About the only care necessary is sufficient attention to keep the cells clean and to keep the solution-level above the tops of the plates. These are some of the characteristics of the Edison battery which have been strong factors in establishing the Edison feature of low cost of battery maintenance and operation.

Weight

The advent of all-steel cars, necessitating the building of stronger bridges, heavier locomotives and heavier rails, is one big reason for taking advantage of every possible opportunity to save weight. In this connection consider the weight of a 25 cell, 30 volt, 300 ampere-hour Edison Alkaline set as compared with a 16 cell, 30 volt, 300 ampere-hour set of other batteries. The Edison set weighs not over 880 pounds. The other battery will weigh, on the average, about 2880 pounds, making a clear saving in favor of the Edison Alkaline Storage Battery, of approximately 2000 pounds on 30-volt equipment and 4000 pounds on 60-volt equipment.

In addition to the saving in haulage costs the reduced weight of the Edison battery will show considerable saving in the cost of handling batteries at terminals. Edison batteries assembled in three-cell trays weigh only 100 pounds and can be easily handled by one man, whereas it takes three men to handle a double compartment tray of other batteries weighing 350 pounds.

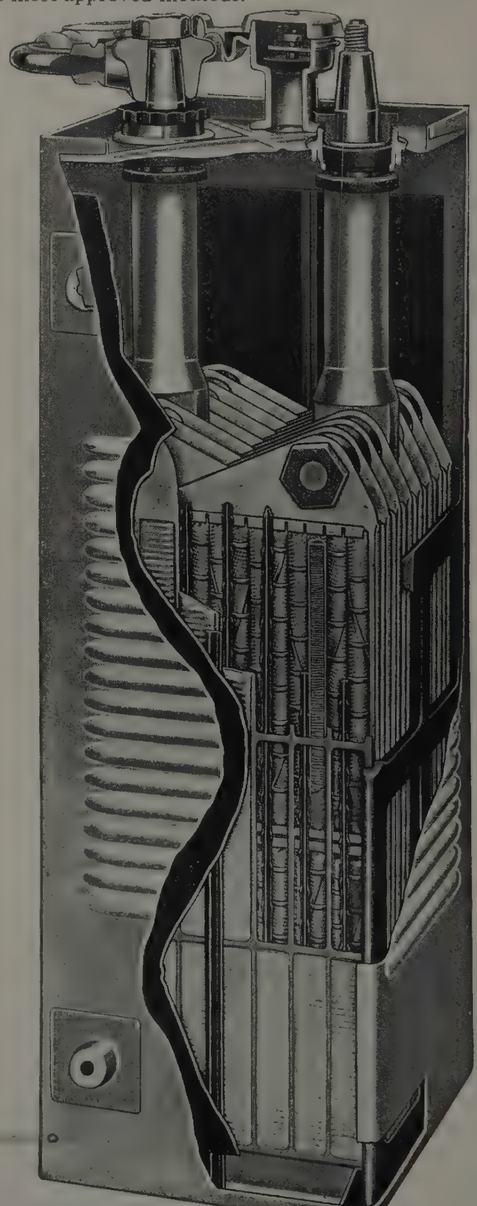
Maintenance and Operation

In addition to the saving in weight is the big saving in the cost of maintenance and operation. The electro-chemical principle of Edison batteries makes them absolutely free from disease. There are no sulphated plates to require special treatment. The manner in which the active materials are held in perforated steel tubes and pockets eliminates washing out sediment. The sturdy steel construction of the plates assembled in a steel container leaves nothing about the Edison battery to buckle or crack. Hydrometer readings are not necessary except at long intervals of service to determine the gravity of the alkaline solution. The changing of electrolyte in the Edison Battery is only necessary at intervals of from 3 to 5 years. This does not necessitate the removal of the battery to a battery house as the renewal of the electrolyte can be made on the platform, or on the ground beside the car, in about one hour.

This exemption of the Edison battery from an annual retirement to a battery house for cleaning and repairs makes the extra sets, incident to the care of other batteries, unnecessary and is another Edison saving in maintenance and operation. In fact, the exclusive use of Edison batteries would eliminate the necessity for, and therefore the expense of, a battery house.

Life

The life of any storage battery is generally computed on the number of complete cycles of charge and discharge which it is able to develop. The number of such cycles obtained depends upon the care exercised to keep the battery in good condition and upon such service requirements as would tend to allow the battery to be operated according to the most approved methods.



The Edison Alkaline Cell cut away to show the all-steel construction

The Edison Storage Battery

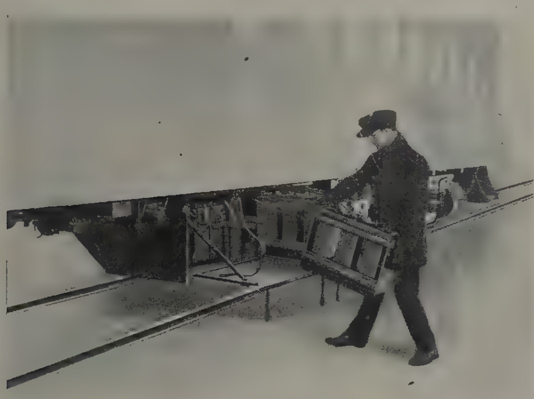
The operating requirements of train lighting service are far from ideal for the battery. Transportation conditions are such that batteries are sometimes completely discharged and allowed to remain in that condition for long periods and are also very much overcharged at times, both of which conditions cause injurious diseases, impossible in an alkaline battery.

Edison batteries in service six and seven years are still giving full rated capacity.

Temperature

For short, infrequent periods the Edison battery will withstand severe heating better than other types. It is for this reason that numerous batteries have come through fires with no harm except to the rubber parts and the wooden trays.

But, injurious temperatures are seldom met in train lighting, for the rates are almost never very high and ventilation is usually sufficient in warm weather. In the matter of low temperatures, storage batteries are



Edison Batteries assembled in three cell trays weigh only 100 pounds, and can be handled by one man

self warming—still air is a good heat insulator—a battery surrounded by still air keeps sufficiently warm for satisfactory operation.

In January, 1914, Canada experienced the severest cold weather in 38 years, and yet 42 Edison equipped cars gave service that completely dispelled all fear of cold. In fact the road on which these batteries are used has since doubled its Edison equipment and three other Canadian railroads have adopted Edison batteries.

Care

From the operating man's point of view, care has always been a big item. For this reason the brevity and simplicity of the instructions for the care and operation of Edison Alkaline Storage Batteries, as set forth in our instruction book No. 118X, will be appreciated. These may be condensed to three simple rules:

(1) Add distilled water enough to keep the solution level above the tops of the plates at all times. This simple and inexpensive operation is by far the most important of our instructions; its careful observance will result in maximum life and efficiency.

(2) Replace electrolyte with fresh solution at long intervals, probably about 3 or 5 years.

(3) Keep the outside of each cell reasonably clean and dry.

Advantages

The Edison Alkaline Storage Battery is the only battery built of steel. It is the only storage battery having an alkaline solution and using active materials of nickel hydrate (positive) and iron oxide (negative). This construction and principle cause Edison Alkaline Storage Batteries to possess advantages distinctly individual. Among these are:

It is light in weight.

It occupies less space.

It requires no spare parts.

Its steel container is unbreakable.

It requires a minimum of attention.

It suffers small loss of charge when idle.

It does not need frequent hydrometer readings.

Its tray assembly and cell connections are simple.

It cannot suffer from sulphation or any kindred "disease."

Its exclusive use eliminates the need of a battery house.

It is not subject to buckling or growing of plates.

It may be discharged to zero, or as low as may be desired, without fear of injury.

It requires no internal cleaning, the active materials being held securely in perforated steel tubes and pockets.

It may be left unused, either charged or discharged, without any attention, and suffer no injury.

For a complete description of the Edison Battery in Train Lighting Service send for Bulletin 118.

DATA ON EDISON TRAIN LIGHTING BATTERIES

Car-Lighting Cells have plates of standard design, but are assembled in higher containers, giving 3 inches additional space above the plates for solution.

This feature permits of working batteries for long periods without adding water.

Type	A-4H	A-5H	A-6H	A-8H	A-10H	A-12H
Rated Capacity, ampere-hours	150	187.5	225	300	375	450
Charging rate for 7 hours, amperes	30	37.5	45	60	75	90
Discharging rate for 8 hours, amperes	18.75	23.4	28	37.5	47	56.00
Average discharge voltage per cell	1.24	1.24	1.24	1.24	1.24	1.24
" " " 25 cells	31	31	31	31	31	31
" " " 50 cells	62	62	62	62	62	62
Weight single cell complete, pounds	16.3	19.4	22.6	30.7	38.3	46.9
Weight complete battery including trays, etc., per cell, pounds	19.4	22.5	25.7	34.5	46	54
Weight 25 cell battery, pounds	485	563	643	863	1150	1350
" 50 " " "	970	1125	1285	1725	2300	2700
CELL DIMENSIONS, INCHES:						
Length (determined by number of plates)	2.64	3.19	3.80	5.03	6.15	7.39
Width	5.13	5.13	5.13	5.20	5.45	5.45
Height, container	15.16	15.16	15.16	15.28	15.28	15.38
Height, over all	16.13	16.13	16.13	16.66	16.66	17.16
*STANDARD TRAY DIMENSIONS:						
Width over all, inches	7.25	7.25	7.25	7.06	7.75	9.06
Height " " "	18.12	18.12	18.12	18.12	18.12	18.62
Length " 3 cell Tray, inches	24.70	24.70	24.70	24.70	24.62	24.62
" " 4 " " "	24.70	24.70	24.70	31.37	28.00	28.00
" " 5 " " "	24.57	24.70	24.70	31.37	36.00	36.00

* These trays are built to fit the standard battery compartments on passenger cars.

Edwards Trap Doors and Fixtures

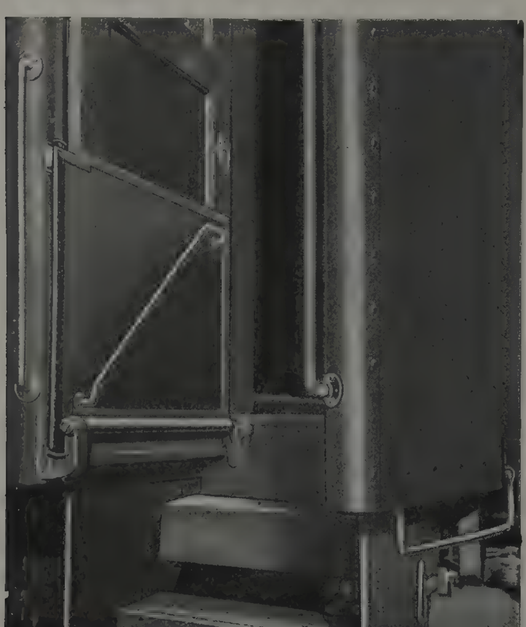
Requirements

The surface of the trap door should be smooth and unbroken to facilitate cleaning on the under side. This is particularly important if the trap doors open after the vestibule doors. All parts should be easily accessible so that adjustments or repairs may be made without the necessity of going beneath the car or removing the platform floor. The door should lock down securely and yet open quickly and easily.

Description

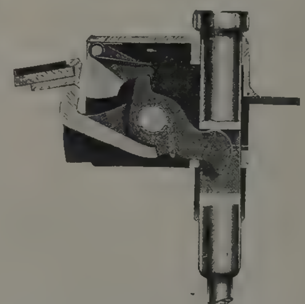
The trap door proper consists of a 3/16 in. plate reinforced with a steel binding of a design suitable for the various thicknesses of floor covering. The hinge member, which contains the flat torsional spring bars, extends across the rear of the door plate, and reinforces it at this point. A combination support bar and binding is provided to extend along the edge of the platform floor and end sill, the door resting on this when in a closed position. The lock can be placed at any point on the end sill, but preferably near the center of the opening.

The door hinge is formed from a separate piece of metal and securely riveted to the door. It contains the flat adjusting springs, which are used to balance and raise the door. The adjusting plug passes through the bracket and into the end of the hinge member of the door, also engaging the flat springs and forming the bearing at this point. The brackets are secured to the end sill of the car either by screws or, in the case of steel cars, by rivets. The adjusting plug is provided with a series of holes arranged in such a manner that a fine adjustment may be secured. The purpose of the springs is to balance the door and this is accomplished by placing a slight torsional strain on the springs, when the door is in a vertical or open position. When the proper torsion on the spring is secured it is held by means of a pin passing through the adjusting bracket and plug where the holes register. To remove the door from the car, the door should be placed in a vertical or open position and the strain on the torsional bars relieved. The pin may then be readily removed and the adjusting plug pulled out far enough to permit the door being taken down. It is unnecessary to remove the brackets, a feature which is especially desirable for steel cars, as it permits the brackets being attached to the car body by rivets instead of fastening them with machine screws or bolts, which are liable to work loose in service.

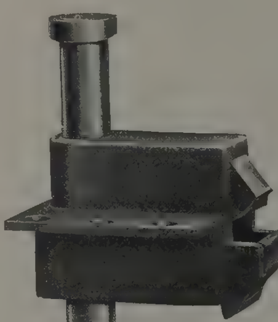


Elevated platform type of door in open position

The trap door lock holds the door in a closed position by a latch which projects over the top edge of the door. This lock is operated by a downward pressure of the foot on the foot pin, withdrawing the latch and allowing the door to raise. If the door should stick for any reason and thus be prevented from raising, a starting lever is brought into action which comes in contact with the bottom of the door and forces it to open a sufficient distance to insure its opening automatically.



Cross section of Type H lock, with latch released and starting lever in action



Type H trap door lock

Several designs of the trap doors and locks are made to meet individual requirements; the principle of their operation is, however, the same in all cases.

For subway and elevated cars an additional feature is provided which permits the door to slide outward a sufficient distance to meet the station platform.

Advantages

The use of a metal door furnishes a smooth, unbroken surface that is easily cleaned, and is light yet strong. It will not swell and bind or work out of shape and, therefore, will always maintain a proper fit.

The hinge construction permits easy application to any type of car construction, either wood or all steel, and makes it possible to balance the door in either a fully open or partially closed position. The door may be removed quickly and easily for repairs and all adjustments may be made without going beneath the car or disturbing any other part.

This type of lock insures the door opening easily and positively, and eliminates the possibility of injuring the hands in opening it. Hand holes are unnecessary in either the door or sill in this type of construction.

There are few parts to the door and operating mechanism and these are all made of metal and are of simple design thus insuring long life and low maintenance costs.

Edwards' Window Fixtures

Edwards' Window Fixtures

The different designs of window fixtures manufactured by this company resolve themselves into two distinct types, the balanced sash and the unbalanced. All the other designs are modifications of the same principles. The sash is applied to the window frame with a clearance space of about ⅛ in. edgewise and 3/32 in. between face of sash and stop casings. At each side of the window a corrugated metal bar is fastened to the front edge of the stop casings. Near the bottom corners of the sash a combined lock and sash tightening device is placed, having a rocker shaft lever, operated by a finger latch extension, and controlling an extending arm designed to contact with the corrugated bar, thereby forcing the sash against the outside stops at the bottom with a self-adjusting pressure which always maintains a tight joint. The stop bars have notches throughout their entire length, designed to receive the bolts, locking the sash in any position. The top of the sash is held tightly against the outside stop by two compression rollers attached to the two upper corners of the sash, so placed as to bear against the edges of the inside stop casings. With thin sash, when preferred, these rollers may be attached to the inside casings to bear against the sash.

Spring Actuated Roller Bearing Device for Eliminating Vibration of Sash

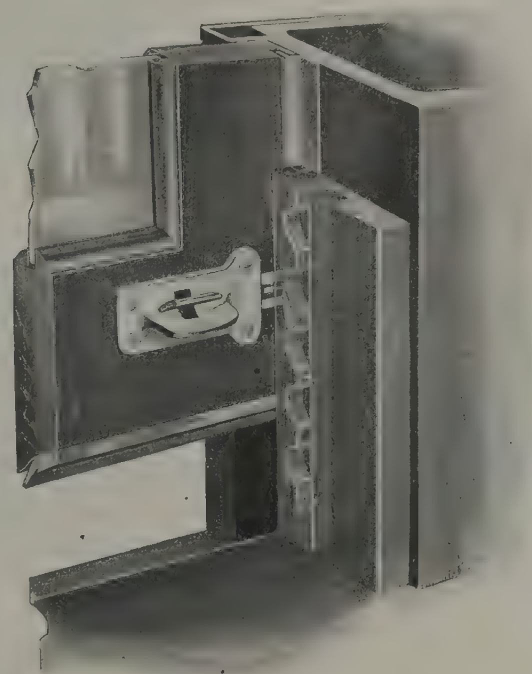
This construction holds the sash firmly against the outer stops at all four corners with a self-adjusting pressure, rendering the sash at all times tight and free from rattle yet easy of operation, and free from binding in the guideways.

In operating the sash the lock lever is released by the compression of two small levers between the thumb and finger, which releases the sash and permits it to be readily raised or lowered by hand; the pressure of the compression rollers at the top always remains the same.

Interior finish removed, showing application of sash balance

Balanced Type

In the balanced type of sash the window is raised by a roller sash balance. The sash is connected to the roller by a chain arranged to draw at an angle, and not overlap in winding on the roller, when raising the sash. This chain is attached to the sash by two sash tightening devices placed on top of the sash at each corner around which a continuous chain passes. This construction causes an even pull on each side and forces the sash firmly outward against the outside stops with a yielding pressure.



No. 13 Sash Lock and Side Weather Stripping—Phantom View of Stop Bar in Operative Position

The sash balance is supported in plain brackets, so located that the pull of roller will be in a perpendicular line from the point of attachment to the sash. The sash is provided with rubber buffers placed to strike against the bracket flanges when raised to its limit. In this design the balance should be adjusted to slightly underbalance the sash.

Advantages

Edwards' window fixtures with top, bottom and side weather-stripping, keep the window dust and draft proof at all times. They permit the sash to be applied a loose fit, insuring easy operation at all times. They present a pleasing appearance and add rather than detract from the beauty of the car.

They automatically allow for shrinkage and swelling of wooden sash due to weather conditions.

They can be applied to either old or new equipment.

The roller balance can be adjusted from the outside without removal or marring of the finish.

Load Discharging Cars

Product

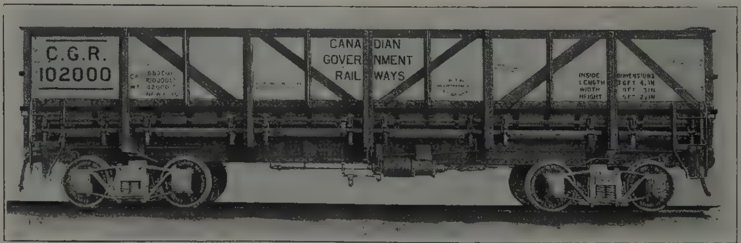
We design load discharging cars for coal, coke, ore, ballast and grain, and furnish the door operating mechanism castings delivered to the car builder. To design cars to meet the varied fixed conditions which exist in different localities and to have the designs one hundred percent efficient for the service intended has been our purpose as car designers. Whether the conditions warrant the use of a Hopper, a Gondola or a General Service car, or whether it be desired that the load be discharged to the sides or to the center of the track or just below the car does not matter, so long as we understand the conditions to be met, we are prepared to furnish a suitable design.

We contend first, that the weight of a car should be of a proper ratio to the total weight of the car and

55 ton Center Discharge Hopper Car

55-ton Side Discharge Hopper Car

50-ton Side Discharge Gondola Car



50-ton General Service Gondola Car

Load Discharging Cars

the load to be carried, and the material used placed in such manner that the greatest cubic capacity be obtained. Also the arrangement of the doors should be such that the load will discharge freely from the car body.

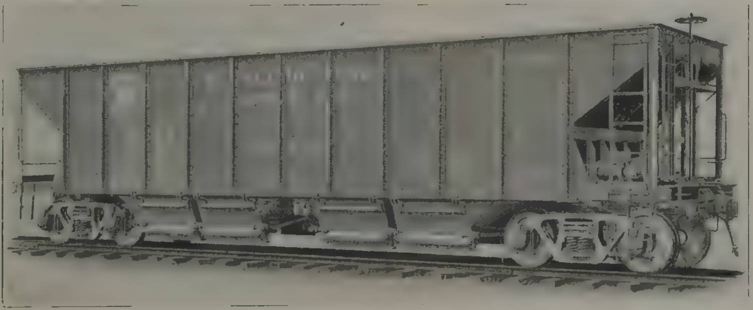
In our business of designing load discharging cars, we perform the service of *Consulting Engineers* for the purpose of better presenting our door operating mechanism, which is applicable to all standard designs and which we as *Merchants* supply to the Builders.

Our mechanism is in extensive use on nearly all of the large Systems of the United States, since it possesses unusual merit, combining the essential qualities of strength and simplicity with a positive automatic lock, adjusting features to assure tight-fitting doors and convenience and safety of operation.

55-ton Bottom Discharge Hopper Car

55-ton Side Discharge Gondola Car

70-ton Center Discharge Hopper Car



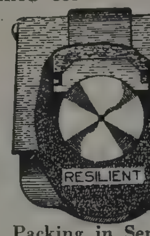
70-ton Side Discharge Hopper Car

Flower's "Resilient" Journal Box Packing

Packing Waste of Other Days

When, nearly twenty years ago, Samuel A. Flower formed a company to manufacture a specialty in journal box waste, the supply world generally received the news with its usual good-natured skepticism—"Another patented packing!" It was assumed that the life of the newly formed corporation would be of short duration.

But Samuel A. Flower, undaunted, determined that lubrication of car journals presented no insurmountable difficulties; was, in fact, merely the introduction between the journal and the lining of a film of oil which would reduce the friction between the metals. This oil would fill the interstices or pores in the metal surfaces and permit of their free movement on each other. The brasses, linings, journals, oils, were all right—they were made so by experts; the methods of packing were correct—also the work of experts; the waste—oh, that was different—it was just waste!



Packing in Service

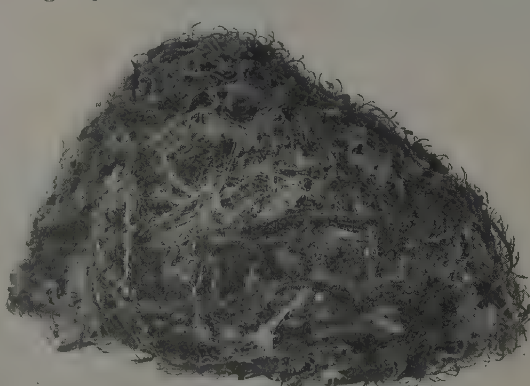
The Source of Hot Box Troubles

Yet here was a fruitful source of hot box troubles. 100,000 hot boxes per year was the record of one of the large trunk lines, as stated by its Chief Car Inspector, at an average cost of $10 per hot box. The reduction of this tremendous expense by the standardization of waste calculated to lubricate seemed to Flower a problem well worth solution.

After exhaustive tests he found that the failure of packing waste in most cases lay in the fact that the packing would fall away from the journal when subjected to the shocks and vibrations of traffic, thereby cutting off its supply of oil. Evidently what was needed to overcome this defect was material that would not only hold and feed oil but could be kept in constant contact with the journal.

Adulteration the Great Evil

Flower was, also, early forced to observe that much of the trouble caused by the then prevailing mixtures came from the amount of jute, muck yarn, rewashed waste, Flyings and hard threads which for lack of rigid specifications was permitted in mixtures. This constituted adulteration, the prevalence of which demoralized the waste industry since price differences were often the result of unscrupulousness in the use of these adulterants. Hence, early in his campaign, Flower directed attention to the undesirability of such stock, and himself religiously avoided their use. That his ideals for packing waste, today have universal application is due to his zeal in this matter.


"Resilient," Open in Nature

Approaching Waste from a New Angle

The various grades of waste had hitherto been determined by price, color and thread length, but it was soon evident to Flower that these factors were negligible in the problem of conveying oil to a revolving journal. He delved into the textile fibre field and found that there were only four classes of fibres,—animal, vegetable, mineral and artificial. Mineral fibres, like asbestos, and artificial fibres, such as wood silk, were soon proven to be entirely worthless. Of the animal and vegetable fibres only wool and cotton were found to be capable of properly functioning. Repeated tests proved that a nearly even mixture of both gave best service. Wool possesses absorbent qualities while cotton is highly capillaritive.

The Solution of the Problem

The soggy nature of the mixture in service, which still persisted, was overcome by incorporating into it vegetable fibre, mechanically curled, long, clean, tough and highly resilient, which, when intimately mixed with the cotton and woolen threads, acts like so many coiled springs in the packing, absorbing the shocks and vibrations of traffic, thus insuring constant contact with the journal. Moreover, it rendered the packing "open" in nature, permitting dirt and grit to fall to the bottom of the journal box, thereby preventing glazing.

The especial feature of the Flower Waste & Packing Company's product is its great elasticity or resiliency. From this quality comes the name "Resilient," which has for two decades stood for a standardized product, uniform in quality, highly efficient, absolutely free from adulteration of any sort whatever.

United States R.R. Administration Specification R-94-A

With the building of heavy rolling-stock equipment attention was necessarily directed to securing of satisfactory packing waste. After extensive tests, several large trunk lines, notably the Pennsylvania R. R. Co. issued specifications calling for the mixtures which Flower had submitted to them for approval. These specifications were used to cover material purchased for U. S. R. R. Engineering Regiments overseas. The United States Railroad Administration, when standardizing car equipment, issued Specifications R-94 and R-94A, both of which contain mixtures into which is incorporated mechanically curled fibre. The Flower Co. offer their product in strictest conformity with any of these specifications.

The Flower Waste & Packing Co. is located in Bayonne, N. J., where it maintains a very modern plant, together with a laboratory to which railroad men are invited to bring their lubrication troubles.

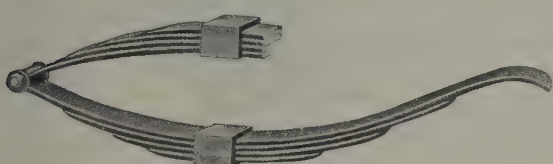
Coil and Elliptic Springs

Product

Manufacturers of Specialties in Coil and Elliptic Springs adaptable to all classes of Car Construction. Standard types of this Company's product are in service throughout the United States and foreign countries. Strictly high grade

No. 54. Half-Elliptic Scroll Ends

spring steel is used, and only first class mechanics are employed who have been trained in the various processes of spring manufacture.



No. 48. Three-Quarter Elliptic

Facilities

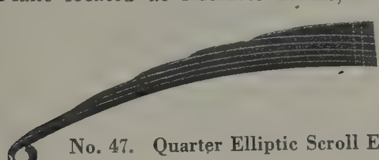
The facilities and methods employed in the manufacture of Coil and Elliptic Springs by this Company are in thorough accord with the highest recognized mechanical and scientific practice.

The Plant located at McKees Rocks, Pa. (Pittsburgh District) has been greatly enlarged and equipped with the most modern and up-to-date appliances, which enables the company to satisfactorily meet every demand made upon them. Special attention is given to oil tempering and testing.

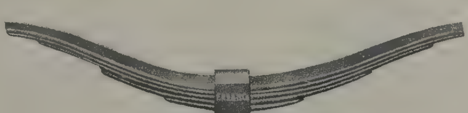
Each spring passes through the Inspection Department where exhaustive tests are made insuring a high grade and uniform product. Limited space permits

No. 26. Round Wire Torsion Spring

the illustration of only a few of the springs manufactured, but these will give a general idea of the standard type produced.



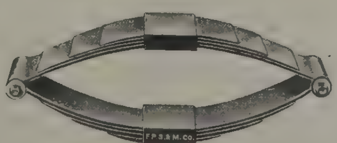
No. 47. Quarter Elliptic Scroll End



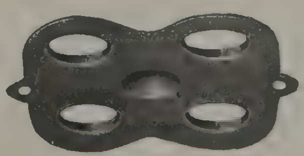
No. 46. Half Elliptic Plain End

Extension Springs

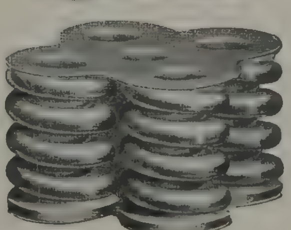
No. 55. Half-Elliptic Scroll Ends



No. 50. Single Full Elliptic with Auxiliary Plate



No. 45. Full Elliptic Springs

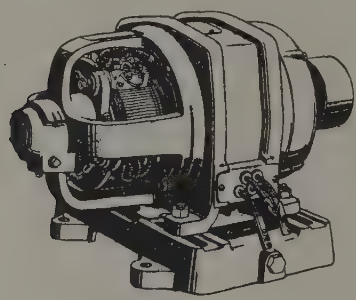


Shop Equipment

Constant and Varying Speed A. C. Motors

Type RI, constant speed, single phase induction motors are furnished in sizes ¼ to 15 h.p. Frequencies, 25, 40 or 60 cycles. Voltages interchangeable for 110 or 220 volt circuits.

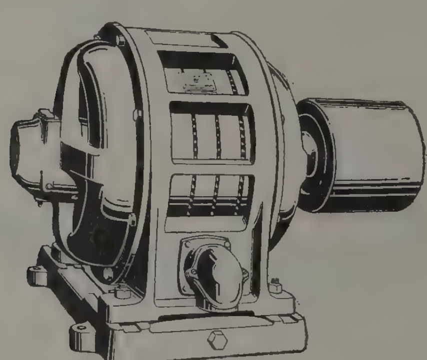
Bulletin 41507A and Leaflet 61200.



Type RI Single-Phase Motor

Multi-Speed A. C. Motor

The Form KT is a polyphase induction motor having a skeleton frame. These motors are furnished in sizes from 1 HP to 750 HP. They are adaptable for driving all classes of machines requiring constant speed, and are extremely simple, having great overload capacity, and a high power factor.



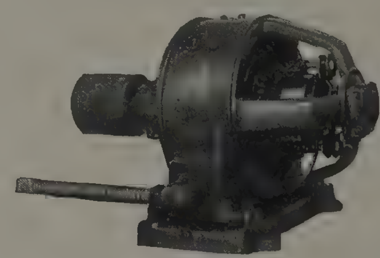
Type KT Polyphase Induction Motor

The Form K multi-speed induction motors for 60 cycles 3 phase service only can be furnished. Standard low voltages can be furnished up to 12 HP and 4 constant speeds, 1800, 1200, 900 and 600 RPM. Constant horse-power motors are suitable for machine tools; constant torque motors for operating fans, blowers and similar machinery.

Constant Speed D. C. Motor

The RC Motor with commutating poles may be classed as a universal direct current motor. It is specially designed to meet the majority of conditions required of motors. It can be furnished for constant speed, either shunt wound, for conditions requiring close speed regulation; compound wound for conditions commanding heavy starting torque, or where violent power fluctuations occur; or series wound, where load either requires fixed values or may be made subject to automatic or manual control.

All RC motors will be shipped for floor installation but may be readily arranged for wall or ceiling suspension. It can also be equipped with special belt tightener.



RC Type Motor

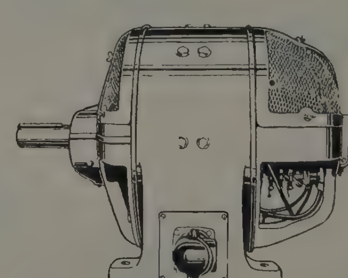
Ratings for open and semi-closed, self or separately ventilated types can be had from one-half (½) HP to 150 HP, 115, 230 and 550 volts.

Adjustable Speed D. C. Motor

This requirement is met by the type RF motor. This motor is designed for adjustable speeds with commutating poles. It is used for machine tools and similar service where widespread variation and adjustment of speed, independent of load, is required.

Built with a removable tapered shaft, split back end shield and bearings which facilitate repairs and changes. Conduit terminal bases protect connections and operator.

Made for direct current only in voltages of 230 and 550 and in ranges from two (2) HP to fifty (50) HP. Speed adjustments 2 to 1, 3 to 1 or 4 to 1, according to the requirements.



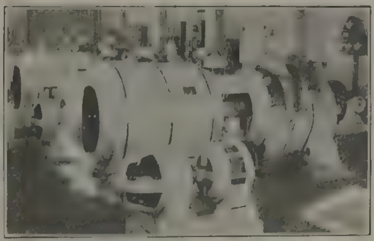
Type RF Adjustable Speed Motor

Hand and Automatic Control

This Company is in a position to supply motor control equipment to meet practically every requirement in the Railway Field. Special controlling devices are available for use with any of the types of motors above.

Shop Equipment

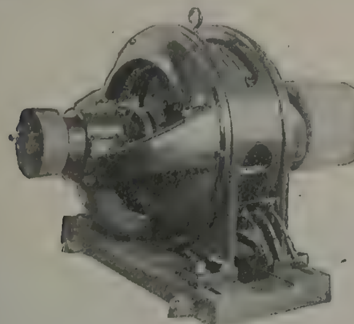
Turbo Generators



The General Electric Company manufactures Curtis steam turbines which are admirably adapted for installation in electric generating stations, and for supplying light and power to mills, machine shops, laundries, bakeries, breweries, apartment houses, office buildings, railroad stations, etc.; also for driving pumps and auxiliary equipment.

Belt Driven Generators

The General Electric Company manufactures Belt Driven, direct current Generators in capacities from a fraction of a horse power to three hundred (300) Kilowatt unit, in standard voltages. Alternating current generators are designed for various frequencies, voltages and phases, from 7½ to 550 Kw.



ATB 150 KW., 900 R.P.M., 2300-Volt, Form PB, 60-Cycle Belt Driven Alternator.

Motor Generator Set

G-E Motor Generator Sets are built in sizes from .2 to 1500 Kw. Large sets are used extensively in Railway and Mine Services. Small sets from .2 to 200 Kw. are used for excitation purposes. A line of standard motor generators with single phase 60-cycle induction motor and shunt-wound generator is used extensively for battery charging.

200 KW. Motor Generator Set

Switchboard

The General Electric Company offers for use on all systems of electrical distribution a complete line of switchboard divided into three broad classes as follows: Standard Unit Panels, Modified Standard Unit Panels, Special Panels.

Standard Unit Panels

This panel has been developed, classified and listed to meet certain conditions that have been found to occur repeatedly in connection with control and distribution of electric power. It has not been developed for voltage aboue 1500 DC. or 3500 AC. Wherever possible it is advisable to use Standard Unit Panels. They are less expensive than any other classes, and require less time to build and ship and are equal in quality and workmanship.

All equipment on these boards is made by a single company, thus centralizing the possibilities for the behavior of the entire switchboard.

Modified Standard Unit Panel; Special Panel

Same design, construction and appearance as Standard Unit Panel, but recommended to meet requirements which are either modifications of conditions covered by Standard Unit Panels in voltages or in capacity beyond its scope.

Special Panels are constructed to meet unusual conditions of voltage, capacity, control, architecture, etc.

G-E Flow Meters

The G-E Flow Meter provides a means for accurately measuring the total flow of steam, water, air or gas, through pipes or closed conduits, and so furnishes information of great value to the economical management of any manufacturing industry, Power Plant, Pumping Plant or wherever such fluids are used.

Steam Flow Meters are adapted for measuring the

G-E Indicating Flow Meter

G-E Indicating Recording and Integrating Flow Meter

amount of steam generated by a single boiler, or battery of boilers, and delivered to any department of a manufacturing plant used for Power, Heat or Manufacturing Processes and consumed by turbines, engines, pumps, etc. Used for equalizing loads on individual boilers of a battery, or discovering losses originating from leaks.

Water Flow Meters are used for measuring the output of Pumping Plant, amount distributed to different sections, amount of input of water turbines, amount of feed water delivered to boilers, amount of water consumed in Plants, etc.

Air Flow Meters can be used to measure the amount of air delivered to Blast Furnaces, to Mines, to any Department of a manufacturing plant, etc.

Used in determining efficiency of air compressors or losses or leaks in pipe lines, also for determining "slip" of pumps.

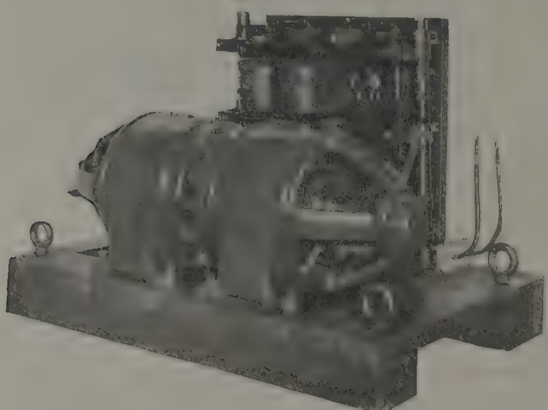
Flow Meters are built in several types for various classes of service, indicating integrating and graphic recording. These three types are also combined in one meter.

Explained fully in Bulletin No. 46501-B.

Shop Equipment—Electric Locomotives

G-E Arc Welding Set

As a result of much research work, the General Electric Company has completed the development of a novel type of arc welding equipment which combines the best electrical characteristics for the arc with high efficiency and light weight. 125 volts was selected as the standard because that was found to give the best results, not only from the standpoint of efficiency, size and weight for the set, but from the standpoint of the distributing



Constant Energy Arc Welding Set for Metallic Welding. One-Man Portable Outfit.

system. These characteristics have been demonstrated from a series of practical tests under commercial operating conditions.

Car Wheel Lathe Drive

G-E Motor Drive for car wheel lathes is controlled by push buttons located wherever desired for convenience of operator. These buttons are used

Wheel Lathe driven by G-E Wheel Lathe Equipment

to quickly start or stop the motor, the latter being accomplished by automatic electric braking.

The exact cutting speed required for any work, at any moment, is obtained by turning the knobs on a box, in easy reach of the workman.

Convenience and responsiveness are the main features of this drive, with the added advantages of close speed adjustments instantly obtainable, all working together to reduce the time and lessen the power charge for any job.

Electric Locomotives

This Company builds Electric Locomotives for moving all classes of rolling stock. The largest type built is a 280 ton locomotive used for heavy freight service. For moderate speed, heavy passenger, and freight service the 90 to 110 class of Electric Locomotive is designed, Bulletin No. 4870.

For interurban roads requiring heavy service for trains weighing from 300 to 500 tons, the G.E.-50 ton direct current Locomotive is adapted. Bulletin No. 4852.

Storage Battery Locomotive No. 6966 Switching Cars

Where Electric Locomotives are used as switching unit in the industrial plants, and for switching service in the terminals of the interurban roads, the 22 to 35 ton type of locomotive is recommended. Bulletin No. 4867.

For Industrial Service

The General Electric Co. builds Electric Locomotives ranging from two (2) to twenty-five (25) ton. The industrial service type is admirably adapted for moving material from one building to another, for switching standard cars, or for similar work about yards, and terminals.

A special type of storage battery Locomotive is built for use where haulages are short and conditions render the operation of the trolley or third rail type of locomotive inexpedient. Bulletin No. A-4131.

This company maintains a separate engineering organization for Electric Locomotives. Parties interested should communicate direct with our nearest office.

G-E Railroad Fans

Types

The line of G-E Railroad Fans consists of exhaust, stationary, oscillating, and ceiling types. The standard sizes manufactured are as follows:

9-in. stationary, bracket type, four-blade.
9-in. exhaust, six-blade.
12-in. stationary, bracket type, four-blade.
12-in. oscillating type, four-blade.
38-in. ceiling type, four-blade.

The bracket fans are provided with either single or double-voltage windings and can be arranged for single or three-speed operation. The double-voltage feature prevents the necessity of changing fans in cross-continental service.

They are not adapted for double-voltage operation and are wound for single-speed running. Speed control, however, can be obtained when motors are not connected in series.

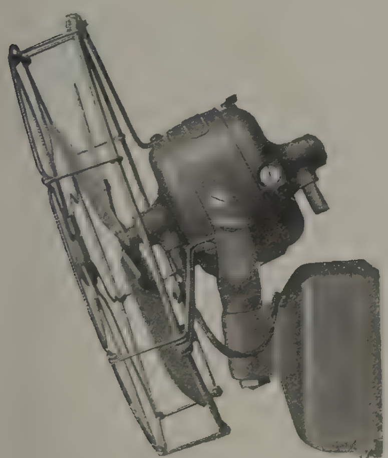
Send for Bulletin 41700B.

Exhaust Fans

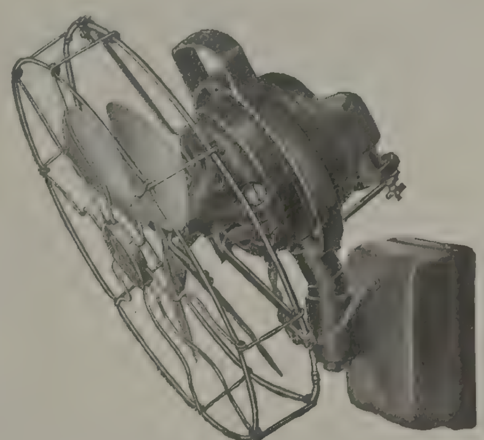
These fans are designed especially for dining-car, kitchens, buffets, smoking compartments, lavatories, etc.

The fan consists of a standard 12-inch railroad bracket fan body provided with a six blade 9 in. fan and mounted in a suitable tripod. It can be wound for double voltage but cannot be arranged for multi-speed operation.

It is recommended that the exhauster be installed in the side of the cars in order to avoid ducts which would offer resistance to the movement of the air and materially reduce the efficiency of the installation.



Twelve-Inch Stationary Bracket Fan



Twelve-Inch Oscillating Bracket Fan

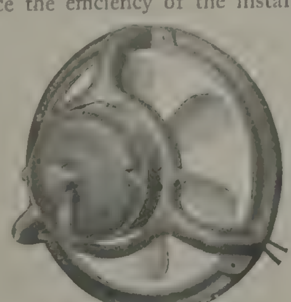
Thirty-eight-Inch Ceiling Fan

Ceiling Fan

The ceiling fan, like the bracket, is especially designed to withstand shocks and jolts peculiar to railroad service. The oiling system is automatic and unusual precautions have been taken to prevent dripping of oil. The armature of the conventional drum type is floated on a highly successful type of thrust bearing which is immersed in oil at all times; hence, high efficiency, quiet operation, and long life.

Locking devices are provided where necessary to prevent backing out of screws where the motor is subjected to excessive vibration.

These motors can be wound individually from 24 volts up to 200 volts and can be operated in series.



Nine-Inch Exhaust Fans

Where to get G-E Service

This page is prepared for the ready reference of the readers of the *Car Builders' Dictionary and Cyclopedia.* To insure correspondence against avoidable delay, all communications should be addressed to the G-E sales office, or G-E foreign representative nearest the writer.

Offices in the United States

Location	G-E District or Sales Office
Alabama, Birmingham	Brown-Marx Bldg.
California, Los Angeles†	724 S. Spring St.
California, Oakland	
California, San Francisco†§	Rialto Building
Colorado, Denver†	First Nat'l Bank Bldg.
Connecticut, Hartford	Hartford Nat'l Bank Bldg.
Connecticut, New Haven	Second Nat'l Bank Bldg.
Connecticut, Waterbury	
District of Columbia, Washington	Comm'l Nat'l Bank Bldg.
Florida, Jacksonville	Heard Nat'l Bank Bldg.
Georgia, Atlanta†§	Third Nat'l Bank Bldg.
Illinois, Chicago†§	Monadnock Building
Indiana, Fort Wayne	Ft. Wayne Elec. Works
Indiana, Indianapolis	Traction Terminal Bldg.
Iowa, Des Moines	Hippee Building
Kentucky, Louisville	Starks Building
Louisiana, New Orleans†	Maison-Blanche Bldg.
Maryland, Baltimore	Lexington St. Bldg.
Massachusetts, Boston†	84 State St.
Massachusetts, Springfield	Mass. Mutual Bldg.
Mass., Worcester	Room 627, State Mutual Bldg.
Michigan, Detroit	Dime Savings Bank Bldg.
Michigan, Grand Rapids	413 Com. S'v'gs Bank Bldg.
Minnesota, Duluth	Fidelity Building
Minnesota, Minneapolis†	410 Third Ave., No.
Minnesota, St. Paul	
Missouri, Joplin†	Miners' Bank Bldg.
Missouri, Kansas City†	Dwight Building
Missouri, St. Louis†	Pierce Building
Montana, Butte†	Electric Building
Nebraska, Omaha	Electric Building
New Jersey, Newark	
New York, Albany	
New York, Buffalo	10th Floor, Electric Bldg.
New York, Elmira	Hulett Building
New York City§†	Equitable Bldg., 120 Broadway
New York, Niagara Falls	Gluck Building
New York, Rochester	Granite Building
New York, Schenectady	G-E Works
N. Y., Syracuse	Onondaga County Sav. Bank Bldg.
North Carolina, Charlotte	Comm. Nat'l Bank Bldg.
Ohio, Cincinnati†	Provident Bank Bldg.
Ohio, Cleveland	Illuminating Bldg.
Ohio, Columbus	The Hartmann Bldg.
Ohio, Dayton	Dayton Savings & Trust Bldg.
Ohio, Toledo	Spitzer Building
Ohio, Youngstown	Stambaugh Bldg.
Oklahoma, Okla. City*†	1 West Grand Ave.
Oregon, Portland†	Electric Building
Pennsylvania, Erie	Commerce Bldg.
Penn., Philadelphia†§	Witherspoon Bldg.
Pennsylvania, Pittsburgh†	Oliver Bldg.
Rhode Island, Providence	Turks Head Bldg.
South Carolina, Columbia	
Tennessee, Chattanooga	James Bldg.
Tennessee, Knoxville	Burwell Building
Tennessee, Memphis	Randolph Building
Tennessee, Nashville	Stahlman Building
Texas, Dallas†	*Interurban Building
Texas, El Paso†	*500 San Francisco St.
Texas, Houston†	*Third & Wash. Sts.
Utah, Salt Lake City†	Newhouse Building
Virginia, Richmond	Va. Rwy. & Pr. Bldg.
Washington, Seattle†	Colman Building
Washington, Spokane	Paulsen Building
West Virginia, Charleston	Charleston National Bank Building
Wisconsin, Milwaukee	Public Service Bldg.

*Southwest General Electric Company.

†Warehouse. §Service shop.

For Business Outside of the United States

International General Electric Company, Inc.

General Sales Offices: 120 Broadway, New York and Schenectady, N. Y., U. S. A.

Foreign Representatives

Argentine: Cia General Electric Sudamericana, Inc., Buenos Aires.

Australia: Australian General Electric Company, Sydney and Melbourne.

Brazil: Companhia General Electric do Brazil, Rio de Janeiro and Sao Paulo.

Chile: International Machinery Company, Santiago, Valparaiso and Antofagasta.

China: General Edison Company, Inc., Anderson, Meyer & Co., Ltd., Shanghai.

Colombia: Wesselhoeft & Wisner, S. A. Barranquilla and Bogota.

Cuba, Zaldo & Martinez, Havana.

Dutch E. Indies: International General Electric Company, Soerabaia, Java.

England: International General Electric Company, Inc., London.

India: International General Electric Company, Inc., Calcutta.

Japan: International General Electric Company, Bagnall & Hilles, Ltd., Yokohama.

Japan, Mitsui Bussan Kaisha, Ltd., Tokio.

Mexico: Mexican General Electric Company, Mexico City.

New Zealand: The National Electrical and Engineering Company, Wellington, Christchurch, Dunedin and Auckland.

Peru: W. R. Grace & Company, Lima.

Philippine Islands: Pacific Commercial Company, Manila.

South Africa: South African General Electric Company, Johannesburg and Capetown.

Uruguay: Cia General Electric Sudamericana, Inc., Montevideo.

Venezuela: Wesselhoeft & Wisner, Caracas.

For business in Great Britain address British Thomson-Houston Co., Ltd., Rugby, Eng.

For Canadian business address Canadian General Electric Company, Ltd., Toronto, Ont.

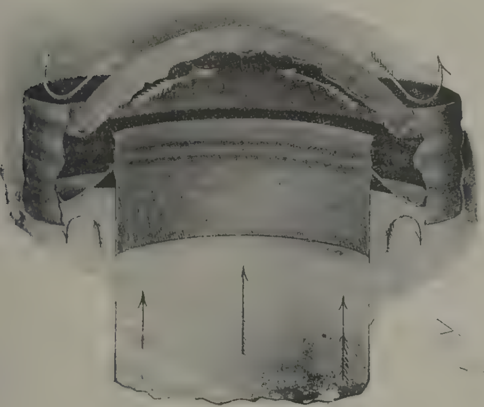
For Hawaiian business address Catton, Neill & Company, Ltd., Honolulu.

Ventilators and Lamp Jacks

Globe Ventilator

"Globe" Ventilators, for ventilating railway and electric cars of all classes, are strongly and simply constructed and absolutely storm-proof.

Under all conditions, placed in any position, they can be relied upon to furnish a continuous exhaust with no downward draft. They are equally efficient on any type of roof construction.



The Globe Ventilator

The arrows in the above diagram show how the vitiated air and smoke are carried outward and how rain, sleet and cinders cannot drive into the car.

These scientifically correct ventilators, free from moving parts to wear out and cause trouble and maintenance expense, insure satisfactory service and good ventilation, whether the car is standing or travelling many miles an hour.

The "Globe" insures good, fresh, invigorating, healthy air—in a word, effective ventilation in smoking,

sleeping, postal and passenger cars. Note its construction as shown by the illustrations and see how the outside currents of air against the ventilator create a strong outward draught. Simple, Silent, *Storm-Proof,* Standard, such is the "Globe" Ventilator.

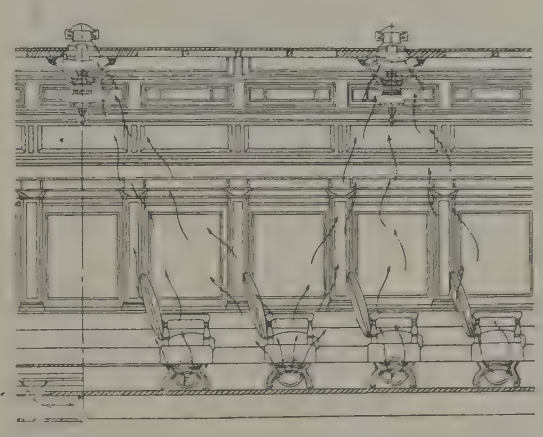
Globe Lamp Jack

The "Globe" Lamp Jack insures a clear, steady flame, and causes the lamp to burn equally well whether the train is moving forward at the rate of fifty miles an hour, or is at a standstill. Conclusive evidence of the efficiency and storm and cinder-proof qualities of the "Globe" Lamp Jack is the fact that a "Globe" is placed over every Pintsch gaslight in service on our railways.

In addition to their having been the standard of many roads for car use for a long period, "Globe" Ventilators are very widely and successfully used for ventilating depots, machine shops, round houses, freight houses and railway buildings of every description in every portion of the country.

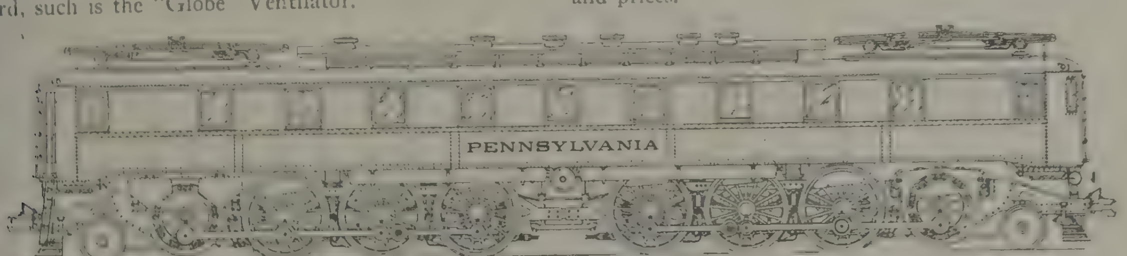
The "Globe" Ventilator is being also widely and successfully used on electric locomotives.

If there is truth in the saying that it is the service that counts, the extended use of "Globe" Venti-



lators and "Globe" Lamp Jacks proves all the above statements, just as these strong, effective, scientifically constructed devices prove their economy both in first cost and absence of maintenance.

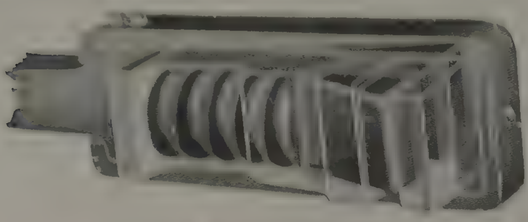
Send for blue print giving details of construction and prices.



Pennsylvania Railroad Electric Locomotive, Equipped with Globe Ventilators

Gould Car Specialties

Body Bolster. The Gould Cast Steel Body Bolster for reinforcing wooden underframe cars is designed to use short steel draft sills and continuous steel center sills between the bolsters. It is cast in one piece and projecting brackets are provided to receive ends of draft and center sills.



Gould Friction Draft Gear

Continuous Spring Buffer. The Gould Continuous Spring Buffer is a simple and effective buffer for passenger cars without platform, refrigerator, express or other cars used in passenger service. This buffer affords continuous passageway from car to car and may be used with ordinary freight type coupler and draft gear if desired.

Improved Friction Buffer. The Gould Improved Friction Buffer was designed for use with heavy modern steel equipment, is self contained and is easily applied and removed from cars. It provides a coupling up movement of 2½ inches and a buffing movement of 2½ inches with a capacity up to 150,000 lbs., which may be reduced to any desired point by removing leaf springs and substituting a shim plate.

Freight Coupler. All Gould Freight Couplers have positive, automatic lock sets and knuckle openers, and the knuckles are equipped with shoulders interlocking in the head to relieve the knuckle pin of injurious strains. It can be furnished with any length of head or style of shank and can be furnished side operative if required.

Passenger Coupler. The Gould Passenger Couplers are of improved design to suit modern heavy equipment. They have a positive bolt lock and bell crank knuckle opener and can be furnished to operate right and left at the bottom, right and left at the top, or from the side of coupler head as preferred by the customer. They are furnished with a great variety of shanks to suit different car conditions.

Carrier and Centering Device—The Gould Combination, Coupler Carrier and Centering Device is of new design. It will safely carry and centralize the heaviest coupler.

Steel Draft Sills or Passenger Car Platforms. The Gould Platform is made up of "Z" Bars extending from the end sills to or through the body bolster. It may be arranged to suit any style of body bolster, end sill, buffer, or draft gear. It is a valuable device for strengthening cars with wooden underframes.

Journal Boxes. The Gould Inset Lid Journal Box is provided with a lid with continuous beveled face which does not project beyond the mouth of the box and is dust proof.

The Gould Pinless Lid Journal Box is provided with lid interlocking on lug on the box and no lid pin is required. A coil type of spring is used. The ordinary MCB lid can be applied to this box. The Gould Coupler Company also furnishes the ordinary MCB Standard Journal Box in all styles.

Friction Draft Gear. The Gould Friction Draft Gear is of improved design and is of all steel construction. It consists of a casing, a heavy double coil release spring, a center follower, a pair of case hardened wedges and two groups of plate or leaf springs. In buffing or pulling these wedges are forced inward by inclined faces in the casing, thus compressing the leaf spring element. The function of the double coil spring is to return the release elements to its forward position and it is sufficiently heavy in design to do this under all conditions. Only one follower is required, the other being integral with the casing. The maximum capacity of the gear is 240,000 lbs. with a travel of 2½ inches. Leaf springs may be removed and shims substituted to reduce capacity or to compensate for wear. An important feature of this gear is the low recoil eliminating injury to the car from this source. It is designed for MCB pocket space of 24⅝ inches x 12⅞ inches x 9⅛ inches or for passenger service to suit 6½-inch yoke. Capacity of passenger gear, 150,000 lbs. with travel of 2½ inches.

Gould "Z" Type Truck Bolster. Gould "Z" Type Cast Steel Truck Bolster is so designed that maximum of vertical and transverse strength is obtained at moderate weight. Owing to the unique design a transverse strength of at least 75 per cent of the vertical is guaranteed.

Cast Steel Truck Side Frame. Gould Cast Steel Truck Side Frame is of the well known "T" section except that the beading around the openings in the frame has been widened, being the full width of the frame at the column and narrowing up as it approaches the ends. This adds greatly to the transverse strength and also provides additional vertical strength.

Gould Automatic Slack Adjuster. We manufacture three types of Gould Automatic Slack Adjusters. All these types can be used for all freight, passenger and electric equipment. The truck lever type takes the place of bottom rod connection, one per truck. Auto Cylinder lever tie rod and Cylinder Pneumatic type, one per car.

The Gould Improved Automatic Cylinder Pneumatic Type *Piston Travel Regulator* requires one Slack Adjuster to a car, applicable to old and new equipment. When attached to old Brake Cylinders the Gould Regulator takes the place of the cylinder pressure head. Special Gould Regulators combine the Brake Cylinder and Slack Adjuster without gaskets, except one pipe connection provided for Triple Valve.

This improved type Piston Travel Regulator corrects any false travel immediately on the application of the brake. Any desired predetermined regulation will remain constant. Seven inch travel is the preferred standard for steam railroads and four inch for Electric Cars.

The Gould Regulator will instantly, on terminal application of the brake, correct any excess Piston Travel to standard. No wrenches required and can be *instantly* let out for replacing worn out *Brake Shoes.* Service application of the brakes maintain a constant and *Uniform Piston Travel.*

Gould Piston Travel Regulator is powerful, simple, safe, positive, accurate, reliable, maintaining maximum efficiency of the air and *Hand Brakes* at all times.

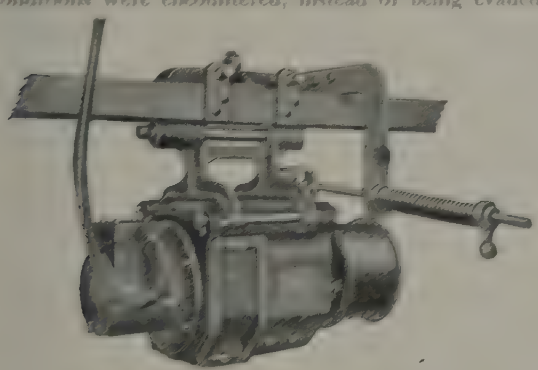
Gould Simplex System—Car Lighting

Essential Features

The essential features of the Gould Simplex System are: An axle driven generator; a mechanical pole changer for the reversal of the armature circuit in accordance with the direction of train movement; an automatic regulator for the control of the generator field; an automatic solenoid operated switch for cutting in and cutting out the generator; a voltage regulator for the lamp circuit; a storage battery to furnish power when the generator is not in motion.

Advantages

The Gould Simplex System of electric car lighting has been developed to a high standard of efficiency and is the result of years of experimenting under actual service conditions, by the manufacturers. When difficulties and extreme service conditions were encountered, instead of being evaded,



they were met and overcome. The result of these efforts has been to make the Simplex System an equipment capable of giving satisfactory service under all conditions.

The most important advantages of this system may be briefly summarized as follows:

(1) The cost of illumination has been brought to an exceedingly low point.

(2) Operation is absolutely automatic.

(3) Requires a minimum of attention to maintain a high standard of operating efficiency.

(4) Simple design and construction.

(5) Absolute control of generator output and lamp voltage regulation.

(6) Can be adapted to either truck or body hung suspensions.

Specifications

Generator - Multi - polar shunt wound type; cast magnet frame; laminated pole pieces; grease lubrication; ball bearings type 412. Brushes readily accessible through removable covers. All connections on a terminable block. Pole changer—mechanical; extremely simple; unique in construction.

Generator output control is effected through compression of a single carbon pile resistance in the field circuit. Protection against open battery circuits is provided. The automatic switch is of simple design and a lamp voltage regulator maintains constant voltage, thereby reducing lamp costs.

The Gould Storage Battery

General Description

To develop the most successful type of storage battery, for application to car and train lighting, has taken years of experimenting. The Gould Storage Battery, in its present form, is the result of the experience gained during these years. Gould Storage Battery Plates, because of the distinctive features of their construction and manufacture, are particularly adapted to car and train lighting. This statement is attested by their long life under the most rigid service conditions. The success of the Gould Storage Battery in car lighting work is largely due to long life of plates and the ability to maintain initial capacity. The general excellence of minor construction details has also contributed its share in this respect.

A New Positive Plate

The recent introduction of a Positive Plante' Plate having "Chemically Pure" (CP) active material, by the Gould Storage Battery Company, marked another step forward in the art of battery manufacture. In the earlier type of plate, made according to the old formation process, it was neces-

sary to have a very large exposed surface of the lead rib in order to produce an initial capacity up to the rating of the plate. After approximately a year's service, the active material produced in the original formation all became dislodged, due to battery action, and was replaced by new active material formed by the pure Plante' action of the plates charging and discharging in the electrolyte. This natural active material is in considerably more condensed form than the original formation, as it forms only a thin layer over the surface of the plate, and has considerable more capacity per pound.

The chemically pure plate cannot buckle because there is plenty of space between ribs to allow for the strains caused by expansion of active material due to sulphation.

Forming acids are not used in the manufacture of the new plate. This eliminates excessive growth of plates. The active material is a chemically pure crystalline formation of pure lead peroxide, which gives high capacity, voltage and efficiency.

See pages 877 to 886.

Car Heating and Ventilating Apparatus

Pressure Regulator No. 1014

This Regulator has a capacity large enough for the longest modern steel passenger trains, and in addition, will supply enough steam to run a Turbo-Generator Outfit for train lighting.

The valve is simple in construction, easily gotten at in case of needed repairs. Both Control Valves and Main Valves can be extracted by removing their respective plugs. In fact, the whole mechanism can be removed without dismounting the valve.

The valve has a very sensitive adjustment and perfect balance, so that when once set for pressure desired any perceptible change in pressure on either side of regulator is instantly compensated and the pressure supplied is maintained uniformly whether cars are added to or taken from train.

See Fig. 2072, Page 817, illustrated section.

Steam Hose Coupler No. 804S with Gravity Trap

In addition to just being a coupler that will couple, lock and make a steam-tight joint with any make of coupler that conforms to M. C. B. recommended practice we have gone further and have embodied in our 804S several important features.

To prevent freezing of hose we have equipped the 804S with our gravity safety trap, No. 882, which rids them of all condensation the moment the pressure is off.

See Fig. 2077, Page 817, illustrated section.

Packless End Train Pipe Valve No. 1126 with Automatic Drip

In Gold's Packless End Valve No. 1126 the drip is from the valve itself, when valve is closed, thus eliminating the continual dripping through the hose. This feature is also a protection to the trainmen in uncoupling hose, as the valve is absolutely tight when shut and by the aid of the Gravity Traps in Gold's Couplers, the condensation which lodges in the couplers is relieved.

A quarter turn fully opens and closes the valve, and it cannot be jarred from set position by pressure of steam or by the vibration of train.

The valve is of the packless design and positively will not leak around the stem.

See Figs. 2091-2092, Page 820, illustrated section.

Packless Quick Opening Supply Valve No. 1140

This valve was designed primarily to be used as an inlet or supply valve in car heating systems, to facilitate the handling of steam heat. A quarter turn fully opens or closes valve. As the valve is packless, the usual maintenance charge on this part of the steam heat apparatus is eliminated. The valve is of the rotary type and we make the claim of long life, ease of operation and absolute tightness under working pressure up to 200 pounds.

See Fig. 2083, Page 819, illustrated section.

Packless Quick Opening Twin Supply Valve No. 1145

This valve was designed for use as an inlet or supply valve for vapor systems, but can be utilized in most any place where the controlling of two circuits is necessary.

Ordinarily two valves per side are necessary, but by the use of our No. 1145 the extra valve is eliminated. The construction is similar to the No. 1140 valve described above with the exception that the valve is closed in first position, one-quarter turn opens one circuit and one-half turn opens both circuits.

See Fig. 2068, Page 816, illustrated section.

Vapor Valve No. 1112 For Application Inside of Car

In constructing our latest type of Vapor Valve No. 1112, we have, we believe, overcome all objectionable features; *we have reduced the weight including the ventilating dip horn to approximately 16 lbs.* (vapor valves heretofore used weighing as high as 36 lbs. each) and have adhered to all the desirable features of our No. 887 Valve.

We have adhered to our original method of operation, "*The Straight Push,*" avoiding the use of levers, bell cranks, etc., and have eliminated the use of packing and packing nut on the main stem so as to give this stem all possible freedom when set in motion by the expansion of the diaphragm.

The diaphragm used is of special design, and very flexible, having expansive qualities sufficient to obviate the necessity of the adjusting screw giving the valve *a perfect working range of steam pressure from one to one hundred pounds.*

The expansive diaphragm is constructed in two separate and distinct sections or diaphragms joined together as a unit, each section separately containing a volatile liquid.

This construction increases the flexibility and power of the diaphragm and also doubles its life.

Should one section fail, the remaining section will operate the valve until replacement can be made thus avoiding the shutting off of steam from that side of the car, or a train detention as is the case in other makes of vapor valves.

See Figs. 2097 to 2105, Page 821, illustrated section.

Thermostatic Control

This apparatus gives an automatic control which will practically hold the temperature in the car constant at all times and at such temperature as may be desired.

In cars heated by steam or hot water the apparatus consists of a thermostat No. 1066 placed on the wall of the car and one or more electric inlet valves No. 981 placed on the cross over pipes according to the number of circuits to be controlled.

The electric current consumption is small and is obtained from the lighting circuit.

In cars heated by electricity, the apparatus consists of a thermostat No. 1066 and an automatic switch No. 1015 placed either in or underneath the car.

In addition to supplying comfort to passengers these systems permit of an appreciable saving in steam or electricity of a value far in excess of the fixed charge on the investment and maintenance of the equipment.

See Figs. 2134 to 2137, Page 827, illustrated section.

Literature

Full descriptive circulars on the foregoing specialties will be sent on request.

It is important to note that we have not combined nor have we any connection with any other car heating company in the United States.

Sheet Metal Equipment for Cars

Lights

The importance of reliable Tail or Marker lanterns on the rear end of any train cannot be overestimated. The safety of life and property depend upon the proper design and construction of these lanterns to withstand severe vibrations, and high velocity winds. The Top Draft lantern has many advantages over the "top and bottom" system of ventilation, but we make these lanterns in both styles.

The Gray Top Draft Steel Marker Lantern is equipped with either three or four lenses of any color desired, and a sliding door. The lantern is securely mounted on an Adjustable Arm permitting it to be turned and used in either right or left hand positions. These lanterns have stood the test under the most severe conditions in service, and leave the factory only after each and every lantern has been put through a very severe and complete high velocity wind test *while burning.*

As the Marker Lanterns usually overhang the side of the car to which they are attached, at least one lens, of the three and four lens lanterns, is always visible to either the engineer or fireman, thus minimizing the possibility of a light failure to go unnoticed.

Where a lighter weight lantern is desired, we make it of heavy tin, with "top and bottom" draft, fitted with either sliding or hinged door, and with two, three or four lenses as specified.

Lubrication

The lubrication of the journal bearings is a matter of vital importance, and the Inspectors' Oil Can has been found best suited for this purpose. We make this Can of heavy tin, with strong handle, and sheet steel spout, in capacities ranging from one to three gallons.

It is also necessary that all journal boxes be kept packed with fresh oily waste to insure good lubrication and prevent "hot boxes." For this purpose we make the so-called Dope Bucket in which the waste may be mixed with the oil, and used as a container for serving purposes. It is made of heavy galvanized iron throughout and provided with a heavy wire bail.

Ventilation

Car ventilators are usually made of sheet metal for lightness and strength. To be most effective they must be properly designed, rust-proof and carefully constructed. These serve to illustrate one of many things entering into car construction which we are prepared to manufacture.

Construction

A Tool Box is a necessity to the efficient workman, for it saves his time when selecting tools or moving them around. We make these boxes in various sizes and shapes, of tin, heavy steel, and galvanized iron, fitted with strong handle and lock.

Health

Pure drinking water for the use of passengers and employees on trains can only be served from well-made sanitary containers. The Passenger Coach Water Cooler illustrates a typical style for holding the water and ice together, although it can be made in any desired shape to suit the car design, and have an inner tank to hold the ice separate from the water. When made of Monel Metal, or galvanized iron with pure tin lining, equipped with self-closing faucet, and painted to match the interior of the car, it makes a very satisfactory and hygienic tank for its purpose.

When used with a Drip Pan, supported by brackets directly under the Water Cooler, and piped to drain under the car, this combination makes a neat and complete water serving unit.

A Filler Can made of heavy tin, with a strong handle and spout, is more practical and sanitary than the ordinary pail or bucket for filling Water Coolers. This Can is made in three and five gallon sizes.

The adoption of paper drinking cups necessitates the use of suitable containers for them near the Water Tank. We have designed, and manufactured many thousands steel cabinets for this purpose. Once the cabinet is securely fastened from the inside, to the wall of the car, filled with a supply of cups, and locked, both the cabinet and contents are securely protected against theft. Mechanical means located at the bottom, provide for the delivery of single cups only, thus preventing any waste of the cups.

For the Caboose, where the long handle dipper is still the favorite of some trainmen, the Water Can with a snug fitting cover is much better in many ways than the open top pail for holding drinking water. It is made of heavy tin, heavily banded, with a copper bottom. Capacity 2½ gallons.

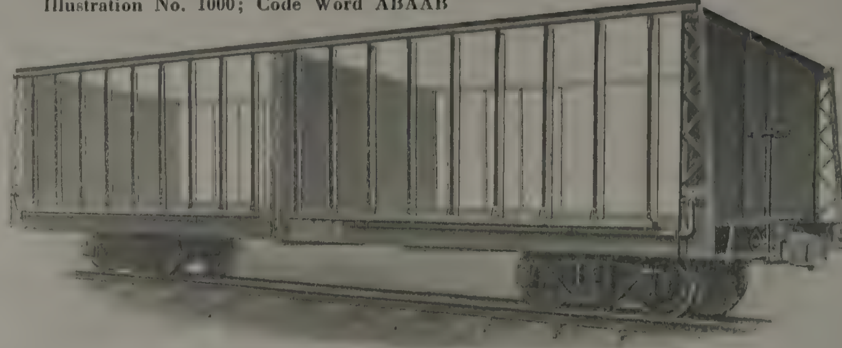
Safety

The safety of trains and their passengers depends not only on the use of Fusees and Torpedoes as warnings, but also upon the proper care of these articles when not in use. The generally accepted method of protecting these against moisture and fire is the use of the Fusee and Torpedo Carrying Case, which is made of heavy tin, painted, and lettered with the initials of the road. It is provided with a carrying handle, and sometimes with a shoulder strap. It holds 8 five-minute and 8 ten-minute fusees, and 24 torpedoes.

For the Caboose, the Fusee and Torpedo Supply Box is found more practical, as it is made of heavy galvanized iron, strongly seamed and riveted, and has a capacity of 4 dozen fusees and 4 dozen torpedoes.

Gregg Standard Cane Car

(Patented in U. S. and Other Countries)
Illustration No. 1000; Code Word ABAAB



Discharging Side. Stakes of steel angles individually hinged at top to steel Z bar side rail, and fastened together at bottom by steel channel, thus releasing all stakes at the same time.

Securing Device. Side door is secured at bottom by a solid steel locking bar, with bearings attached to underframe, and solid lugs, securely holding side door closed. The locking bars are operated from one end of car, where they are secured by our patented malleable iron Quick Releasing Locking Device, provided also with connection for padlock. When the locking bar is released the entire side door swings outward. Discharging side is higher than fixed side to facilitate passage of cane under side rail.

Fixed Side. Stakes of steel angles bolted rigidly to underframe and top side rail.

End Walls and Partitions. Rigidity and strength of the end walls are maintained by latticed corner stakes and channel centre stakes, with steel end top rail.

Sheathing. Columns 1 and 2 of tables show cars with end walls and partition covered with steel plates. Rigidity and strength of end walls are maintained by latticed corner stakes and channel centre stakes, with steel end top rail. Partition plates are so arranged that cane will not catch when discharging. Plates are supported at top and bottom, as well as in center and both sides.

Columns 3 and 4 of table show cars with same rigid framing of end walls and partitions, but sheathed with wood planks, instead of steel plates. Partitions are sheathed on both sides, and planks are supported at the ends by the steel side stakes, and at the centre by wood stakes, and reinforced at top by steel cross rod.

Underframe. All steel construction, with built-in bolsters and cross bearers. (No truss rods are necessary).

Floor. Columns 1 and 2 of table below show cars with steel plate floor riveted to underframe.

Columns 3 and 4 of table show cars with floor of wood planks bolted to underframe. With wood floor the underframe has heavy steel diagonal braces, riveted between sills.

Couplers. Standard Automatic Steel Couplers. Improved Design.

Trucks. Diamond Arch Bar Trucks. (See page 1190). All castings of malleable iron. Wheels grey iron, with chill hardened tread and flange.

Brake. Regularly furnished without brake. Any kind of brake may be added either before or after purchasing.

Sizes. Table below shows sizes of cars usually ordered. Material for these cars is carried in stock, and they may be ordered by car number or code word.

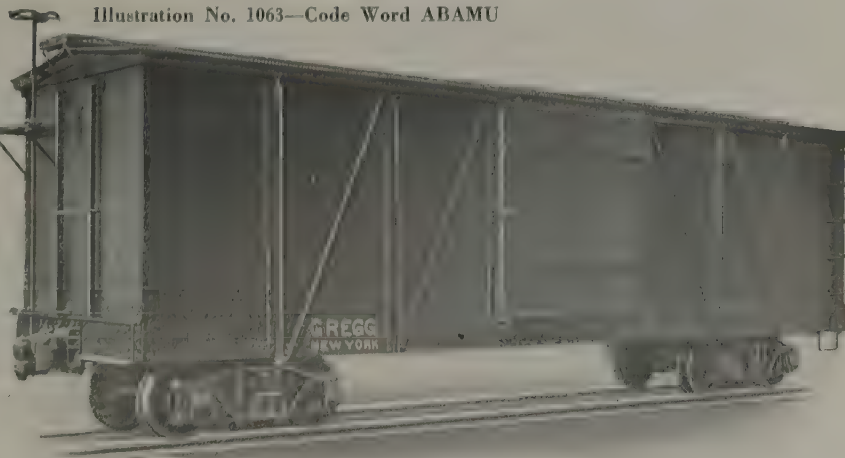
Optional Specifications. The *dimensions* or *design* of *any* part of the car may be changed to conform to the desires of our customers, or to suit special conditions, and correspond with existing equipment.

Use these columns for cars with steel plate floor and steel plated end walls and partition.		Use these columns for cars with wood floor and wood sheathing on end walls and partition.		Use these columns for both types of floor and sheathing.							
								Height of superstructure.			
Car No.	Code Word.	Car No.	Code Word.	Capacity tons of 2,000 lbs.	Size of underframe.	No. of cane compartments.	No. of hinged stakes.	High side.	Low side.	Track gauges.	Diam of wheels.
1001	ABAAC	1032	ABAGN	7	5x20	2	12	6′	5′	24″ to 48″ or 60 cm. to 1.200 m.	16″
1002	ABAAF	1033	ABAGO	8	5x22	2	12	6′	5′		16″
1003	ABAAG	1034	ABAGU	8	5½x20	2	12	6′	5′		16″
1004	ABAAL	1035	ABAHA	9	5½x22	2	12	6′	5′		16″
1005	ABAAM	1036	ABAHI	9	6x20	2	12	6½′	5½′		18″
1006	ABAAP	1037	ABAHL	10	6x22	2	12	6½′	5½′		18″
1007	ABAAS	1038	ABAHM	11	6x24	2	14	6½′	5½′		18″
1008	ABAAW	1039	ABAHS	12	6x26	2	14	6½′	5½′		20″
1009	ABABA	1040	ABAIB	13	6x28	2	18	6½′	5½′		20″
1010	ABABS	1041	ABAIC	14	6x30	2	18	6½′	5½′		24″
1011	ABABY	1042	ABAIF	15	6x32	3	21	6½′	5½′		24″
1012	ABACA	1043	ABAIG	13	6½x24	2	14	7′	6′	30″ to 48″ or 75 cm. to 1.200 m.	20″
1013	ABACI	1044	ABAIL	14	6½x26	2	14	7′	6′		20″
1014	ABACS	1045	ABAIM	15	6½x28	2	18	7′	6′		20″
1015	ABACY	1046	ABAIP	16	6½x30	2	18	7′	6′		24″
1016	ABADE	1047	ABAIY	17	6½x32	3	21	7′	6′		24″
1017	ABADO	1048	ABAJE	15	7x24	2	14	7½′	6½′		24″
1018	ABADU	1049	ABAJO	16	7x26	2	14	7½′	6½′		24″
1019	ABAED	1050	ABAKE	17	7x28	2	18	7½′	6½′		24″
1020	ABAEJ	1051	ABAKS	18	7x30	2	18	7½′	6½′		24″
1021	ABAEK	1052	ABAKU	19	7x32	3	21	7½′	6½′		24″
1022	ABAEN	1053	ABALD	20	7x34	3	21	7½′	6½′		24″
1023	ABAER	1054	ABALE	20	7½x30	2	18	7½′	6½′		24″
1024	ABAET	1055	ABALK	23	8x30	2	18	8′	7′		24″
1025	ABAEV	1056	ABALO	23	8½x28	2	18	8′	7′	56½″ or 1.667 m.	33″
1026	ABAEX	1057	ABALT	25	8½x30	2	18	8′	7′		33″
1027	ABAFE	1058	ABALU	26	8½x32	2	20	8′	7′		33″
1028	ABAFO	1059	ABALY	27	8½x34	2	20	8′	7′		33″
1029	ABAFT	1060	ABAMO	28	8½x35	3	21	8′	7′		33″
1030	ABAGE	1061	ABAMP	30	8½x38	3	27	8′	7′		33″
1031	ABAGH	1062	ABAMS	30	8¾x37′ 2″	3	21	7′ 3″	6′ 9″		33″

Gregg Standard Box Car

(Patented in U. S. and Other Countries)

Illustration No. 1063—Code Word ABAMU



Framing. Of steel angle beams, designed to withstand all strains and maintain rigidity.

Sheathing. Seasoned pine with waterproof joints.

Doors. Weathertight construction, with rigid frame, braced with steel angles, suspended on roller bearings.

Roof. Galvanized corrugated steel.

Shipment (Packing). Car ends, doors and sides are shipped in sections, completely assembled, ready to attach to underframe.

Underframe. All steel construction well braced.

Floor. Wood plank with tight joints.

Couplers. Standard Automatic Steel Couplers. Improved Design.

Trucks. Diamond Arch Bar Type. (See page 1190.)

Brake. Hand wheel on one truck.

Sizes. Tables below show sizes of cars usually ordered. Material for these cars is carried in stock and they may be ordered by car number or code word.

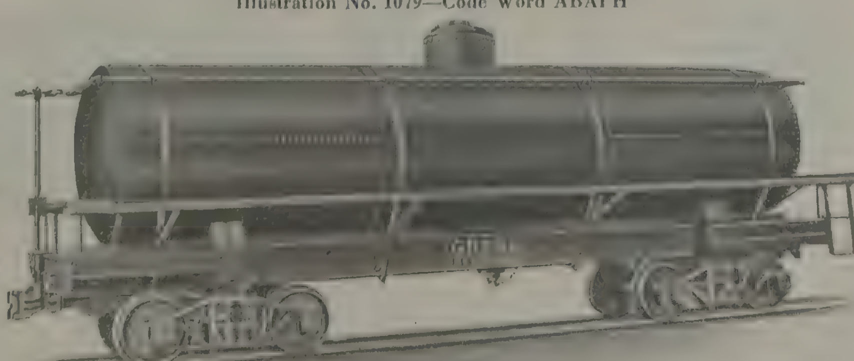
Optional Specifications. The *dimensions* or *design* of *any* part of the car may be changed to conform to the desires of our customers, or to suit special conditions, and correspond with existing equipment.

Car No.	Code Word	Capacity in tons of 2000 lbs.	Size of Frame	Size inside minimum			Track Gauge	Diam. Wheel
				Length	Width	Height		
1064	ABANA	8	5½x20	19' 1¼"	5' 4¼"	5' 6"	24" to 48" or 60 cm. to 1.200 m.	16"
1065	ABANG	10	5 x24	23' 1¼"	5' 1¼"	5' 6"		16"
1066	ABANI	10	6 x20	18' 9½"	5' 9½"	6' 1"		18"
1067	ABANK	12	6 x24	22' 9½"	"	"	30" to 48" or 75 cm. to 1.200 m.	20"
1068	ABANS	15	6 x30	28' 9½"	"	"		24"
1069	ABANY	11	6½x20	18' 9½"	6' 8½"	"		18"
1070	ABAOH	13	6½x24	22' 9½"	"	"		20"
1071	ABAOJ	16	6½x30	28' 9½"	"	"		24"
1072	ABAOK	15	7 x24	22' 9½"	6' 9½"	"		21"
1073	ABAON	20	7 x30	28' 9½"	"	"		21"
1074	ABAOR	23	7 x31	32' 9½"	"	"		"
1075	ABAOV	22	7½x30	28' 9½"	7' 3½"	"		"
1076	ABAOX	23	8 x30	"	7' 9½"	"	56½" or 1.667 m.	"
1077	ABAOZ	25	8½x30	"	8' 3½"	6' 8½"		33"
1078	ABAPA	30	8½x35	33' 9½"	"	"		"

Gregg Standard Tank Car

(For Water, Oil, Molasses, etc. Patented in U. S. and Other Countries.)

Illustration No. 1079—Code Word ABAPH



Tank. Steel plate with machine caulked seams. Ends dished and flanged.

Dome. Equipped with ample size manhole.

Safety Valve. All domes are equipped with safety vent.

Outlet. 6". May be reduced to any size. Operated from inside of dome.

Anchorage. Patented Solid anchorage riveted to tank and secured to underframe at center. Prevents buckling of ends and shell.

Underframe. All steel construction, well braced.

Couplers. Standard Automatic Steel Couplers. Improved Design.

Trucks. Diamond Arch Bar type. (See page 1190.)

Brake. Hand wheel on one truck.

Sizes. Tables below show sizes of cars usually ordered. Material for these cars is carried in stock and they may be ordered by car number or code word.

Optional Specifications. The *dimensions* or *design* of *any* part of the car may be changed to conform to the desires of our customers, or to suit special conditions, and correspond with existing equipment.

Car No.	Code Word	Capacity of tank		Size Tank		Track Gauges	Dia. Wheel
		U. S. Gal.	Litres	Diameter	Length		
1080	ABAPT	1000	3785	3' 9"	12' 5"	24" to 42" or 60 cm. to 1.000 m.	16"
1081	ABAPY	1500	5675	4' 0"	16' 5"		"
1082	ABARB	2000	7570	4' 3"	19' 5"		18"
1083	ABARC	2500	9460	4' 6"	21' 9"	[illegible]	20"
1084	ABARF	3000	11355	4' 9"	23' 2"		21"
1085	ABARJ	4000	15140	5' 0"	27' 10"		"
1086	ABARL	5000	18925	5' 6"	28' 11"		"
1087	ABARM	6000	22710	6' 0"	29' 3"		"
1088	ABARP	5000	18925	6' 6"	20' 11"	56½" or 1.6[illegible] m.	33"
1089	ABARS	6000	22710	"	23' 11"		33"
1090	ABASO	8000	30280	7' 0"	28' 8"		"
1091	ABASP	10000	37850	7' 6"	31' 1"		"

Gregg Standard Cane Cars

(Patented in U. S. and Other Countries)

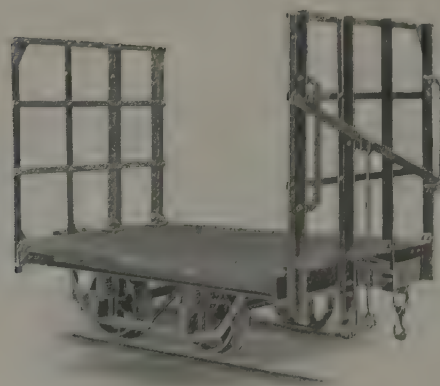


Illustration No. 1092—Code Word ABAST
(Sometimes known as Porto Rican or Decauville Type)

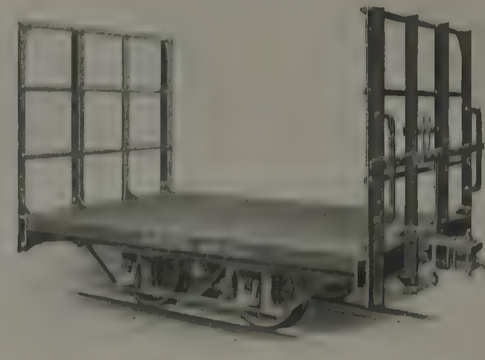


Illustration No. 1093 Code Word ABASY

Platform. Steel channel underframe covered with steel plate floor.

Couplers. The first three cars of tables are regularly furnished with hook and ring couplers, shown in illustration No. 1092; the other cars with link and pin couplers, shown in illustration No. 1093. Both types of couplers have springs which absorb the buffing shocks and pulling strains.

Running Gear. Special steel wheels, with spring supported journal boxes, brasses held in place in a positive manner, so as not to become displaced when car is overturned. Suitable for oil or grease lubrication.

End Racks. Rigid steel end racks, fastened to platform by a patented device.

Top Chains. Where it is desired to pile the cane much above the end racks, car may be equipped with top securing chains and tightening windlass.

Brake. Car is regularly supplied without brake. Hand lever brake may be furnished where desired.

Sizes. Tables below show sizes of cars usually ordered. Material for these cars is carried in stock and they may be ordered by car number or code word.

Optional Specifications. The *dimensions* or *design* of *any* part of the car may be changed to conform to the desires of our customers, or to suit special conditions, and correspond with existing equipment.

Car No.	Code Word.	Capacity in Tons of 2,000 lbs	Size of Platform.	Height of Ends Above Floor.	Track Gauges.	Diam. of Wheels.
1094	ABATA	1½	4'x5'	3' 6"	50CM 1M	12"
1095	ABATH	2	4'x6'	3' 9"	50CM 1M	14"
1096	ABATI	2½	4'x7'	4' 0"	50CM 1M	14"
1097	ABATY	3	4½'x8'	4' 3"	60CM 42"	14"
1098	ABAUD	4	5'x10'	4' 6"	60CM 48"	16"

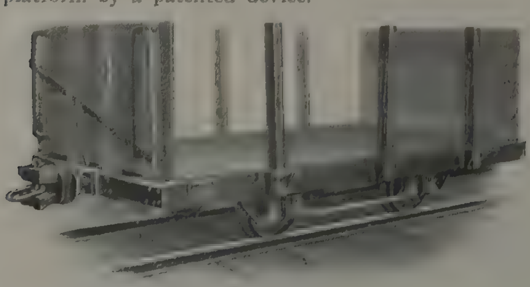


Illustration No. 1099
Code Word ABAUJ

(Sometimes known as Hawaiian Types)

Illustration No. 1100
Code Word ABAUR

Platform. Steel underframe with wood plank floor.

Couplers. Gregg Patent Link and Pin Spring Couplers.

Running Gear. Special steel wheels with double spring supported journal boxes, fitted with brass bearings, positively held in position. For oil or grease lubrication.

End Uprights. Tapered wood stakes with covering planks.

Side Stakes. Car in illustration No. 1099 has wood side stakes set in patent quick releasing pockets.

Side Doors. Car in illustration No. 1100 has strong bottom hinges and side doors secured with chain latch.

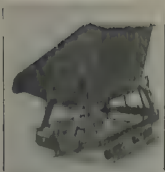
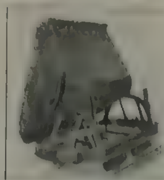
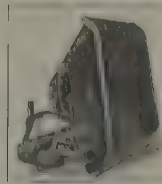
Brake. Regularly supplied without brake. Hand lever brake furnished where desired.

Sizes. Tables below show sizes of cars usually ordered. Material for these cars is carried in stock and they may be ordered by car number or code word.

Optional Specifications. The *dimensions* or *design* of *any* part of the car may be changed to conform to the desires of our customers, or to suit special conditions and correspond with existing equipment.

These columns indicate car in illustration No. 1099		These columns indicate car in illustration No. 1100		These columns apply to both types of cars.			
Car Number.	Code Word.	Car Number.	Code Word.	Size of Platform.	Capacity in Tons of 2,000 lbs.	Track Gauges.	Diam. of Wheels.
1101	ABAUT	1107	ABAVY	4½'x9'	3	24"-42"	14"
1102	ABAUV	1108	ABAWA	5'x10'	4	24"-48"	16"
1103	ABAUX	1109	ABAWI	6'x10'	5	30"-56½"	16"
1104	ABAUZ	1110	ABAXO	6'x12'	5	30"-56½"	18"
1105	ABAVA	1111	ABAYE	6'x14'	5	30"-56½"	18"
1106	ABAVI	1112	ABAYR	7'x16'	6	36"-56½"	18"

Gregg V Dump Car—Improved Patented Design

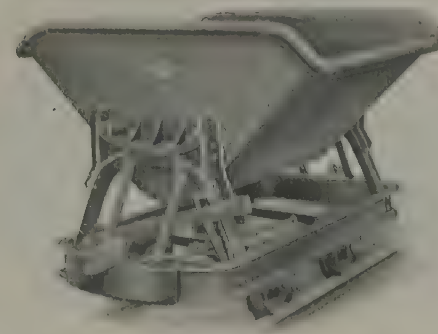


Illustration No. 1113—Code Word ABAYT

Dumping. Especial consideration has been given to this operation, and the cars are dumped with great ease, whether full or nearly empty. The dumping angle is very steep, which results in throwing the load well away from the track and car, and leaves the car body clean. Due to our special rocker and arch design, the usual tendency to kick off the track has been eliminated.

Dimensions. Certain dimensions have a large influence on the expense of loading and the suitability of the car to work in confined spaces. These points have been carefully considered, and the car has been designed to have a low height and narrow overall width, for passing under trestles, scaffolding or through doorways, tunnels, etc. We have obtained a low loading height, decreasing the distance through which the material must be lifted, and therefore increasing the speed and decreasing the cost of loading. With these advantages in dimensions, the length is yet no more than on other cars of the same capacity, our design being more compact than that of other cars.

Sloping Ends. The bodies have sloping ends, which allows the load to be discharged more easily than from vertical end cars. Also the bodies can be nested for shipment, thus securing a much lower freight measurement.

Body Edges. The rounded channel edges of the body make it very strong and stiff to withstand severe service. The shape of the edge fits a man's hands.

Body Joints. The body is well riveted together with an unusual number of rivets. The corner joint is formed by means of a substantial malleable iron casting.

Rocker. The body rocker is a malleable iron casting, unusually strong, and its special shape working in conjunction with the curved rocker support, results in ease of dumping, and stability of the car. The rockers have double flanges, so that the body cannot jump off the rocker support, and bottom lugs of improved shape prevent the body from sliding sidewise.

Rocker Support. This member is forged in one piece of heavy Tee steel, making the simplest and strongest possible construction for load carrying and side strains. The end thrust is taken by the diagonal end braces. Side horns are die forged of heavy Tee steel.

Body Fastener. These combined features will not be found on any other car. They are all perfect in operation and are of great importance to users of V dump cars.

(a) It is only necessary to release one end of the body for dumping.

(b) The body dumps away from the operator, making it impossible to injure the workman by dumping the load on him.

(c) The body may be locked in a half tipped position, which facilitates loading by hand.

(d) The catch locks the body automatically when it returns to upright position.

Brake. Cars usually supplied without brake. Lever type brake may be added either before or after purchasing.

End Braces. This is the only adequate construction for withstanding end thrust. There are four per car, of unusual size and strength.

Roller Bearings. The roller bearings are of an improved design, resulting in less friction than in ordinary bearings. The rollers are large, and the inside of the housing is accurately finished and has oil grooves in addition to an oil well and lubricating plug. An inside washer excludes dirt and maintains the oil supply.

Wheels. Either cast steel or chilled iron wheels will be supplied, as desired. The wheels are of best quality and design and have 3-inch treads, together with flanges 1-inch deep.

Axles. Axles are of round steel, and the journal bearings are accurately turned and finished.

Underframe. This is the round end pattern, made of extra deep steel channels without any joints at the sides or corners.

Buffers. Our buffers are made of heavy die forged steel, and are unusually long. They are well riveted to the underframe channels, which results in an end frame construction which can withstand the most severe bumps or collisions.

Couplings. These are of the most approved permanent link-and-pin type, being made of drop forged steel and so designed that they cannot become loose or lost.

Car No.	Code Word	Track Gauge		Cubic Capacity			Overall Dimensions of Car			Body Dimensions (Inside)			Loading Height.	Diam. Wheels.	Axles
		Ins.	Cms.	Yds.	Ft.	M.	Length Over Buffers	Width Over Body.	Height from Rail.	Length at Top.	Width at Top.	Depth at End.			
1114	ABAYT	18	45.7	½	13½	⅜	5' 10½"	3' 6"	3' 0½"	4' 0"	3' 4"	20"	2' 8"	10"	1½"
1115	ABAZA	20	50	½	13½	"	"	"	3' 1½"	"	"	"	2' 8½"	"	"
1116	ABAZI	"	"	⅔	18	½	6' 4½"	3' 8"	3' 4½"	4' 6"	3' 6"	22½"	2' 9½"	"	"
1117	ABAZY	24	60	"	"	"	"	"	3' 6"	"	"	"	3' 1"	12"	"
1118	ABBAC	"	"	1	27	¾	6' 0½"	4' 10"	3' 10¾"	4' 3"	4' 8"	29"	3' 5¾"	"	1¾"
1119	ABBAF	"	"	1½	40	1	6' 9½"	5' 3½"	4' 2½"	4' 11"	5' 1½"	32"	3' 9½"	14"	2"
1120	ABBAL	30	75	1	27	¾	6' 0½"	4' 10"	4' 0½"	4' 3"	4' 8"	30"	3' 7¼"	12"	1¾"
1121	ABBAM	"	"	1½	40	1	6' 9½"	5' 3½"	4' 4½"	4' 11"	5' 1½"	32"	3' 11½"	14"	2"
1122	ABBAP	"	"	2	54	1½	7' 7½"	5' 8½"	4' 11¼"	5' 8½"	5' 6½"	37"	4' 3¾"	"	2¼"
1123	ABBAS	36	90	1	27	¾	6' 0½"	4' 10"	4' 2"	4' 3"	4' 8"	30"	3' 9"	16"	2"
1124	ABBAW	"	"	1½	40	1	"	5' 3½"	4' 5¼"	4' 11"	5' 1½"	32"	4' 0¼"	14"	"
1125	ABBED	"	"	2	54	1½	7' 7½"	5' 8½"	4' 11⅛"	5' 8½"	5' 6½"	37"	4' 3¾"	16"	2¼"
1126	ABBEH	"	"	3	81	2	8' 8"	6' 5"	5' 2¾"	6' 8¼"	6' 3"	40¾"	4' 7¼"	"	2¾"
1127	ABBET	42	105	2	54	1½	7' 7½"	5' 8½"	4' 10½"	5' 8½"	5' 6½"	37"	4' 3"	"	"
1128	ABBEK	"	"	3	81	2	8' 6"	6' 5"	5' 5"	6' 8¼"	6' 3"	40¾"	4' 9½"	"	"

Gregg Standard Diamond Arch Bar Truck

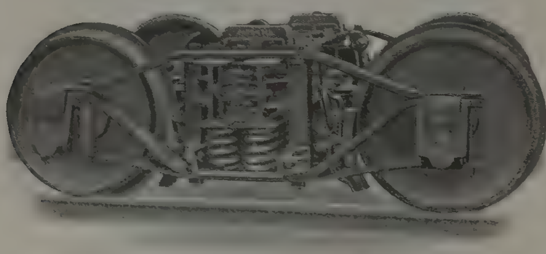


Illustration No. 1129—Code Word ABBEN

Gregg Low Bolster Truck

(Especially desirable for narrow gauges and low heights)

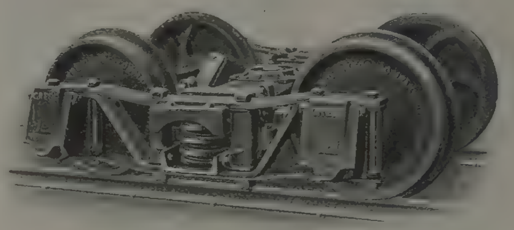


Illustration No. 1130—Code Work ABBET

Wheels. Wheels of best quality grey iron with chill-hardened tread and flange, as indicated in first two columns of tables, or of special analysis cast steel, as in third and fourth columns.

Axles. Of steel, all journals made with collars and shoulders.

Journal Boxes. Of Malleable Iron, fitted with brass bearings, for oil or grease lubrication.

Bolster. That of standard truck shown in illustration No. 1129 composed of steel I beams, riveted together with cover plates and filler blocks. Bolster of low truck shown in illustration No. 1130, is of special construction, consisting of a channel and heavy plate, so designed as to give great strength and stiffness with extremely low height, at the same time maintaining a full length of spring.

Cast Parts. All cast parts of malleable iron.

Brake. Regularly furnished without brake. Hand or air brake supplied where desired.

Sizes. Tables below show sizes of trucks usually ordered. Material for these trucks is carried in stock and they may be ordered by truck number or code word.

Optional Specifications. The dimensions or design of any part of the truck may be changed to conform to the desires of our customers, or to suit special conditions, and correspond with existing equipment.

GREGG STANDARD DIAMOND ARCH BAR TRUCK.

Use these columns for trucks with chilled iron wheels.		Use these columns for trucks with cast steel wheels.		Use these columns for either iron or steel wheels.				
Truck No.	Code Word	Truck No.	Code Word	Capacity of two trucks (Tons of 2000 lbs.)	Dia. of Wheels	Dia. of Axles	Size of Journal Bearings	Track Gauges
1131	ABBEV	1150	ABBUR	5	14"	2¼"	1¾x3½	24" to 48" or 60cm. to 1.200m.
1132	ABBIC	1151	ABBUT	7	"	2½"	2"x4"	
1133	ABBIF	1152	ABBUV	9	16"	3"	2¼x4½	
1134	ABBIG	1153	ABBUX	10	18"	"	2¼x5"	24" to 56½" or 60cm. to 1.667m.
1135	ABBIL	1154	ABBUZ	11	"	3¼"	2½x5"	
1136	ABBIM	1155	ABBYA	12	20"	"	2½x5½	
1137	ABBIP	1156	ABBYB	12	"	3¾"	2¾x5"	
1138	ABBIS	1157	ABBYC	13½	"	"	2¾x5½	
1139	ABBIY	1158	ABBYF	15	24"	"	2¾x6"	30" to 56½" or 75cm. to 1.667m.
1140	ABBOH	1159	ABBYG	16	"	4"	3"x6"	
1141	ABBOJ	1160	ABBYL	18	"	4¼"	3¼x6"	
1142	ABBOK	1161	ABBYM	20	"	"	3¼x7"	
1143	ABBON	1162	ABBYS	22	"	4½"	3½x7"	
1144	ABBOR	1163	ABCAC	25	"	4¾"	3¾x7"	
1145	ABBOT	1164	ABCAF	30	"	5½"	4¼x8"	
1146	ABBOX	1165	ABCAG	20	33"	4¼"	3¼x7"	56½" or 1.667m.
1147	ABBOZ	1166	ABCAL	25	"	MCB	3¾x7"	
1148	ABBUD	1167	ABCAM	30	"	"	4¼x8"	
1149	ABBUK	1168	ABCAP	40	"	"	5"x9"	

GREGG LOW BOLSTER TRUCK.

Use these columns for trucks with chilled iron wheels.		Use these columns for trucks with cast steel wheels.		Use these columns for either iron or steel wheels.				
Truck No.	Code Word	Truck No.	Code Word	Capacity of two trucks (Tons of 2000 lbs.)	Dia. of Wheels	Dia. of Axles	Size of Journal Bearings	Track Gauges
1169	ABCAS	1179	ABCIF	5	16"	2¼"	1¾x3½	20" to 42" or 50cm. to 1m.
1170	ABCED	1180	ABCIL	7	"	2½"	2"x4"	
1171	ABCEH	1181	ABCIM	8	18"	"	2"x4½	24" to 42" or 60 cm. to 1 m.
1172	ABCEJ	1182	ABCIP	9	"	3"	2¼x4½	
1173	ABCEK	1183	ABCIS	10	"	"	2¼x5"	
1174	ABCEN	1184	ABCIY	11	"	3¼"	2½x5"	
1175	ABCER	1185	ABCOD	12	"	"	2½x5½	
1176	ABCET	1186	ABCOH	12	"	3¾"	2¾x5"	
1177	ABCEV	1187	ABCOJ	13½	"	"	2¾x5½	
1178	ABCIC	1188	ABCOK	15	"	"	2¾x6"	

Gregg Patent Link and Pin Spring Coupler

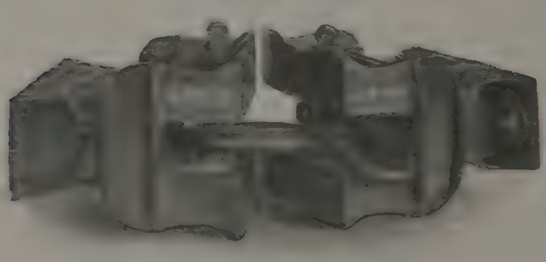


Illustration No. 1189—Code Word ABCON

The Gregg Patent Link and Pin Spring Coupler, of malleable iron and steel, is self contained, and combines the features of a coupler and buffer, the internal spring absorbing the buffing shocks and pulling strains.

Each coupler is provided with a link and pin, so arranged as not to become detached and lost, but easily coupled together.

The coupler is attached to the end sill of the car by bolts, making it particularly adaptable and easy to attach to cars in service which have unsatisfactory types of couplers.

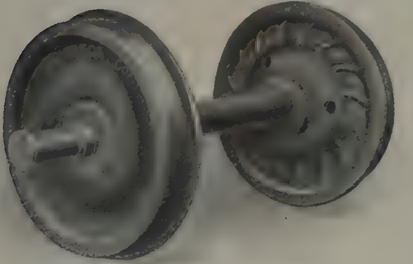
Used on locomotives or tenders it is especially desirable, as it gives the advantage of a spring coupler in a place where a solid type is usually furnished by the manufacturers.

APPROXIMATE CAPACITY OF CARS FOR WHICH COUPLERS ARE SUITABLE

Coupler Number	Code Word	8-Wheel Cars	4-Wheel Cars	Size of Face	Length of Coupler
1190	ABCOT	7 Tons	5 Tons	5¼"x9½"	11"
1191	ABCOX	12 Tons	8 Tons	10"x11"	12"

Chilled Iron Wheels on Axles

Illustration No. 1194. Code Word ABCUK

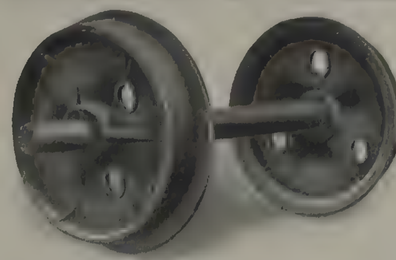


Wheels of best quality gray iron, with chill-hardened tread and flange, mounted by hydraulic pressure on steel axles. Journals are provided with collar and shoulder to take end thrust.

Wheel on Axle No.	Code Word	Dia. of Wheel	Tread of Wheel	Dia. of Axle	Size of Journal	Capacity in tons of 2000 lb. on 2 axles (4-Wheel Car)
1195	ABCUN	12"	3"	2¼"	1¾"x3½"	2½
1196	ABCUR	14"	"	"	" "	"
1197	ABCUT	"	"	2½"	2"x4"	3½
1198	ABCUV	16"	3¼"	"	" "	"
1199	ABCUX	"	"	3"	2¼x4½	4½
1200	ABCYB	"	"	"	2¼x5"	5
1201	ABCYC	18"	"	"	"	"
1202	ABCYF	"	"	3¼"	2½"x5"	5½
1203	ABCYG	"	"	"	2½x5½"	6
1204	ABCYI	20"	3½"	3"	2¼"x5"	5
1205	ABCYL	"	"	3¼"	2½"x5"	5½
1206	ABCYM	"	"	"	2½"x5½"	6
1207	ABCYS	"	"	3¾"	2¾"x5½"	7
1208	ABDAH	"	"	"	2¾"x6"	7½
1209	ABDAJ	"	"	4"	3"x6"	8
1210	ABDAN	"	"	4¼"	3¼"x6"	9
1211	ABDAR	"	"	"	3¼"x7"	10
1212	ABDAT	"	"	4½"	3½"x7"	11
1213	ABDAV	"	"	4¾"	3¾"x7"	12½
1214	ABDAX	24"	3½"	3¾"	2¾"x6"	7½
1215	ABDAZ	"	"	4"	3"x6"	8
1216	ABDEB	"	"	4¼"	3¼"x6"	9
1217	ABDEC	"	"	"	3¼"x7"	10
1218	ABDEF	"	"	4½"	3½"x7"	11
1219	ABDEG	"	"	4¾"	3¾"x7"	12½

Cast Steel Wheels on Axles

Illustration No. 1220. Code Word ABDEP



Wheels of a special analysis cast steel. The material and design are such as to give great strength with light weight. Wheels 18" or more in diameter, are regularly mounted on axles having a collar and shoulder as shown in cut of chilled iron wheels.

Wheel on Axle No.	Code Word	Dia. of Wheel	Tread of Wheel	Dia. of Axle	Size of Journal	Capacity in tons of 2000 lb. on 2 Axles (4-Wheel Car)
1221	ABDEP	10"	2½"	1½	1⅜x3½	1¼
1222	ABDES	"	"	1¾	1⅝x4	1½
1223	ABDEW	"	"	2	1⅞x4½	2
1224	ABDID	12"	3"	1¾	1⅝x4	1½
1225	ABDIJ	"	"	2	1⅞x4½	2
1226	ABDIK	"	"	2¼	2x5	2½
1227	ABDIN	14"	"	2	1⅞x4½	2
1228	ABDIR	"	"	2¼	2x5	2½
1229	ABDIT	"	"	2½	2¼x5½	3
1230	ABDIX	16"	3¼"	2¼	2x5	2½
1231	ABDIZ	"	"	2½	2¼x5½	3
1232	ABDOB	"	"	2¾	2½x6	4
1233	ABDOC	18"	3¼	3	2¼x5	5
1234	ABDOF	"	"	3¼	2½x5	5½
1235	ABDOG	"	"	"	2½x5½	6
1236	ABDOL	20"	3½	3	2¼x5	5
1237	ABDOM	"	"	3¼	2½x5	5½
1238	ABDOP	"	"	"	2½x5½	6
1239	ABDOS	"	"	3¾	2¾x6	7½
1240	ABDUC	24"	3¾"	3¼	2½x5	5½
1241	ABDUF	"	"	3¾	2¾x6	7½

Standard Side Spring Journal Box

Patented in the U. S. and Other Countries

Illustration No. 1242. Code Word ABDUG

Standard Top Spring Journal Box

Patented in the U. S. and Other Countries

Illustration No. 1248. Code Word ABDYE

Journal Boxes are of malleable iron, equipped with brass bearings positively held in place by means of a special key. For oil or grease lubrication. Spring lugs of side spring box are set well down on side, making it especially desirable for cars with low floor height or for narrow gauges. Top spring boxes are generally used on cars with higher floors or couplers.

Box with Bearing Number	Code Word	Standard Journal Size	Capacity tons of 2000 lb for 4-Wheel Car	Maximum Journal Size	Capacity tons of 2000 lb for 4-Wheel Car	Distance Centre of Journal to bottom of sill
1243	ABDUL	1⅞x4"	3	2"x4"	3½	4⅞"
1244	ABDUM	2¼x5"	5	2½x5"	5½	4⅝"
1245	ABDUP	2½x5"	6	2⅞x5"	7	6$\frac{11}{16}$"
1246	ABDUS	2¾x6"	7½	3"x6½"	8½	6½"

If pedestal and springs are required add the number 1247 or code word ABDUY to any box.

Box with Bearing Number	Code Word	Standard Journal Size	Capacity tons of 2000 lb for 4-Wheel Car	Maximum Journal Size	Capacity tons of 2000 lb for 4-Wheel Car	Distance Centre of Journal to bottom of sill
1249	ABDYK	1⅞x3½"	2	1⅞x3½"	2	5¾"
1250	ABDYR	2"x5"	4	2¼x5½"	5½	5½"
1251	ABDYT	2¼x5"	5	2½x6"	6	7⅝"
1252	ABDYU	2½x6	7	3¼x7	10	10"

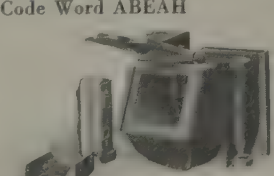
If pedestal and spring are required add the number 1253 or the code word ABEAD to any box.

Standard Solid Type Journal Box

Patented in the U. S. and Other Countries

Illustration No. 1254. Code Word ABEAH

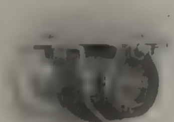
For use on trucks or bogies, and for cars which do not require springs. Two smallest sizes have brass held by key and the others use the wedge system.



Box with Bearing Number	Code Word	Standard Journal Size	Capacity tons of 2000 lb for 4-Wheel Car	Maximum Journal Size	Capacity tons of 2000 lb for 4-Wheel Car	Distance Centre of Journal to top of box.
1255	ABEAJ	2"x4"	3½	2"x4½"	4	2⅛"
1256	ABEAK	2¼x5"	5	2¼x5½"	6	2½"
1257	ABEAN	2¾x6"	7½	3"x6"	8	2⅞"
1258	ABEAR	3¼x7"	10	3¾x7"	12½	3⅝"
1259	ABEAT	4¼x8"	15	4¼x8"	15	4⅞"

Improved Design Roller Bearing Boxes

Illustration No. 1260. Code Word ABEAX



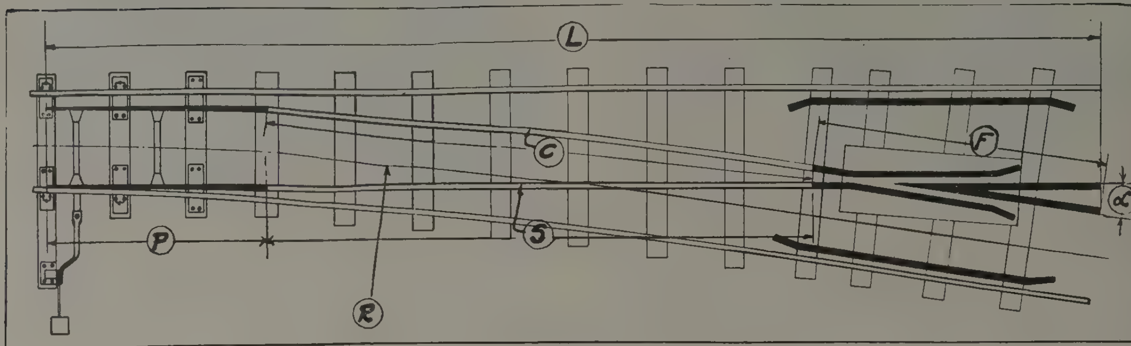
Used on industrial and plantation cars. Interior of box accurately machined, fitted with rollers of steel, and dust and oil proof washers. Designed for oil or grease lubrication.

Box with Bearing Number	Code Word	Standard Journal Size	Capacity tons of 2000 lb for 4-Wheel Car	Distance Centre of Journal to top of box
1261	ABEBE	1⅛x3"	1	1¼"
1262	ABEBO	1⅝x3½"	2	1$\frac{11}{16}$"
1263	ABEBU	1$\frac{11}{16}$x4"	3	2"
1264	ABECE	2"x4½"	4	2⅛"
1265	ABECH	2⅝x5"	5	2½"

Gregg Standard Switches for Permanent Track

Copyrighted tables

Illustration No. 1266—Code Word ABECO



These tables are of great assistance in selecting the switch most suitable and in installing same by giving various working measurements. *However, the tables and measurements will not give the desired results unless the frogs and points called for in the tables are used.* Any weight or size of rail may be used without altering the dimensions given in the tables, and the frogs, points, etc., are the same for either a right or a left hand switch. Guard rails are usually the same length as the frog.

A large supply of switches and track material is carried in stock and any of these switches in any weight of rail can be furnished for prompt shipment.

Inquiries or orders need only specify the following:

1. Code word or number, indicating the complete switch.
2. Weight of rail.
3. Style of switch stand or throw.

NOTE: For switch stands or throws, track gauges and weights of rail, refer to the following page.

Complete Switch Number	Complete Switch Code Word	Frog Number (Spread)	Angle of Frog α	Radius of Curve on Centre line of Track R	Length of Switch L		Length of Points P		Length of Frog F		Length of Straight Rail Between Frog and Points S		Length of Curved Rail Between Frog and Points C	
USE THE FOLLOWING TABLE FOR TRACK GAUGES OF 20 INCHES OR 50 CMS.														
				Feet	Feet	Ins.	Feet	Ins.	Feet	Ins.	Feet	Ins.	Feet	Ins.
1267	ABECT	3	18°-55′	30	11	8	3	0	3	3	5	5	5	6 5/8
1268	ABECU	3½	16°-16′	41	13	5	3	0	3	6	6	11	7	0 1/16
1269	ABEDA	4	14°-15′	53	15	3	3	0	3	9	8	6	8	7 1/16
1270	ABEDS	4½	12°-41′	68	17	0	3	0	4	0	10	0	10	1¼
1271	ABEDY	4	14°-15′	53	15	3	5	0	3	9	6	6	6	7 1/16
1272	ABEEB	4½	12°-41′	68	17	0	5	0	4	0	8	0	8	1¼
1273	ABEEC	5	11°-25′	83	18	9	5	0	4	3	9	6	9	7⅝
1274	ABEEF	5½	10°-23′	101	20	7	5	0	4	6	11	1	11	1⅞
1275	ABEEG	6	9°-32′	120	22	6	5	0	5	0	12	6	12	7¼
USE THE FOLLOWING TABLE FOR TRACK GAUGES OF 24 INCHES OR 60 CMS.														
				Feet	Feet	Ins.	Feet	Ins.	Feet	Ins.	Feet	Ins.	Feet	Ins.
1276	ABEEL	4	14°-15′	64	17	11	3	0	3	9	11	2	11	3½
1277	ABEEM	4½	12°-41′	81	20	0	3	0	4	0	13	0	13	1 1/32
1278	ABEEP	4	14°-15′	64	17	11	5	0	3	9	9	2	9	3½
1279	ABEES	4½	12°-41′	81	20	0	5	0	4	0	11	0	11	1 1/32
1280	ABEFA	5	11°-25′	100	22	2	5	0	4	3	12	11	13	0
1281	ABEFI	5½	10°-23′	121	24	3	5	0	4	6	14	9	14	10 1/16
1282	ABEFS	6	9°-32′	144	26	6	5	0	5	0	16	6	16	7½
1283	ABEFY	6½	8°-48′	169	28	9	5	0	5	6	18	3	18	4⅜
1284	ABEGA	7	8°-10′	196	31	0	5	0	6	0	20	0	20	1
1285	ABEGI	7	8°-10′	196	31	0	7	6	6	0	17	6	17	7
USE THE FOLLOWING TABLES FOR TRACK GAUGES OF 30 INCHES OR 75 CMS.														
				Feet	Feet	Ins.	Feet	Ins.	Feet	Ins.	Feet	Ins.	Feet	Ins.
1286	ABEGS	4	14°-15′	80	21	11	5	0	3	9	13	2	13	4
1287	ABEGY	4½	12°-41′	101	24	6	5	0	4	0	15	6	15	8¼
1288	ABEHE	5	11°-25′	125	27	2	5	0	4	3	17	11	18	0⅜
1289	ABEHO	5½	10°-23′	151	29	9	5	0	4	6	20	3	20	4⅝
1290	ABEHT	5	11°-25′	125	27	2	7	6	4	3	15	5	15	6⅜
1291	ABEHU	5½	10°-23′	151	29	9	7	6	4	6	17	9	17	10⅝
1292	ABEID	6	9°-32′	180	32	6	7	6	5	0	20	0	20	1 15/16
1293	ABEIJ	6½	8°-48′	211	35	3	7	6	5	6	22	3	22	4 11/16
1294	ABEIK	7	8°-10′	245	38	0	7	6	6	0	24	6	24	7 1/16
1295	ABEIN	7½	7°-38′	281	40	9	7	6	6	6	26	9	26	10⅝
1296	ABEIR	8	7°-09′	320	43	6	7	6	7	0	29	0	29	1 1/16
1297	ABEIT	8	7°-09′	320	43	6	10	0	7	0	26	6	26	7 1/16
USE THE FOLLOWING TABLE FOR TRACK GAUGES 36 INCHES OR 90 CMS.														
				Feet	Feet	Ins.	Feet	Ins.	Feet	Ins.	Feet	Ins.	Feet	Ins.
1298	ABEIV	4	14°-15′	96	25	11	5	0	3	9	17	2	17	4½
1299	ABEIX	4½	12°-41′	122	29	0	5	0	4	0	20	0	20	2¾
1302	ABEKA	5	11°-25′	150	32	2	5	0	4	3	22	11	23	0¾
1303	ABEKI	5½	10°-23′	182	35	3	5	0	4	6	25	9	25	10 13/16
1304	ABEKT	5	11°-25′	150	32	2	7	6	4	3	20	5	20	6¾
1305	ABEKY	5½	10°-23′	182	35	[illegible]	7	6	4	6	23	3	23	4 13/16
1306	ABELA	6	9°-32′	216	38	6	7	6	5	0	26	0	26	2 1/16
1307	ABELB	6½	8°-48′	254	41	9	7	6	5	6	28	9	28	11
1309	ABELG	7	8°-10′	294	45	0	7	6	6	0	31	6	31	7 7/16
1310	ABELM	7½	7°-38′	338	48	3	7	6	6	6	34	3	34	5
1311	ABELP	8	7°-09′	384	51	6	7	6	7	0	37	0	37	1 5/16
1312	ABELS	8	7°-09′	384	51	6	10	0	7	0	34	6	34	7 5/16
USE THE FOLLOWING TABLES FOR TRACK GAUGES 1 METER OR 39⅜″														
				Feet	Feet	Ins.	Feet	Ins.	Feet	Ins.	Feet	Ins.	Feet	Ins.
1313	ABEMA	4	14°-15′	105	28	2	5	0	3	9	19	5	19	7 13/16
1314	ABEMI	4½	12°-41′	133	31	6	5	0	4	0	22	6	22	9¼
1315	ABEMY	5	11°-25′	164	34	11	5	0	4	3	25	8	25	10 3/16
1316	ABEND	5½	10°-23′	198	38	4	5	0	4	6	28	10	29	0
1317	ABENE	5	11°-25′	164	34	11	7	6	4	3	23	2	23	4 3/16
1318	ABENO	5½	10°-23′	198	38	4	7	6	4	6	26	4	26	6
1319	ABENT	6	9°-32′	236	41	11	7	6	5	0	29	5	29	6⅞
1320	ABEOB	6½	8°-48′	277	45	5	7	6	5	6	32	5	32	6 3/16
1321	ABEOC	7	8°-10′	322	48	11	7	6	6	0	35	5	35	6 13/16
1322	ABEOF	7½	7°-38′	369	52	6	7	6	6	6	38	6	38	7 3/16
1323	ABEOG	8	7°-09′	420	56	0	7	6	7	0	41	6	41	7 9/16
1324	ABEOL	8	7°-09′	420	56	0	10	0	7	0	39	0	39	1 7/16
1325	ABEOM	8½	6°-44′	474	59	6	10	0	7	6	42	0	42	1¾
1326	ABEOP	9	6°-22′	532	63	1	10	0	8	0	45	1	45	2¾
USE THE FOLLOWING TABLES FOR TRACK GAUGES 42 INCHES														
				Feet	Feet	Ins.	Feet	Ins.	Feet	Ins.	Feet	Ins.	Feet	Ins.
1327	ABEOS	4	14°-15′	112	29	11	5	0	3	9	21	2	21	5
1328	ABEOW	4½	12°-41′	142	33	6	5	0	4	0	24	6	24	9 3/16
1329	ABEOY	5	11°-25′	175	37	2	5	0	4	3	27	11	28	1¼
1330	ABEPO	5½	10°-23′	212	40	9	5	0	4	6	31	3	31	5 5/16
1331	ABEPS	5	11°-25′	175	37	2	7	6	4	3	25	5	25	7¼
1332	ABEPU	5½	10°-23′	212	40	0	7	6	4	6	28	9	28	11 5/16
1333	ABERD	6	9°-32′	252	44	6	7	6	5	0	32	0	32	2¾
1334	ABERJ	6½	8°-48′	296	48	3	7	6	5	6	35	3	35	5 5/16
1335	ABERK	7	8°-10′	343	52	0	7	6	6	0	38	6	38	7¾
1336	ABERN	7½	7°-38′	394	55	9	7	6	6	6	41	9	41	11 5/16
1337	ABERO	8	7°-09′	448	59	6	7	6	7	0	45	0	45	1½
1338	ABERT	8	7°-09′	448	59	6	10	0	7	0	42	6	42	7½
1339	ABERU	8½	6°-44′	506	63	3	10	0	7	6	45	9	45	10 11/16
1340	ABESI	9	6°-22′	567	67	0	10	0	8	0	49	0	49	2¾
USE THE FOLLOWING TABLES FOR TRACK GAUGES 56½ INCHES.														
				Feet	Feet	Ins.	Feet	Ins.	Feet	Ins.	Feet	Ins.	Feet	Ins.
1341	ABESK	5	11°-25′	235	49	7	10	0	5	0	34	7	34	9⅝
1342	ABESU	5½	10°-23′	285	54	6	10	0	5	6	39	0	39	2 7/16
1343	ABETE	6	9°-32′	338	59	6	10	0	6	0	43	6	43	8 5/16
1344	ABETO	6½	8°-48′	398	64	6	10	0	6	6	48	0	48	2⅞
1345	ABEUB	7	8°-10′	461	69	4	10	0	7	0	52	4	52	5⅞
1346	ABEUC	7½	7°-38′	530	74	5	10	0	7	6	56	11	57	1¾
1347	ABEUF	8	7°-09′	602	79	4	10	0	8	0	61	4	61	6½
1348	ABEUG	8½	6°-44′	680	84	3	10	0	8	6	65	9	65	11¾
1349	ABEUL	8	7°-09′	602	79	4	12	0	8	0	59	4	59	6½
1350	ABEUP	8½	6°-44′	680	84	3	12	0	8	6	63	9	63	11¾
1351	ABEUS	9	6°-22′	762	89	3	12	0	9	0	68	3	68	4¾
1352	ABEUY	9½	6°-02′	850	94	3	12	0	9	6	72	9	73	10 7/16
1353	ABEVO	10	5°-43′	942	99	2	12	0	10	0	77	2	77	2⅝
1354	ABEVU	10	5°-43′	942	99	2	15	0	10	0	74	2	74	2⅝
1355	ABEWE	10½	5°-27′	1038	104	2	15	0	10	6	78	8	78	8½
1356	ABEWK	11	5°-12′	1138	109	1	15	0	11	0	83	1	83	1½
1357	ABEWL	11½	4°-58′	1245	113	10	15	0	11	6	87	4	87	4 13/16
1358	ABEWM	12	4°-46′	1356	119	0	15	0	12	0	92	0	92	0½

Gregg Heavy Target Switch Stand

Made of Malleable Iron, suitable for any gauge and weight of rail.

No. 1359 Code Word ABEWO

Gregg Light Target Switch Stand

Made of Malleable Iron, recommended for rails of 40 lbs. and under, and for roads not using switch lamps.

No. 1360 Code Word ABEWY

Gregg Heavy Target Yard Stand

For any gauge and weight of rail.

No. 1361 Code Word ABEXA

Gregg Ground Throw

For general plantation and light railroad service. No 1362 Code Word ABEXI For rails of 30 lbs.. No. 1363, Code Word ABEXY, with counterweighted lever, for rails over 30 lbs.

Weights of Rail and Track Gauges

In inquiries or orders, code words may be taken from the following tables to show:

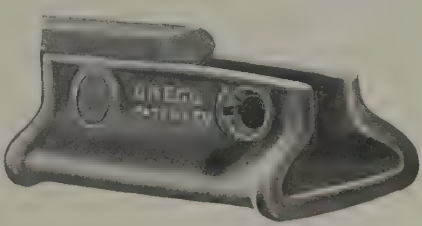
Weight of rail in pounds per yard or apporximately in kilograms per meter.		
Code Word	Pounds per yard	Kilos per meter
ABEYA	8	4
ABEYB	10	5
ABEYF	12	6
ABEYI	14	7
ABEZE	16	8
ABEZO	20	10
ABFAC	25	12½
ABFAF	30	15
ABFAG	35	17½
ABFAL	40	20
ABFAM	45	22½
ABFAP	50	25
ABFAS	55	27½
ABFAW	60	30
Gregg Special Sections highly recommended for their strength and rust resisting qualities.		
ABFED	14	7
ABFEH	18	9

Track Gauge in inches and millimeters.	
Code Word	Gauge
ABFEK	18 ins.
ABFEN	20 "
ABFER	24 "
ABFET	26 "
ABFEV	30 "
ABFIC	36 "
ABFIF	42 "
ABFIG	48 "
ABFIL	56½"
ABFIM	400 mm.
ABFIS	500 "
ABFIY	600 "
ABFOD	660 "
ABFOH	700 "
ABFOJ	750 "
ABFOK	1000 "
ABFON	1440 "
ABFOR	1667 "

Gregg Patent Malleable Iron Splice Shoe

(Patented in the U. S. and Other Countries)

Illustration No. 1398—Code Word ABFOT



Practically unbreakable and rust proof. It makes the joining of the sections easy, and holds them in perfect alignment, without bolting them together. Provision is made for so bolting them, if a permanent joint is desired.

Standard Sizes of Splice Shoes.

Splice Shoe Number	Code Word	For Standard American Rails
1399	ABFOX	10 lbs. or 5 kilos
1400	ABFUK	12 " " 6 "
1401	ABFUN	14 " " 7 "
1402	ABFUR	16 " " 8 "
1403	ABFUT	20 " " 10 "
1404	ABFUV	25 " " 12½"
		For Gregg Rails
1405	ABFUX	14 lbs. or 7 kilos
1406	ABFUZ	18 " " 9 "

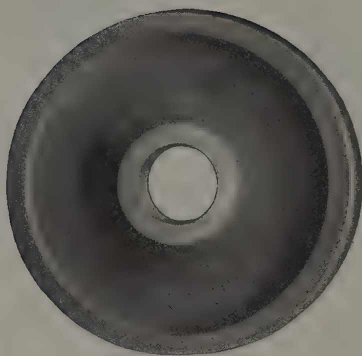
Gregg Steel Ties for Portable Track (Patented in the U. S. and Other Countries)

The corrugated tie section shown in cut is the most economical of light rolled tie sections, combining maximum stiffness and bearing surface, with minimum weight. It is made in both 4" and 5" widths. The Gregg patent fastening is the strongest and most secure device made for the purpose. The malleable iron clips jamb the rail against the tie, holding them securely together.

For Ties 4" wide		For Ties 5" wide		Gauge	Suitable for the following standard American weights of rail.		Usual Weight of load in tons of 2000 lbs. for 4-Wheel car
Tie Number	Code Word	Tie Number	Code Word		lbs. per yrd.	Kilos per meter	
1408	ABFYB	....	....	40 CM.	8 & 10	4 & 5	1 to 1½
1409	ABFYC	....	....	" "	12 & 14	6 & 7	2 to 3
1410	ABFYG	....	....	18 Ins.	8 & 10	4 & 5	1 to 1½
1411	ABFYI	....	....	" "	12 & 14	6 & 7	2 to 3
1412	ABFYL	....	....	50 CM.	8 & 10	4 & 5	1½ to 2
1413	ABFYM	1432	ABGIL	" "	12 & 14	6 & 7	2 to 3
1414	ABFYS	....	....	20 Ins.	8 & 10	4 & 5	1 to 1½
1415	ABGAC	1433	ABGIM	" "	12 & 14	6 & 7	2 to 3
1416	ABGAF	....	....	60 CM.	8 & 10	4 & 5	1 to 1½
1417	ABGAG	1434	ABGIP	" "	12 & 14	6 & 7	2 to 3
1418	ABGAL	1435	ABGIS	" "	16 & 18	8 & 9	4 to 5
1419	ABGAM	1436	ABGIY	" "	20 & 25	10 & 12½	6 to 8
1420	ABGAS	....	....	24 Ins.	8 & 10	4 & 5½	1 to 1½
1421	ABGAW	1437	ABGOD	" "	12 & 14	6 & 7	2 to 3
1422	ABGED	1438	ABGOH	" "	16 & 18	8 & 9	4 to 5
1423	ABGEH	1439	ABGOJ	" "	20 & 25	10 & 12½	6 to 8
1424	ABGEJ	1440	ABGON	66 CM.	12 & 14	6 & 7	2 to 3

For Ties 4" wide		For Tires 5" wide		Gauge	Suitable for the following standard American weights		Usual Weight of load in tons of 2000 lbs. for 4-Wheel car
Tie Number	Code Word	Tie Number	Code Word		Lbs. per yard	Kilos. per meter	
1425	ABGEK	1441	ABGOR	66 CM.	16 & 18	8 & 9	4 to 5
1426	ABGEN	1442	ABGOT	" "	20 & 25	10 & 12½	6 to 8
1427	ABGER	1443	ABGOX	26 Ins.	12 & 14	6 & 7	2 to 3
1428	ABGET	1444	ABGOZ	" "	16 & 18	8 & 9	4 to 5
1429	ABGEV	1445	ABGUD	" "	20 & 25	10 & 12½	6 to 8
1430	ABGIF	1446	ABGUK	75 CM.	12 & 14	6 & 7	3 to 4
		1447	ABGUN	" "	16 & 18	8 & 9	4 to 5
		1448	ABGUR	" "	20 & 25	10 & 12½	6 to 8
1431	ABGIG	1449	ABGUT	30 Ins.	12 & 14	6 & 7	3 to 4
....	....	1450	ABGUX	" "	16 & 18	8 & 9	4 to 5
....	....	1451	ABGUZ	" "	20 & 25	10 & 12½	6 to 8
....	....	1452	ABGYA	36 Ins.	12 & 14	6 & 7	3 to 4
....	....	1453	ABGYB	" "	16 & 18	8 & 9	4 to 5
....	....	1454	ABGYC	" "	20 & 25	10 & 12½	6 to 8
....	....	1455	ABGYF	1 M.	12 & 14	6 & 7	3 to 4
....	....	1456	ABGYG	" "	16 & 18	8 & 9	4 to 5
....	....	1457	ABGYI	" "	20 & 25	10 & 12½	6 to 8

Chilled Iron Car Wheels



General

In the United States, the chilled iron car wheel has been the standard for rail-borne traffic since railroading began. Although distinctly an American product, it is manufactured to a limited extent in Europe. It is used most extensively on the steam and electric railways of North America; and in Central and South America on those railroads which have adopted the American methods of railway operation. No one article has contributed so much to economy in railway practice as the chilled iron car wheel. From the days of the primitive tramway to the present stage of railway development, its use has been continuous and uninterrupted.

In North America, there are approximately 2,500,000 freight cars, 10,000 passenger cars and 40,000 engine tenders equipped with 20,400,000 chilled iron car wheels. This represents about 95 per cent of the total steam railroad equipment. There are also about 500,000 chilled iron wheels used by electric railways. In addition to these, thousands of chilled iron wheels are used in mining, logging, contracting and manufacturing industries.

To maintain this equipment and provide for additional rolling stock, about 4,000,000 wheels are required each year. The Griffin Wheel Company, operating 9 foundries in the United States, from the Atlantic to the Pacific Coasts, with an annual capacity of 2,000,000 wheels, is adequately prepared to take care of the constantly increasing demands for its product. The foundries are located at Chicago, Illinois; Pullman, Illinois; Detroit, Michigan; Boston, Massachusetts; Denver, Colorado; St. Paul, Minnesota; Kansas City, Kansas; Tacoma, Washington; Los Angeles, California.

Before the days of the steam railway, it was discovered that when molten iron was suddenly cooled, the character of the metal was changed. On examining the fracture, it was found that the part which was cooled suddenly, or "chilled," was white, smooth-grained in appearance and extremely hard; while the balance of the metal, which cooled more slowly, was gray, coarse-grained, and of a softer and more ductile quality. This transformation is due to the peculiar action of carbon, and does not occur unless carbon is present in the iron. In the molten state, the carbon combines, or is in solution with the iron, and when suddenly cooled, remains combined with the iron, and produces what is known as "chilled iron." When the cooling takes place slowly, the carbon gradually separates from the iron, forming gray flakes of graphite between the iron molecules.

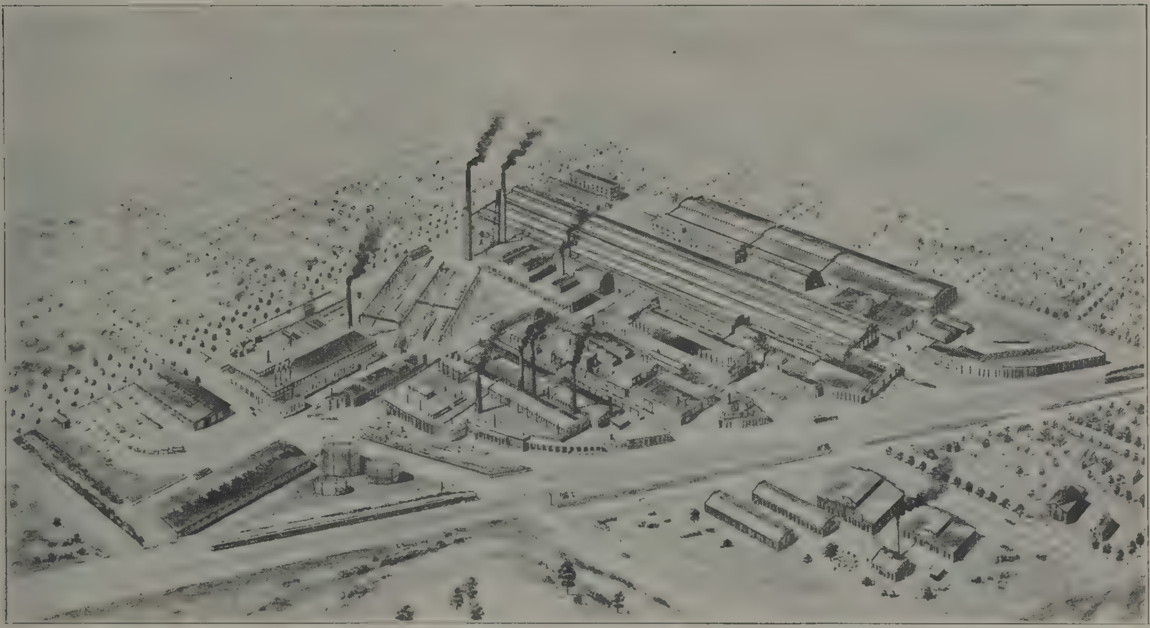
Description

The chilled iron wheel was developed by using this peculiar action of the carbon. The depth of the chill in the tread flange and the ductility and strength of the gray iron, in the plates and hub, are largely influenced by the temperature of the iron when poured, the rate of cooling, and the effect of foreign substances. The wearing surface of the wheel is chilled by forming part of the mold with a metallic ring or "chiller"; while the balance of the mold is of sand, which permits the metal to cool slowly enough to form soft gray iron.

The perfection of a car wheel is not altogether dependent upon the facilities for casting, the size of the foundry, or its capacity for melting iron. A complete knowledge of both the physical and chemical qualities of the iron is essential; and to this end the Griffin Wheel Company maintains a modern laboratory, for testing and analyzing all raw materials as well as the finished product. All of the work, from the charging of the cupola to the final inspection, is conducted in such a scientific as well as a practical manner that the result is a wheel which will give the maximum wear, with sufficient strength for the service for which it is intended.

The standard specification of the Master Car Builders' Association for chilled iron wheels is given in the definition section and recommended weights of wheels for various capacities of cars are shown on page 660.

Freight Cars and Car Equipment



Main Plant of the Haskell & Barker Car Company, Inc.

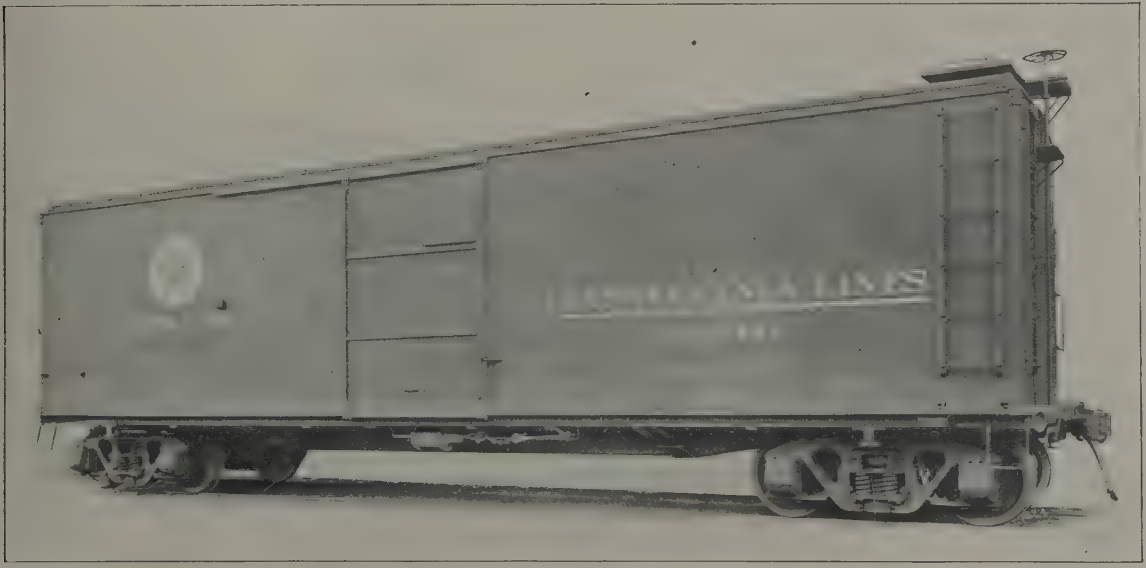
General

Operation of the Haskell and Barker freight car manufacturing plant and facilities was taken over by the present owners—Haskell & Barker Car Company, Inc.—on January 1, 1916. The establishment had been in existence since 1852, with the unusual record of continuous operation except for repairs, etc., in all the years since it started, up to the present time. Obviously this circumstance would have a decided tendency toward quality and effectiveness of labor, and that has actually been the result.

Manufacturing Facilities

The facilities for building all types of wooden, composite and all-steel freight cars—already of the most modern type and unusually good—have been consistently expanded and improved all through the existence of the present owning company. Hence the plant is equipped at least equally with any other unit of the industry in this country for building the most difficult types of cars, whether wood or steel.

We have an engineering force competent to design cars and are prepared to submit drawings and specifi-



All Steel Box Car

Freight Cars and Car Equipment

Military Refrigerator Car

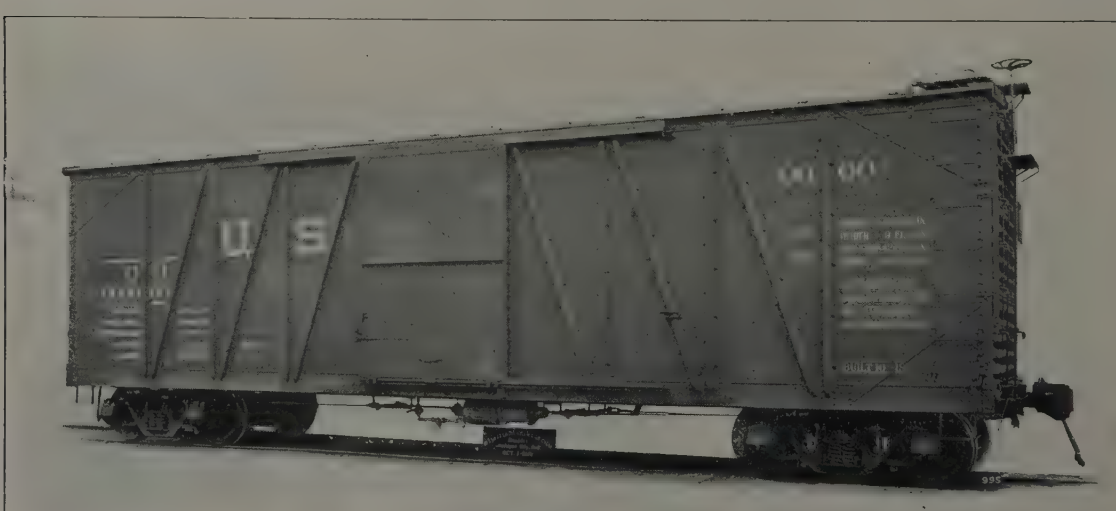
cations on whatever type is desired. Of course, we also build cars of specified construction and design.

We have organization and facilities particularly adapted to construction of refrigerator cars, through long study and experience. The distinction of building all of the refrigerator cars sent from this country for use by the American Expeditionary Forces in France, is ours.

The location—Michigan City, Indiana—is next door to the steel producing center of the Middle West. We are fifty-six miles from Chicago, at the foot of Lake Michigan; and as the mileage from Chicago is lessened the iron and steel producing facilities along the road increase. Gary, Indiana, is less than thirty miles away, assuring unusual opportunities for securing, without delay, steel in quantity and diversity.

We do not merely buy materials and assemble cars; we manufacture them, inasmuch as we are equipped to make all materials that enter into modern car construction except couplers and springs. We have foundries—wheel, grey iron, malleable iron, brass. A large forge shop with most modern equipment is one of our departments. In the above mentioned departments we manufacture for outside use, as well as for the cars we build. Also we have departments with capacity in excess of needs for our own car shops and for supplying outside patrons, for making bolsters, brake beams, journal boxes, roofs, draft gear, and other parts required in car construction.

We have excellent repair facilities and storage yards which are a necessary adjunct thereto. Also experience of our present organization in that line has been very

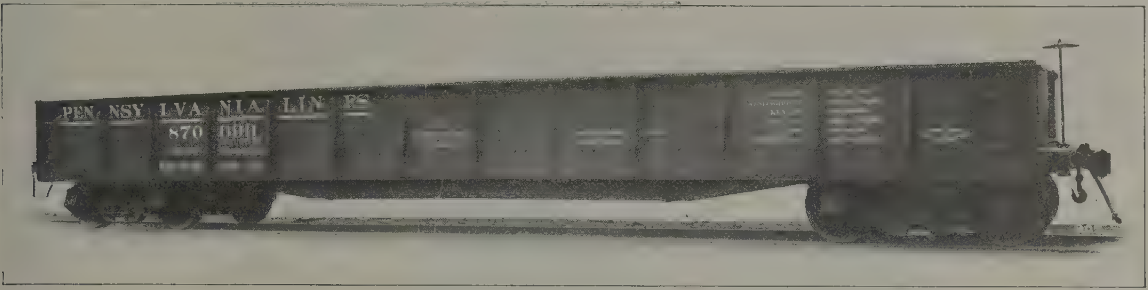


Single Sheathed Box Car

Freight Cars and Car Equipment

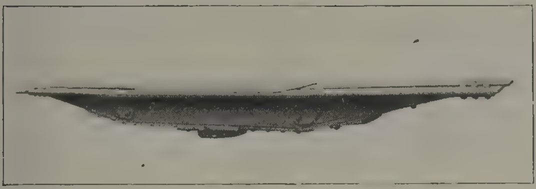
broad, insuring economy and expedition in performance. Similarly with building new cars our facilities permit undertaking repairs of all types—wood, composite and steel.

Requests from you for further information in substantiation and amplification of above statements are desired. The facts will warrant your patronage.

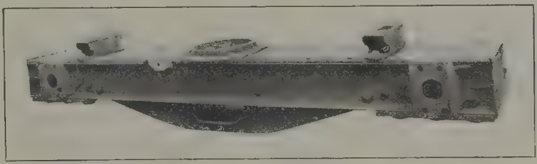


70 Tons Capacity All Steel Gondola

Composite Gondola Car

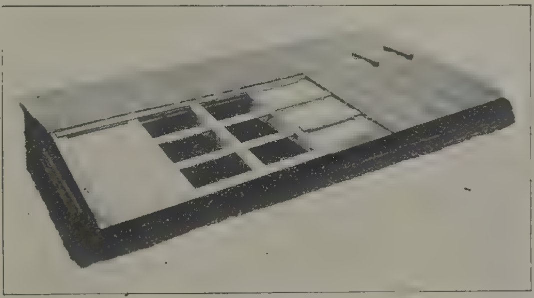


Body Bolster

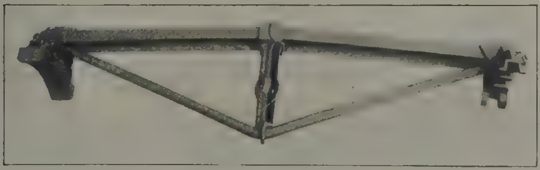


Truck Bolster

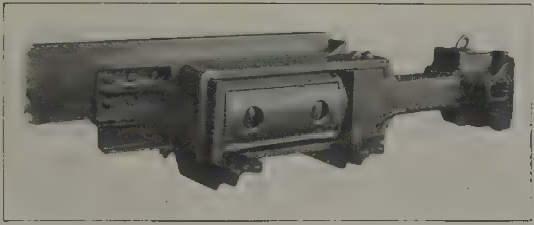
Wheels



Car Roof



Brake Beam



Draft Gear

Walkover Pressed Steel Car Seats

Description

The "Walkover" is our latest design in car seats. It combines great strength and durability with extremely light weight. The pedestals and all metal parts are pressed steel. The pressed steel construction makes a neat and compact design, occupying less room than the average car seat. This makes more comfortable riding for the passenger.

A foot-rest is located beneath the seat which reverses automatically, and provides more foot space and ample room for placing luggage under the seat.

Special care is given to see that all workmanship is perfect. The seats and all their parts are subjected to rigid inspections before and after they are assembled, only first-class product being permitted to leave the factory.

Standard Walkover Steel Seats and Integral Window Steel Finish, Exhibited at the Master Car Builders' Convention at Atlantic City

Types of Seats

The "through line" car seat is manufactured with various styles of aisle arm rests and upholstery covering. For steel cars the entire seat frame is made of steel. This seat is unsurpassed for easy riding and bodily comfort.

The suburban car seat is a modification of the "through line" seat, and can also be upholstered in any material specified. A car equipped with these seats makes a very pleasing appearance, clean cut, comfortable and roomy. "Walkover" seats are also made for electric cars, economizing space and combining luxury and practicability in all installations.

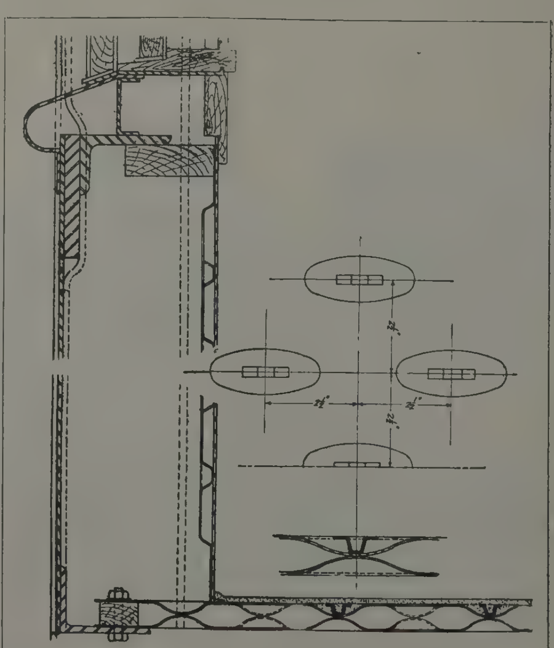
Trussplate Steel Flooring

Description

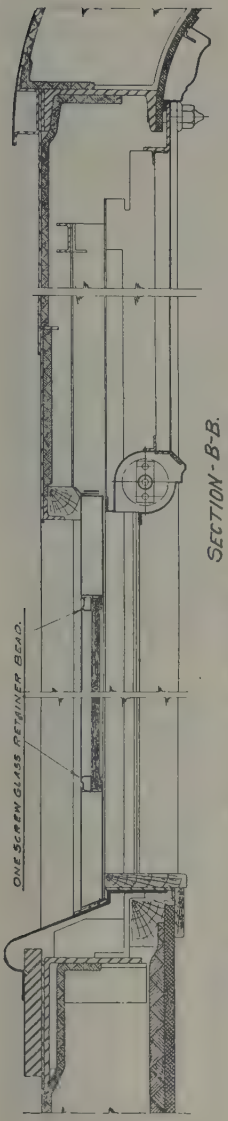
Here is the latest improved Passenger Car Floor Construction (See Fig. 1523) which tests have proven is also the lightest, strongest and affords the best heat and electric insulation; and it has been pronounced the most economical. One might well say of it, to the Railway Official or the Car Builder: "Buy the best floor, and be done with it. Its first cost is its last cost."

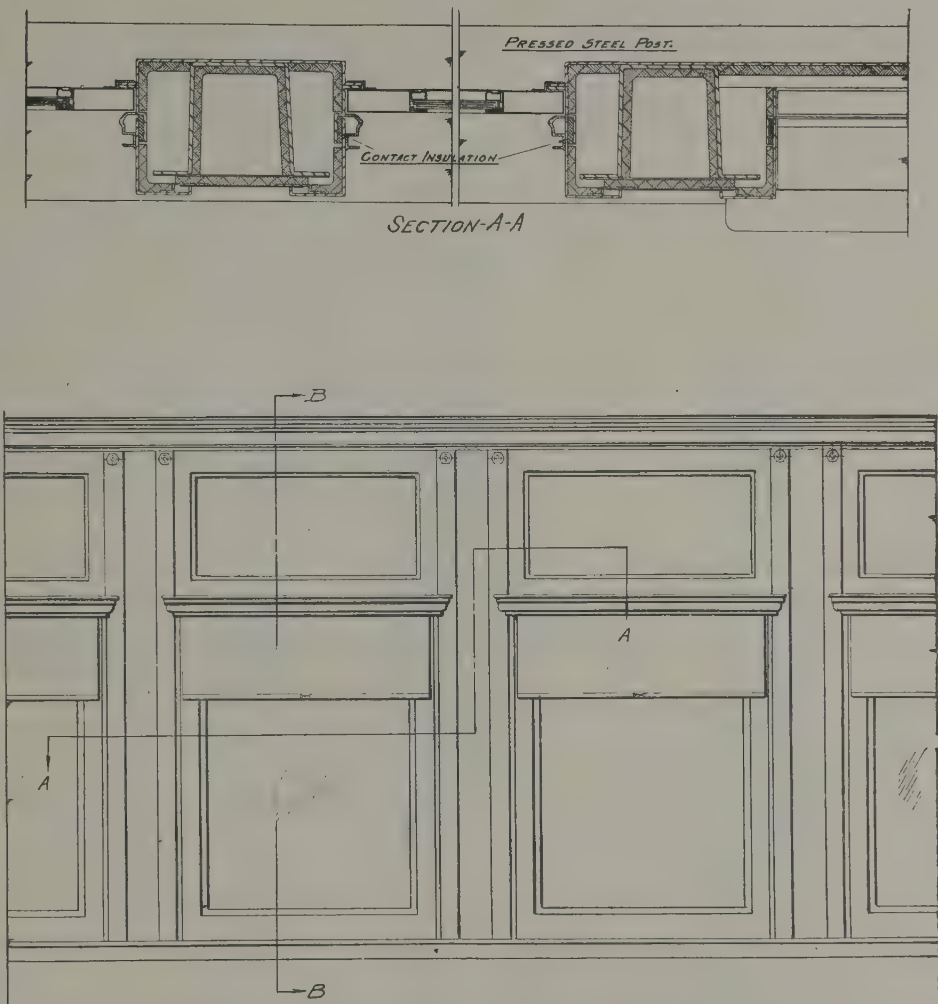
Certainly it is the lightest floor, being made of two sheets of 1/32-inch Steel, with truss-construction between, welded together at extreme points of indentations, and weighing 2½ pounds per square foot, ready for application of the plastic material, requiring only 1½ pounds of the latter, per square foot, to complete the composition floor.

Unique trussing of the indentations formed in the top and bottom sheets, welded firmly at the extreme points, gives the floor its trade-name Truss-plate Steel Flooring, and gives the car the strongest floor possible. Cars already equipped with this Hale & Kilburn Flooring are proof-convincing of its substantial, fire-proof, insulating, sanitary, indestructible and economical qualities.



Interior Steel Finish and Trim





Integral Window Frame. **Include this feature in your cars. Simplifies assembly and cuts down erection expense. No change in present post construction necessary.**

Specialties

This company manufactures every practical design of steel interior finish suitable for all steel railway cars. All metal trim, mouldings, doors, etc., are manufactured from carefully selected sheet steel. A perfected "process welded equipment" lends lightness, strength, durability and beauty to our products. Mouldings are cold drawn through hardened rolls, from special bright finish coil steel, producing sharp, graceful outlines.

After final assembly all material is carefully cleaned and treated with an elastic rust-proof primer, which is baked on in an even temperature. Metal trim is furnished either primed, ready for graining, or completely grained and finished.

Integral Window Frame

A unique and distinctive feature of our interior trim is the Patent Integral Window Frame. It is a complete unit in itself; light, yet strong, and with all operating parts in perfect alignment; absolutely interchangeable, neat and artistic in appearance and easily erected. The nature of its construction and application compensates for any irregularity in the window-spacing of the car frame, and makes possible thorough insulation against heat and cold. Owing to the ease with which it can be erected or removed, the cost of repairs to car frame and insulation is greatly reduced.

Manufacturing and Engineering Facilities

This company is one of the largest manufacturers of car seats and pressed steel specialties. The factory in its equipment of fine machinery and special tools is not equalled in the industry. The experience of many years, aided by the splendid factory accommodations, modern facilities and an organization composed of specialists, result in the highest standard of finished product. Our engineers, experts in steel car work, are at all times ready to co-operate with the representatives of railway companies when considering new equipment.

Locks for Steel Doors (Patented)

General

The advent of steel doors for passenger cars, made necessary a number of modifications in car door locks; particularly in the method of attaching them to the doors.

Steel doors in outward appearance, are usually made to closely resemble wood doors, having to the eye the same side stiles, with top, bottom and central rails, enclosing the panels.

The stiles and rails although apparently solid bars about 1¼ in. thick and 4 or 5 in. wide, are really only metal shells 1/20 of an inch thick and all their strength resides in what might be called the skin. It is to these shell-like stiles that the locks have to be attached.

Our locks as attached to these stiles are designed to accomplish three objects:

1st: To be attached to the doors with the least possible cutting away of the shell-like stiles, particularly at the corners, where the strength of the doors and their resistance to tearing, mainly lies.

2nd: The parts of the lock that are required to be separated in order to attach them to the door to register together and support each other, so that when assembled on the door, the various parts must come together and be in the same adjustment, as they were when fitted together in the factory. So constructed, it is an easy matter to fit the locks to the doors, and make them have the proper action.

3rd: To do away with the necessity of tapping holes into the door itself, for attaching the hardware.

Lock for Sliding Doors

Illustration No. 1 shows our Lock for Sliding Doors, such as is used on the New York Interborough Rapid Transit R. R., the Brooklyn Rapid Transit R. R., the New York Municipal Railway, the Hudson & Manhattan R. R., the Boston Elevated R. R., etc.

The door stile being hollow, there is room inside of it, for each of the working parts to be made strong enough to stand up to its work, and thus do away with frequent repairs. The illustration shows that the metal of the door is not cut away at the corners; nor is it at either side or the edge, enough to materially weaken it.

The side of the stile is not cut away except by the hole necessary to let the key pass through, and the holes for the steel spindles at the top and bottom of the handles, and six small round holes for the posts between the side plates.

Another feature of this lock is, that the part containing the mechanism operated by the key, is made to enter the stile, through the cut in the edge of the door, that is afterwards closed by the latch part of the lock.

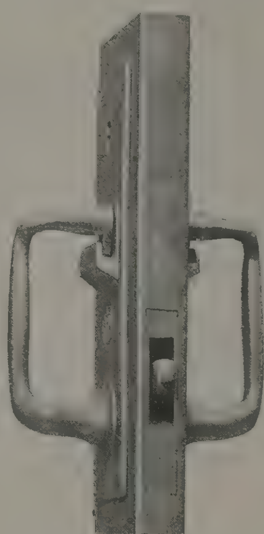


Fig. 1

Fig. 2

Fig. 3

Fig. 4

End Door Lock

Illustration No. 2 shows one of our End Door Locks for swinging doors, as used on the New York Central R. R. Its feature is a Rim lock having a swing latch, that can be attached to a steel door, with the least possible cutting away of the stile, particularly at the corners.

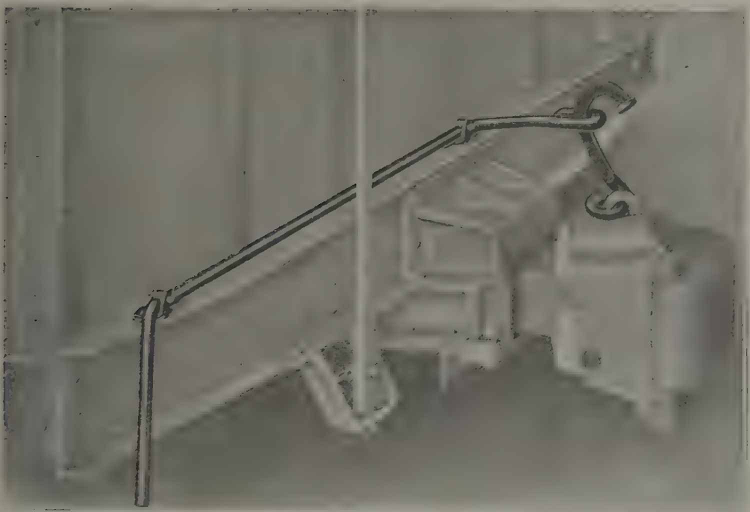
It clearly shows that the corners of the door are not cut away; the small rectangular cut required for the swing latch, is kept away from the corner, a distance of about half an inch.

The detail construction of the lock, to accomplish this object, is shown in illustration No. 3, which represents one of our Saloon Locks. It shows how the latch is grooved, to hook around the half inch strip of metal left intact near the corner of the stile. The two posts with the latch pivoted between them, are first pushed through the small cut in the side of the stile, and then the whole lock is slid sideways to place, towards the edge of the door.

Vestibule Door Latch

Illustration No. 4 shows the same principle carried out in our Vestibule Door Latch with double swing latches, facing opposite ways. One of the swing latches fastens the door shut, and the other fastens it open. It is seen that the corners of the door are not cut away.

Coupler Release Rigging



Imperial Type B Release Rigging

General

There are thousands of cars out of service annually because of defects in safety appliances. Among the most prevalent causes is the chain and clevis type of coupler release rigging. Many accidents to trainmen and frequent delays to trains, both in transit and in classification yards, can be laid at the door of this trouble maker.

Clevises and chains are continually breaking, bolts and nuts are lost, chain links become kinked, and complaints are unending from this imperfect mechanism.

The Link to Safety

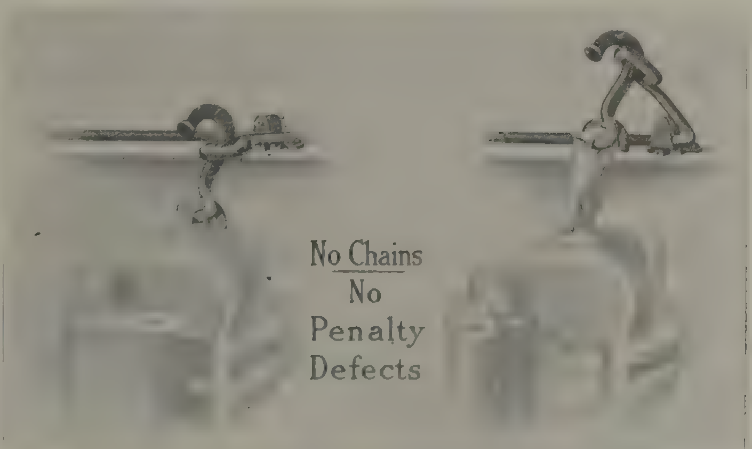
The introduction of the Imperial Type "B" Release Rigging has eliminated these conditions. It uses no chains and cannot become disengaged from the coupler until removed from the uncoupling rod brackets. Manufactured of special heat-treated steel, accurately made and requiring little care, it is the "Link to Safety."

Carmer Release Rigging

The Carmer Release Rigging is a device for a similar purpose. Like the rigging described in the foregoing, it eliminates chains and clevises. It is positive in its operation and there are no penalty defects from its use.

Report of I. C. C. Division of Safety

The following is an excerpt from a report of the Chief of the Division of Safety of the Interstate Commerce Commission:



Operation of Pin Lifter—Imperial Type B Release Rigging

"It is to be noted that nearly 50 per cent of the defects reported under the classification uncoupling mechanism have consisted in broken uncoupling chains, while more than an additional 10 per cent of such defects have resulted from uncoupling chains becoming kinked in coupler heads. Defects of this character could be entirely eliminated by the use of uncoupling devices in which the chain is not used, with the result that the personal injuries due to defective uncoupling mechanism would be materially diminished and the most prolific cause for prosecutions under the safety-appliance acts would be removed."

Carmer Coupler Release Rigging

Cranes—Locomotive, Coal-Handling, Erecting, Wrecking

Industrial Works Locomotive Crane

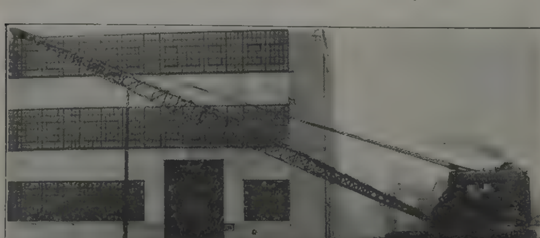
This crane is designed primarily for the handling of coal and ashes at railway terminals. It is operated by a four-cylinder gasoline engine and this forms an important feature because of the intermittent use demanded of a crane in this service, since the consumption of fuel is confined to the period of actual operation and the machine itself is instantly available. This type of crane has a capacity of five tons at a radius of 10 feet and the maximum radius is 25 feet.

Industrial Works Locomotive Crane

Type "G" crane is designed for a variety of uses around industrial plants of almost any character. For these services booms of various lengths can be supplied and the crane is built either with a single drum or with a double drum for two-line bucket operation. The crane has a capacity of 20 tons at 12-ft. radius when equipped with a 40-ft. boom. Between the 5-ton crane and the 20-ton crane, the Industrial Works builds two intermediate types, one of 12 tons' capacity and the other of 15 tons' capacity. Both are steam-operated.

Industrial Works Locomotive Crane

Type "L" crane is adaptable to any kind of heavy work, either in the handling of structural material or for the operation of a two-line bucket. It is suitable for use with booms of various lengths and (when equipped with a boom 40 feet in length) has a capacity of 40 tons at 16½ ft. radius.



Between the 20-ton crane and the 40-ton crane the Industrial Works manufactures two types, one of a capacity of 25 tons and the other having a capacity of 30 tons. Any of the steam-operated cranes here described may be equipped with a generating set for the operation of a lifting magnet.

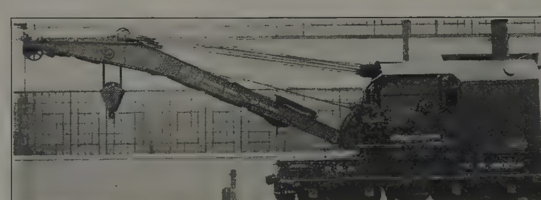
Industrial Works Erecting Crane

Type "N" crane is designed especially for use in general erecting work, such as may be necessary in the construction of buildings or bridges. It can

be furnished with booms of various lengths, thus adapting it for any class of work.

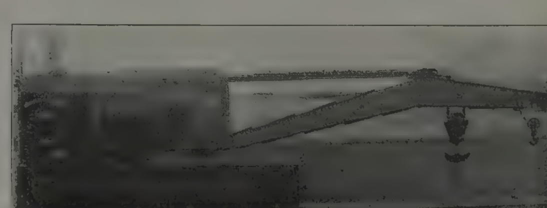
Industrial Works Wrecking Crane

This type, known as Type "T," is a wrecking crane of 120 tons capacity. It is self-propelling. This size is probably more universally used for wrecking purposes than any size built and machines of this capacity are in use upon all of the larger railroads of the country.



Industrial Works Wrecking Crane

The wrecking crane known as Type "X" has a capacity of 160 tons and is the largest size of wrecking crane built, having followed closely in capacity the constantly increasing weights of railroad equipment. In its present state of development it represents the natural result of the placing in service of modern heavy locomotives. In addition to these two wrecking cranes illustrated, types "T" and "X," the Industrial Works also builds wrecking equipment of 75 tons, 100 tons and 150 tons capacity.



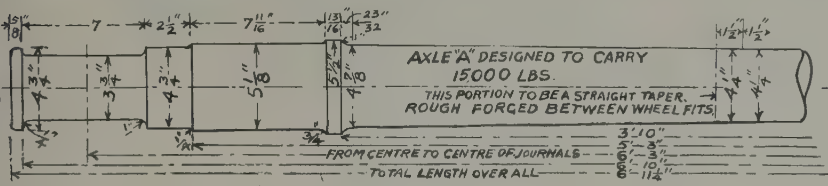
Car and Locomotive Axles

Product

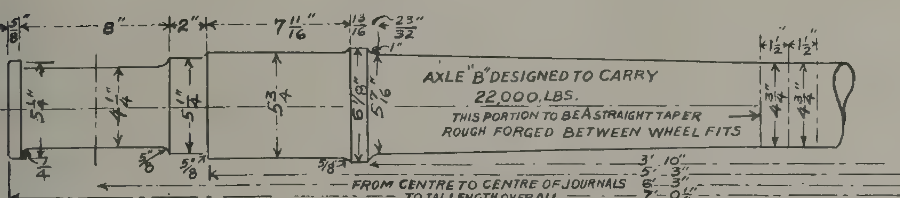
We manufacture Open Hearth Steel Axles for locomotive, passenger and freight service. Also smooth forged or rough turned axles for all classes of cars both steam and electric railroad.

Sales Organization

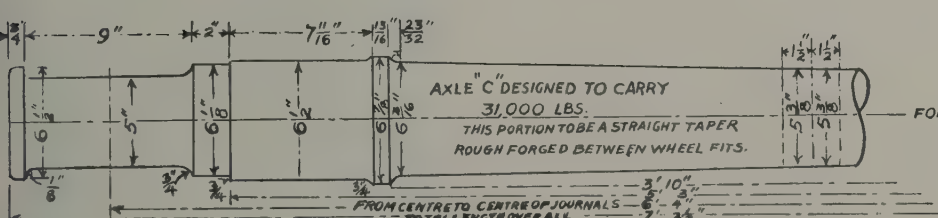
J. R. Johnson & Company was established in 1866. The main office and works are located at Richmond, Virginia. Eastern sales agents, Atkinson & Utech, Inc., 111 Broadway, New York, N. Y.

A


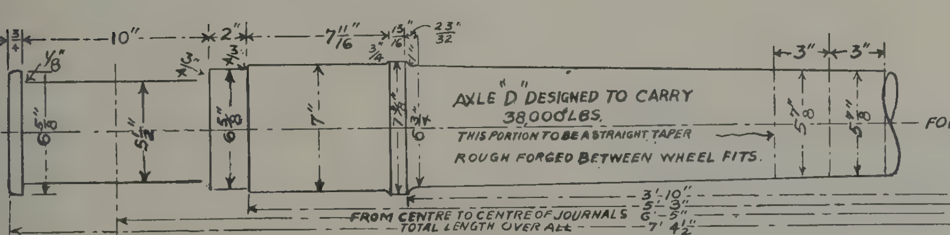
FOR 40M & 50M CAP'Y CARS

B


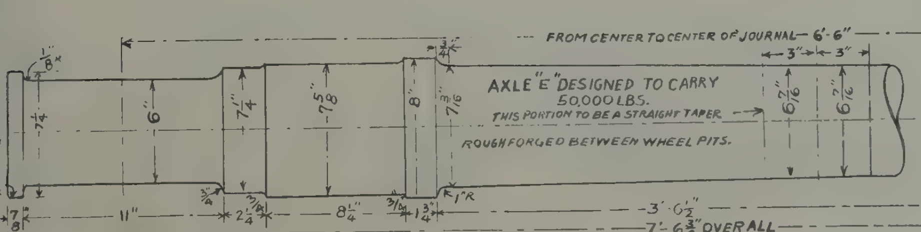
FOR 60M CAP'Y CARS

C


FOR 80M CAP'Y CARS

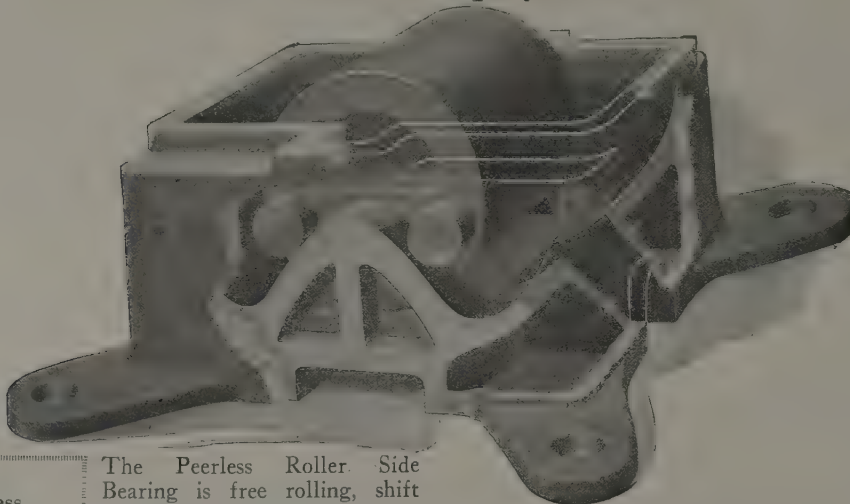
D


FOR 100M CAP'Y CARS

E


FOR 120M CAP'Y CARS

Joliet Car Equipment

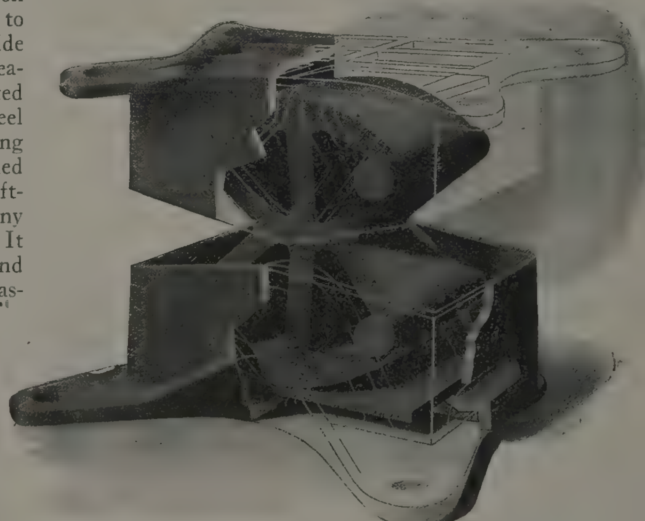


Peerless Side Bearing

The Peerless Roller Side Bearing is free rolling, shift proof and easy to install. Its ample free-rolling travel fits it for normal as well as extraordinary service and practice has clearly shown that its action as a friction bearing will only occur when one or two cars, for example, are placed on sharp industrial curves. It cannot be shifted from normal position by jolts or vibration. Rolling on its own periphery, it is anti-friction, in contrast to semi-friction trunnion rollers. Peerless Roller Side Bearings consist of but three working parts: a malleable iron housing with high carbon steel plates riveted to same and a special hardened steel roller with steel wear plate riveted to the body bearing. The floating type or roller is centered by gravity, being maintained in position by guides and trunnions which prevent shifting. The roller is locked in the housing against any displacement, but may easily be removed by hand. It can be applied in a height of 4″ between the truck and body bolster. Hard material in roller and plate assures minimum wear.

Burry Rocker Side Bearing

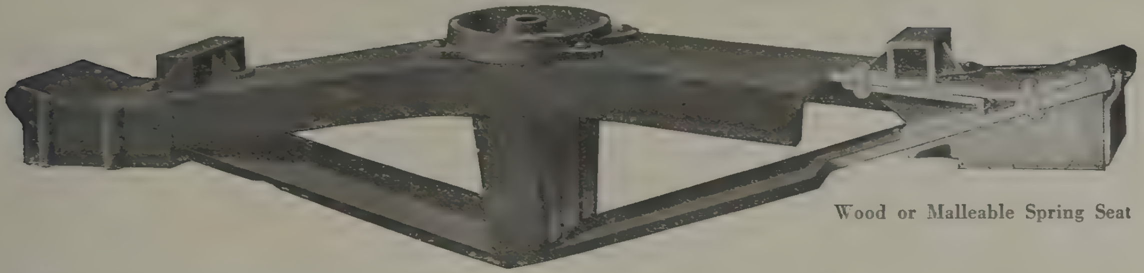
The Burry Rocker Side Bearing is another bearing of simple design, embodying also the frictionless advantage of the roller type. It is always in a true load-supporting and rolling position. It maintains at all times the connection between the body and truck of the car under normal or abnormal conditions. The rocker is locked in the body by lugs and cannot become disengaged in service. Neither does it interfere with the removal of the truck. The rocker is of high carbon steel and it moves on steel wear plates in malleable housings; a very reliable side bearing.



Perry Side Bearing

The extreme efficiency and durability of the "Perry" Roller Side Bearing is beyond question. Its success and extensive use is due to results obtained during a period of over 16 years' service on all classes of railway equipment, from street railway cars to the heaviest freight locomotive tenders and passenger cars up to 240,000 lbs. capacity, special crane and derricks. It has the enviable record of over 700,000 miles of service on a 110,000 lb. observation car, or over three times the average life of a freight car. Its noiseless operation and easy riding makes the "Perry" indispensable on passenger equipment. The "Perry" is too well known to require any detailed description as to construction, but further details as to actual service, durability and economies effected by its use will be furnished on application.

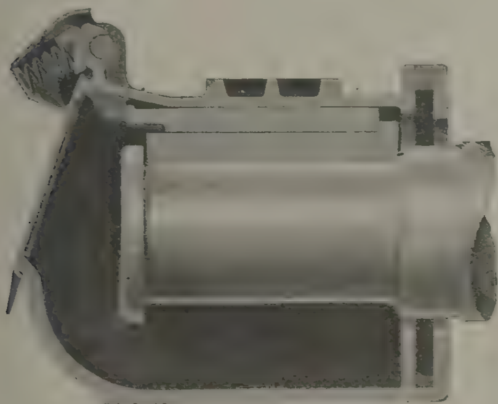
Joliet Car Equipment



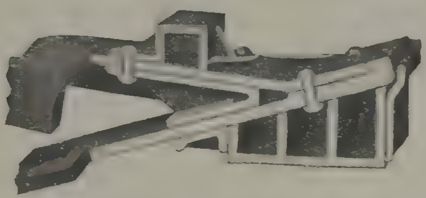
Wood or Malleable Spring Seat

Huntoon Bolster

Practical tests have demonstrated the great rigidity and strength of Huntoon Truck Bolsters for 30, 40 and 50 ton cars and which can be furnished in any quantity desired. A brief description of Huntoon Bolster construction explains in part why it is so popular. It is of the Built-up Type, embodying the same principle that is used in the well known Huntoon Brake Beam. The method of interlocking the tension and compression members of the Huntoon Bolster adds greatly to its strength. Both members are of open hearth steel, the compression member being a channel and the tension member a flat bar, upset at the ends to retain the full cross sectional area at the rivet holes. The king post is of malleable iron



of heavy cross section. The ends of the tension members have shoulders which interlock with the web and flange of the compression member, thus relieving the shearing strain on the rivets. Center plates furnished of malleable iron, cast steel or drop forged as desired. The Huntoon Bolster may be used with either plain or anti-friction type side bearings.



Joliet Journal Box

This is a highgrade malleable journal box made to the Master Car Builders' specifications and improved with a new patented lid which protects the bearing against ice, snow and dust. It is interchangeable with any M. C. B. journal box now in use and as readily applied. There is no flat spring to break. The coil spring and shoe give maximum pressure in closed position, preventing rattling and protecting the bearing perfectly. Should the lid become accidentally torn off or lost, it can be quickly replaced with an M. C. B. standard lid until a new Joliet lid is available.

Huntoon Brake Beam

The Huntoon Brake Beam is built to stand the unusually hard service incident to increased traffic. It is daily reducing delays and shop cost for repairs. The reason lies in its construction. The Huntoon Beam is "Built-up" from a flat tension member, upset at the ends to give added strength at the point of greatest strain and interlocked at the ends of the compression member. There are no nuts to loosen. No "right" and "left" heads and no threads to strip and rust. Nor is there any danger of flanges cutting the tension member. Every beam is rigorously tested beyond its rated capacity and thoroughly inspected before shipment. Furnished in any capacity desired. We are also manufacturers of the Truss Rod type of beam in all capacities.

Manufacturers of Steel Railway Cars

Makers of New Steel Cars

The Keith Railway Equipment Company specializes in the building, rebuilding and repairing of steel freight cars. The many practical and exclusive features which characterize Keith Construction have caused the leaders in various industries, railways, industrial concerns, chemical, animal and vegetable oil plants to consider and decide upon Keith Steel Cars. Keith Cars are carefully constructed to fully meet the well formulated requirements of the Master Car Builders' Association.

Repairing and Rebuilding

The Keith Plant Equipment enables it to offer a prompt, advantageous service to railways and private owners of steel freight cars which need repairing or rebuilding. The Keith Shops are new and modern in every detail and are completely equipped with labor saving machinery and special appliances to expedite the work on repairs or new equipment at every stage. The utmost care is exercised in the selection of raw material entering into all work. The wisdom of sending your equipment to a plant where every facility is at hand to give prompt delivery, is worthy of your consideration.

Makers of Car Parts and Ry. Appliances

The Keith Plant has excellent facilities for the manufacture of steel underframes, truck bolsters, body bolsters and various appliances and car parts of all kinds. The Plant is also splendidly equipped to supply you with forgings and pressed parts.

Tank Cars for Sale and Lease

The Keith standard Type A tank car has been designed after years of careful study and experience. Our aim has been, to build a car for service and economy, to overcome the weak points in construction commonly found, and to reduce the operating item to the lowest possible degree. Tanks are bull riveted throughout, and are built by men who have thoroughly specialized in this class of work.

Keith standard tank cars have some special features which deserve recognition, among which are steam jacketed tank outlet and coil outlet combined; duplex self draining steam heating coil; vulcan cast steel truck side frames; cast steel truck bolster and shock distributing tank anchor. The steam jacketed outlet permits the unloading of contents as soon as the steam is applied instead of waiting until the entire volume of the tank has reached a flowing temperature. This feature also eliminates clogging of outlet so commonly found. The self draining feature also prevents water lodging in the pipes, thus insuring against freezing, bursting and water hammer.

Standard shapes and plates are used in the construction of these cars. All difficult forgings and pressed parts having been eliminated, facilitating the prompt installment of repair parts readily obtainable.

Convenient Location of Plant

The manufacturing plant of the Keith Railway Equipment Company is located at Hammond, Indiana, and is served by the following railroads: Baltimore & Ohio, Chicago Terminal Railroad, Pennsylvania Lines, the Wabash Railroad and the South Shore Electric Lines.

Kerite Insulated Wires and Cables

Characteristics

This company has for over fifty years manufactured the highest grade of insulated wires and cables for aerial, underground, submarine and interior service. Kerite insulation is entirely different in most of its characteristics from rubber compound insulations, which constitute the class known in general as Rubber Insulations.

The distinctive characteristics of Kerite Insulation are:

(a) Superior dielectric physical and chemical properties essential to meet the severest service requirements.

(b) The retention of these properties to a degree not approached by other insulations.

(c) Marked superiority in its ability to withstand oil, heat, vibration and chemicals common to severe service conditions.

The distinctive characteristics of Kerite wires and cables are in addition to the entirely unique character of their insulation—

(a) The use of the very best materials, ingredients and processes in their manufacture that experience can indicate or that money can procure.

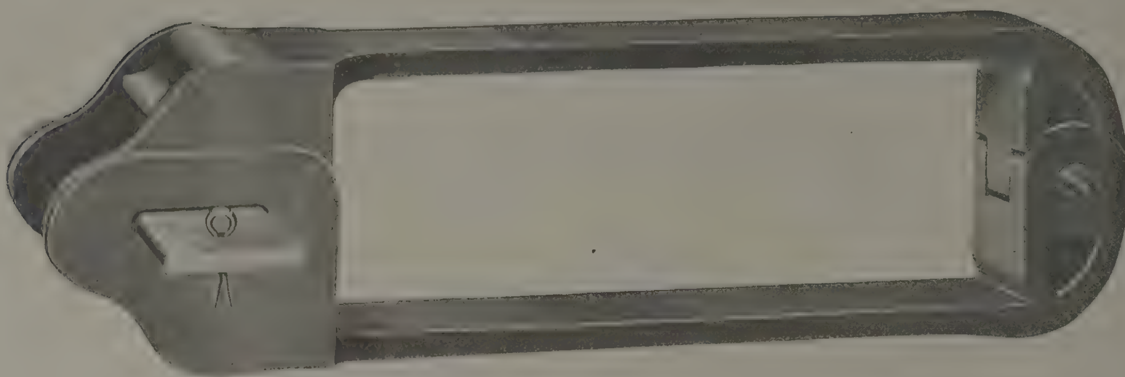
(b) Accuracy of size, precision of workmanship and excellence of finish.

(c) Uniformity of product due to thorough test and inspection throughout the process of manufacture and a pride in excellence of output resulting from over fifty years of continuity of responsibility and control.

The conditions surrounding the use of insulated wires and cables in battery charging plants at yards and terminals and in the lighting circuits of passenger equipment, especially steel cars, are such as to indicate the use of the most permanent insulation obtainable. While the voltages employed are not high, permanency of initial properties is most essential, renewals are expensive and interruption of service due to deterioration of materials not to be tolerated.

Cold, heat, oil, water, vibration and rough handling are daily at work to bring about a breakdown of charging and lighting circuits. No insulation is too good for these circuits. No insulation has the permanency of Kerite Insulation. No insulation will withstand severe service conditions as well as Kerite Insulation. The art of electric and train lighting is hardly old enough for a large body of long service records of the material employed in the art to have been accumulated. Reference to some of the kindred electrical arts shows that in the lighting, telegraph and signaling fields Kerite wires and cables manufactured almost at the beginning of these industries are still in service. Individual records of Kerite in service over thirty years are many.

The Murray Keyoke



Two-Piece Yoke

The Murray Yoke is adapted for use with any design of draft gear. It has a number of distinctive features that offer obvious advantages over any other yoke on the market. No simpler yoke was ever designed. It consists of two open hearth thoroughly annealed steel castings, joined together at one end by a hinge pin. The other end of the castings is provided with slots to take the standard coupler keys. When the yoke is in position the slots register with the standard slot of the same size in the coupler shank. The coupler ends of the yoke castings are designed to fit accurately over the lugs of the coupler so that the pulling strains are taken on these lugs instead of on the coupler key, the key serving principally to lock the yoke to the coupler. The Murray is the only yoke in which the gibs that engage the gibs on the coupler are supported by and cast integrally with the side wings of the yoke.

Easy Removal and Replacement of Coupler

One of the most attractive features of the Murray Yoke is the ease with which the couplers may be removed or replaced in the cars. By simply removing the key the lower member of the yoke may be dropped or the upper member raised sufficiently to permit of sliding the coupler in or out of position. This is of special advantage at outlying points where there are no facilities for doing heavy work. Even in the line of road, providing a coupler is ready at hand, a coupler could be removed and a new one applied with but very little difficulty. It thus becomes of value from an operating as well as from a mechanical viewpoint.

No Pull on Coupler Key

The Murray Yoke is the only key attachment on the market in which the load or pull is transmitted from the yoke direct to the coupler lugs, instead of being taken on the coupler key as is usually the case. This does away entirely with that constant source of trouble, the elongation of slots in the yoke and coupler, and eliminates almost entirely the wear on the key. The feature of pulling on the coupler lugs instead of on the key gives this design of yoke a great advantage. Where the pull is transmitted through the wings of the yoke direct to the coupler key, as in the old style yoke, it is practically impossible to secure sufficient bearing for the key in the wings or head of the yoke, consequently there is an excessive amount of wear on the key and in the slots.

No Slack Between Coupler and Draft Gear

In the old style yoke, where the pull is on the key, the metal in the bearing surfaces is overstressed. It is practically impossible to provide enough bearing area for the key in the head or wings of the yoke to keep the stresses within allowable limits. Consequently, in a short time the slots in both the coupler and the yoke become elongated, creating slack between the coupler and the draft gear. In the Murray Yoke this trouble is entirely obviated by taking the pull on the coupler lugs instead of on the key. Taking the pull on the coupler lugs also prevents any tendency of the keys to tear out through the ends of the slots.

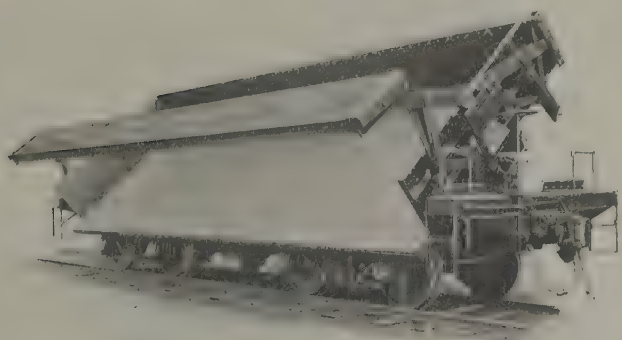
The Murray Yoke is as strong as any yoke on the market.

The Murray Yoke is also designed and furnished for tandem spring draft gear.

The "K & J" All Steel Automatic Air Dump Car

For Railroad, Mining, and Contractors' Service

"K & J" 20-yd. All Steel Automatic Air Dump Car—Upright



"K & J" 20-yd. All Steel Automatic Air Dump Car, Dumped, showing sharp angle and wide load clearance—Door to floor

Operation

The complete operation of the "K & J" All Steel Automatic Two-way Air Dump Car—unlocking, locking, dumping, righting and re-locking—is accomplished by means of two simple levers, one for each side.

Dumping either one car or any number of connected cars is a matter of not more than ten seconds.

Operating air is drawn from the regular air brake train-line through the medium of a storage reservoir and operates an air cylinder at either side of the car. The capacity of the reservoir is sufficient to operate the loaded car two or more times.

By connecting auxiliary valves (situated on the side of the operating cylinders) by means of the dumping lines, any number of successive cars can be operated as a unit from the operating levers of any car so connected.

Among the many large users of the "K & J" All Steel Automatic Air Dump Cars are the Calumet and Arizona Copper Mining Co., The Utah Copper Mining Co., and many of the metal mines of the West; also the larger iron ore mining operations of the Mesabe Range District. Some of the leading railroads of the country, numbering over forty, are also users.

General Specifications.

"K & J" Type R-20.

Level capacity—20 cu. yds.
Angle of Dump—45°.
Length over couplers—32′0½″.
Over-end sills—29′5½″.
Maximum width—10′2″.
Top of rail to center of draw bar—34½″.
To top of car—8′5½″.
Approx. weight—49,000 lbs.

"K & J" Type C-16.

Level capacity—16 cu. yds.
Angle of dump—45°.
Height from top of rail to top of body—7′10½″.
Height from top of rail to center of draw bar—34½″; to top of car—7′, 10½″.
Length over couplers—30′0½″.
Length over end sills—27′6¼″.
Maximum width—10′2″.
Approx. weight—42,500 lbs.

Couplers

Organization

The M. C. B. Standard "D" Coupler, illustrated here, became a standard of the Master Car Builders' Association by letter ballot in July, 1916, and represents the culmination of years of painstaking joint effort on the part of the Association and the several Coupler Manufacturers as follows:

American Steel Foundries, Chicago, Ill.
The Buckeye Steel Castings Co., Columbus, Ohio.
Gould Coupler Co., New York, N. Y.
The McConway & Torley Co., Pittsburgh, Pa.
Monarch Steel Castings Co., Detroit, Michigan.
The National Malleable Castings Co., Cleveland, Ohio.

The benefits to the railroads of the country which will undoubtedly result from the adoption of this new standard of the M. C. B. Association are so far-reaching and important that we have recognized from the beginning that the immediate interests of the individual coupler manufacturer should be subordinated thereto, and it is with great satisfaction that we now announce our readiness to take our part in the production of this coupler.

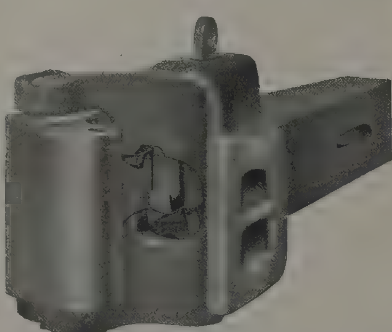
We have a very complete equipment of flasks, patterns, core-boxes, gages, etc., and are now in a position to meet the increasing demand for this new coupler.

Advantages

The design and adoption of the present M. C. B. Standard Coupler has had a threefold purpose:

First, the elimination of the many types of couplers now in use by the selection and substitution of one standard form.

Second, the increase in strength of the new design without resorting to special steels to a point sufficient to meet the increasing demands of service, which on many roads has far exceeded the limits of present-day couplers in ordinary materials.



The M. C. B. Standard "D" Coupler—Knuckle Closed

Third, the increase in efficiency of operation of the new design of coupler, to insure the fullest possible realization in service of all its automatic features.

The first purpose—the reduction to one type—brings in the question of the repair part problem in all its phases. The advantage to the railroads, of carrying but one type of parts or complete couplers for repairs to cars in interchange is so well known as to need no explanation. The saving in cost to any given road by releasing capital which now must be invested in a multiplicity of types of repair couplers is very considerable (see remarks of Mr. Brazier in 1909 Master Car Builders' Proceedings), and can be estimated with a fair degree of accuracy in any particular case. The saving in train delays at places far distant from repair points, by reason of having but one type of coupler to repair, is very great indeed, and is impossible to calculate. The elimination of the multiplicity of designs will tend to make it much simpler to maintain the one standard in proper repair.

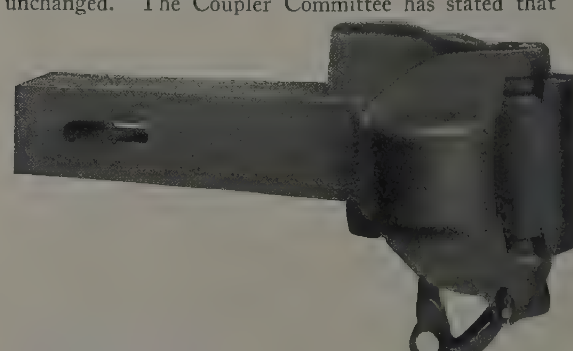
The M. C. B. Standard "D" Coupler—Knuckle Thrown Open

There will be but one kind of knuckle, one lock, etc., and campaigns of education among the trainmen can be carried out with greater success where but one type of coupler is under consideration.

The attainment of the second purpose—increase of strength to meet the present-day needs—has necessitated increased weight. The Standard Coupler,

View from Guard Arm Side

weighing approximately 400 pounds, represents an increase in weight by approximately one-third, but this increase in weight of 33⅓% has brought about a 100% increase in strength with the material remaining unchanged. The Coupler Committee has stated that



Bottom Operated Form—View from Knuckle Pin Side

the estimated increased length of life in service of the new coupler will be about 300%, based upon observations of a number in actual service.

The following table showing results obtained from the various Coupler Committees' reports for 1912,

Couplers

1913, 1914, 1915 and 1916, shows the actual comparison of laboratory tests made by the Coupler Committee, and proves without any doubt that the increase in weight of the Standard Coupler over the old types of couplers has been efficiently distributed, and that the increase in the strength of the Standard Coupler more than justifies the increase in weight:

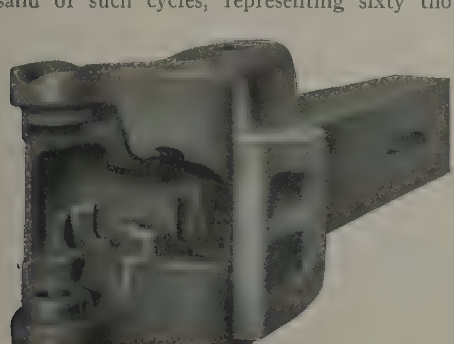
Static Pull	Weight	Permanent Set "C" Knuckle opening after 150,000 lbs.	Ultimate Load	Knuckle opening at 150,000 lbs. per lb. weight of Coupler	Ultimate Load per lb. weight of Coupler
"Present"	292	.305"	261,725 lbs.	.00105"	896 lbs.
"D"	405	.028"	518,720 lbs.	.00007"	1279 lbs.
Dynamic Jerk		Permanent Set "C" after:		Inches Permanent Set "C" per lb. Weight of Coupler after:	
		Third blow at 10 feet	Final Measurement after additional blows	Third blow at 10 feet	Final Measurement after additional blows
"Present"	292	.359"	.515" (Avg. 5.5 blows at 10')	.00123"	.00176"
"D"	406.5	.125"	.508" (Avg. 80. blows at 10')	.00031"	.00125"
Dynamic Guard Arm		Permanent Set "A" after:		Inches Permanent Set "A" per lb. Weight of Coupler after:	
		Fourth blow at 5 feet	Final Measurement after additional blows	Fourth blow at 5 feet	Final Measurement after additional blows
"Present"	292	.371"	.562" (Avg. 5.3 blows at 5')	.00127"	.00192"
"D"	396.8	.063"	.333" (Avg. 55. blows at 5')	.00016"	.00084"
Dynamic Strike		Permanent Set "C" after:		Inches Permanent Set "C" per lb. Weight of Coupler after:	
		Third blow at 5 feet	Final Measurement after additional blows	Third blow at 5 feet	Final Measurement after additional blows
"Present"	292	.233"	1.135" (Avg. 4.8 blows at 10')	.00080"	.00389"
"D"	403	.025"	.61" (Avg. 22. blows at 10')	.00006"	.00151"

Weights for "Present" Couplers taken at average of 292 lbs. See Proceedings Master Car Builders' Association, Vol. 48, Part 1, 1914.

Weights for "D" Couplers taken at average for 5" x 7" shank. See Proceedings Master Car Builders' Association, Vol. 50, Part 1, 1916.

For dimensions "A" and "C," see Proceedings Master Car Builders' Association, Vol. 47, Part 1, p. 192, 1913.

The attainment of the third point—increased efficiency of operation—has been facilitated not only by the observation of large numbers of couplers in service during the trial period, but also by the use of a special machine upon which exhaustive tests have been conducted. This device, called a Service Testing Machine, operates a coupler through any desired number of cycles of knuckle throw, coupling by impact, lockset, pulling apart from lockset, and closing knuckle. The type of coupler finally adopted was put through thirty thousand of such cycles, representing sixty thousand



M. C. B. Standard "D" Coupler Head

complete operations, without a single failure. This has been calculated as the equivalent of about eighty years of operation in actual service, and while the factors of shock and corrosion do not enter in, there is no question but that this test is one of greatest severity.

Operation

View of Knuckle from Locking Side

The coupler is shown in the accompanying Figs. 1 to 5, arranged for top operation, and in Figs. 6 to 8 arranged for bottom operation. The essential parts of the coupler are the body 1, knuckle 2, lock 3, knuckle thrower 4, and knuckle pin 5,

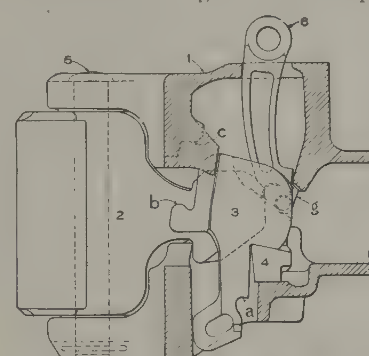


Fig. 1

each of which, except the body, remains unchanged for either type of operation. When equipped for top operation the lifter 6 is used and when the coupler is intended for bottom operation the bottom lock lifter 7 and toggle 8 are used, a cap covering the hole for the lifter 6 and lugs 9 providing a bearing for the lifter 7.

When in locked position (Fig. 1) the lock rests upon the top of one end of the knuckle thrower 4, and its head is located between the knuckle tail and inner guard arm wall as shown in Fig. 2. To lockset the lock, it is lifted either by the top lifter 6, or by the

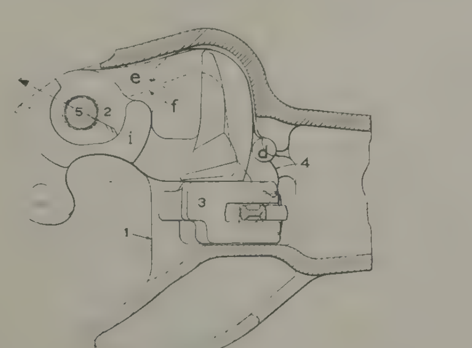


Fig. 2

toggle 8, until the lockset seat *a* on the leg of the lock becomes level with the top surface of the knuckle thrower, whereupon the leg of the lock tips rearwardly and seats upon the knuckle thrower as shown in Fig. 3.

In either top or bottom operating forms the lock is

Couplers

lifted at a point to the rear of its center of gravity so that there is always a tendency for the leg of the lock to swing rearwardly as soon as the lock is lifted. To throw the knuckle the lock is lifted above its lockset position until the fulcrum *b* upon its forward side strikes the shoulder *c* within the coupler head. The vertical movement of the lock is stopped by this contact, and the lock is thereafter forced to rotate about its fulcrum, which gives the lock leg a positive rearward movement, which in turn rotates the knuckle thrower about its trunnions *d*. The tip *e* of the thrower contacts the shoulder *f* on the underside of the knuckle and throws the knuckle open.

The lock-to-the-lock or anti-creep function is obtained in the top operated form by the co-operation of

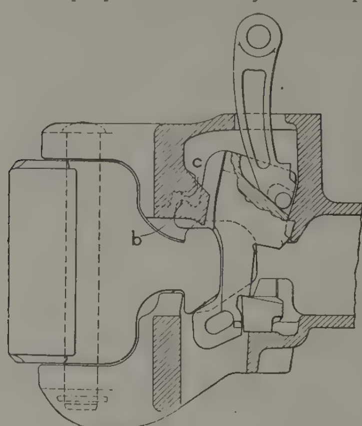


Fig. 3

the lock lifter with the rear wall of the coupler head as shown in Fig. 1. When the parts are locked the lifter slides rearwardly in the lock until its projection *g* underlies the lower edge of the rear wall of the coupler head. Any upward movement of the lock merely binds this projection between the lock and the rear wall. As soon as the lifter itself is raised, however, it slides forward and upward in the lock and frees its anti-creep engagement. In the bottom operated arrangement the

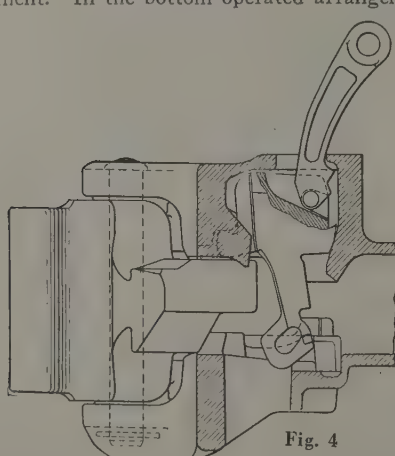


Fig. 4

upper end of the toggle 8 (Fig. 6) normally underlies the projection *h* upon the lower wall of the coupler cavity, and thus performs the lock-to-the-lock function. When the lifter 7 and toggle 8 are raised to lift the lock the end of the toggle 8 slides rearwardly and up in the inclined slot of the lock leg and frees the anti-creep engagement.

In order to obtain the strongest possible anchorage for the knuckle within the coupler head and at the same time to allow the knuckle to swing freely when un-

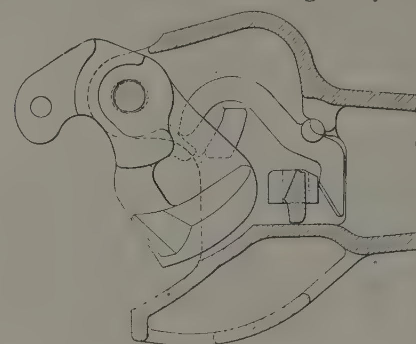


Fig. 5

locked, the knuckle is provided upon its tail with the pulling lugs *m* and *n*, Fig. 9, which engage the corresponding lugs *o* and *p* upon the upper and lower walls of the coupler head, and serve to relieve the knuckle pivot pin of the greater part of the pulling stress. Above and below the lugs *o* and *p* are the buffing shoulders *q* and *r* against which corresponding shoulders on the knuckle bear in buff.

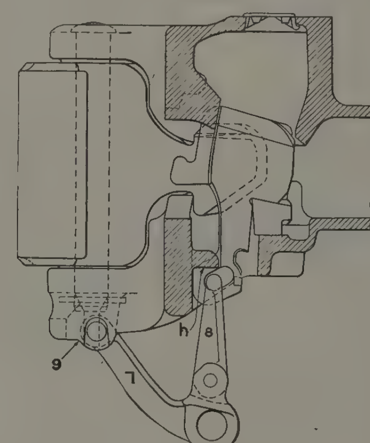


Fig. 6

The forward pull upon the knuckle in draft not only pulls the knuckle directly forward against the pulling lugs, but also tends to force the knuckle laterally in the direction of the arrow in Fig. 2. To resist this lateral pressure the knuckle is provided upon top and bottom with the outwardly extending "pin pro-

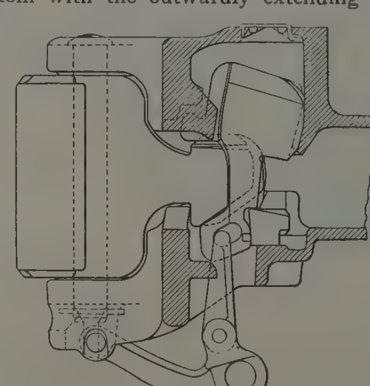


Fig. 7

Couplers

tector lugs" *i* which enter correspondingly shaped recesses in the upper and lower walls of the coupler head. In order to relieve the knuckle pin of the greater part of pulling and buffing stresses the knuckle pinholes in the pivot lugs of the coupler are elongated slightly, as shown in Figs. 2 and 5, allowing the knuckle to take a firm bearing within the head in pull or buff without stressing the knuckle pin.

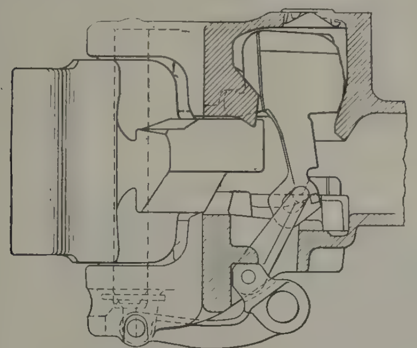


Fig. 8

General Specifications

Inasmuch as the "D" coupler and its parts are of a standard design, and as this design has been fully tested out both in laboratory tests and in service, the old form of Master Car Builders' Specifications, providing for a drop test on the complete coupler and its parts, is unnecessary, as the old

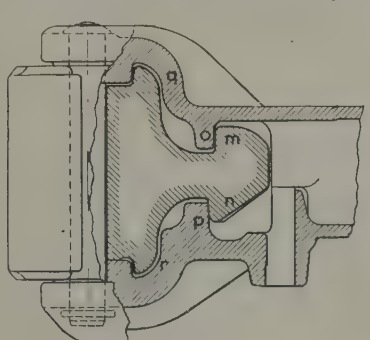


Fig. 9

specifications were not only a test of the material in the coupler, but also of the design.

With the new standard "D" coupler it is only necessary to insure that the material is of the proper chemical analysis, tensile strength, and has been thoroughly an-

Knuckle Thrower

nealed. Therefore, the United States Railroad Administration specifications R-13, dated May 1, 1918, as well as the Coupler Committee Specifications adopted by letter ballot, August 25, 1918, have been drafted along this line; in other words, a test of the material in the couplers and the proper annealing of same.

Lock and Top Lock Lift Assembled

The material as specified is to be of open hearth cast steel with the following analysis:

Carbon	.20 to .35
Manganese ....not over	.75
Phosphorus and Sulphur ....not over	.05

The physical requirements to be met by this material are as follows:

Minimum tensile strength 60,000 lb. sq. in. Minimum yield point as determined by drop of beam, 0.45 tensile strength.

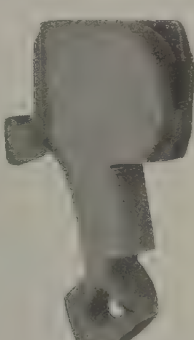
Minimum elongation in 2" in per cent $\frac{1,400,000}{\text{tensile strength}}$ not under 20%.

Minimum reduction in area, in per cent, 30.

The chemical analysis and physical tests under the above prescribed limits are to be made on each heat or melt, and acceptance of the material is to be so governed.

It is also specified that each coupler head and knuckle is to have cast thereon annealing test coupons so that by fracturing these the quality of annealing may be checked for each casting, if desired.

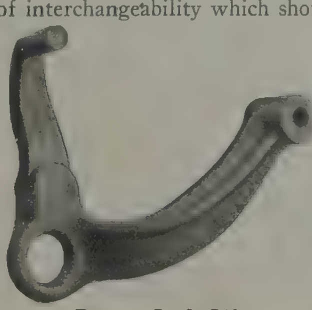
In addition to the above physical and chemical requirements, a certain percentage of the couplers and parts are to be weighed individually and meet a definite minimum weight limit.



View of Lock From Guard Arm Side

In order to govern interchangeability and the proper relation between fitting parts, the Master Car Builders' Coupler Committee, in conjunction with the Coupler Manufacturers, has designed and distributed gages and masters. The specifications require that these gages are to be used not only for the complete coupler, but also for the different parts. In this way there will be no doubt as to the interchangeability, proper fitting, and operation of the coupler. These gages have been submitted to letter ballot and were adopted on August 25, 1918.

It is needless to state that the above only represents the general requirements specified by the Coupler Committee. The specifications as finally agreed upon will allow the Standard Coupler to be produced at as low cost as possible and still meet the exacting requirements of interchangeability which should not be compromised on this new and important standard of the Master Car Builders' Association.



Bottom Lock Lift

Top Lock Lift Hole Cap

Standard, Special and Foreign Car Equipment

Product

We manufacture all types of Standard American Railway Freight Cars; all types of Foreign Railway Freight Equipment; Air Dump Cars; Sugar Cane Cars; Steel Logging Cars; Mining and Special Cars. Several types of cars which we have built are illustrated below and also on the next page.

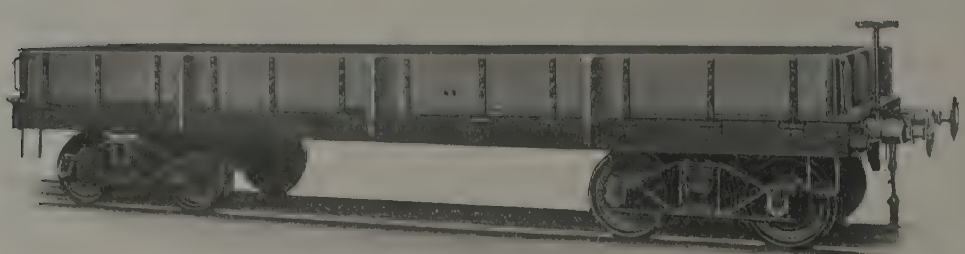
Sales, Manufacturing and Export Facilities

The executive and sales office is in the Hudson Terminal Building, 30 Church Street, New York, N. Y. Our plant is equipped throughout with modern car manufacturing and repair facilities. It is located in Passaic, New Jersey, which is only twelve miles from New York Harbor. The close proximity to one of the world's largest export shipping centers makes it possible for us to assure quick shipment of cars for foreign service.

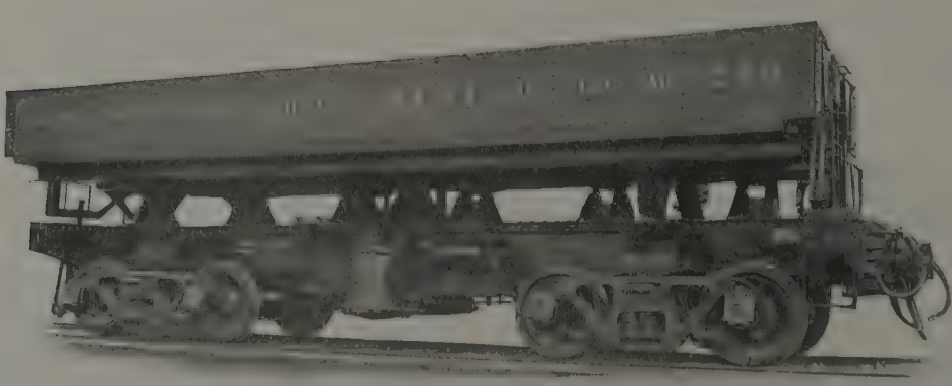
American Freight Cars

Standard American Railway Freight Cars including Box Cars, Stock Cars, Hopper Cars, Gondola Cars and Flat Cars. These cars can be built any size or capacity desired and can be equipped with all standard car appliances.

Standard American Freight Car



Foreign Service Car



Air Dump Car

Standard, Special and Foreign Car Equipment

Foreign Service Cars

Freight Cars for Foreign Service can be furnished in all types and capacities. Included in these types are open and covered Wagons.

Air Dump Cars

Air Dump Cars for Railway Construction and Mine Stripping Work. Furnished in capacities of 16, 20 and 30 cu. yds.

Sugar Cane Cars

Sugar Cane Cars of all types and capacities, from Porto Rican type, 1½ tons capacity, to heaviest Cuban types, 30 tons capacity.

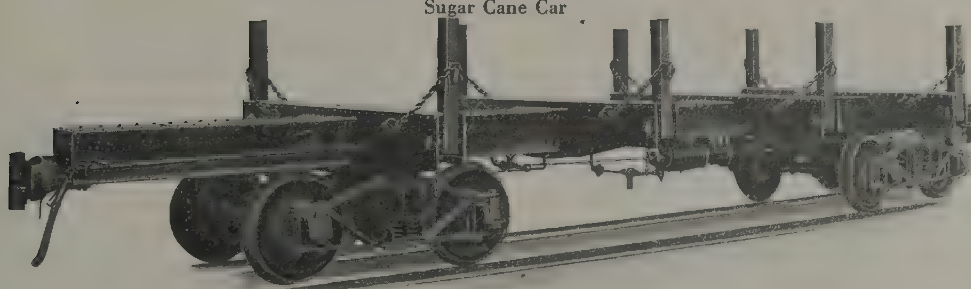
Steel Logging Cars

Steel Logging Cars and Logging Trucks furnished in three types as follows: Two Bunk Skeleton Type, Four Bunk Skeleton Type and Four Bunk Type with Rails for Loader. Also Logging Flat Cars.

Mining and Special Cars

Mining and Special Cars of all types and capacities. Special Cars for special requirements. We can build cars for any service, condition or special purpose.

Sugar Cane Car



Special Logging Car

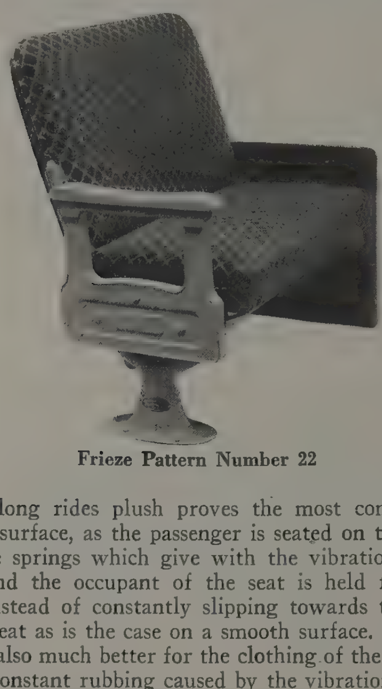
Mining Car

Bay State Brand Mohair Car Plushes

Advantages

Mohair Plush has been used by the Railroads in the United States for 75 years and has proved more satisfactory under all conditions than any other fabric or material that is used for seat covering. Mohair is the hair or fleece of the Angora Goat. It is exceedingly long staple and being a smooth, silky fibre does not attract or hold dirt or dust.

Mohair Plush is a very durable fabric and its length of service is as long or longer than the smooth surfaced materials. In one case a Railroad removed some plush from a passenger coach where it had been in constant service for 12 years and reupholstered a smoking car with it. The nature of the weave is the principal reason for the unusual wear, as being a pile fabric all of the wear comes on the end of the fibre instead of on the side of the fibre as in a flat woven fabric, and in every square inch there are over 50,000 separate fibres, each one receiving about the same amount of wear.



Frieze Pattern Number 22

For long rides plush proves the most comfortable seating surface, as the passenger is seated on thousands of little springs which give with the vibration of the body and the occupant of the seat is held firmly in place instead of constantly slipping towards the front of the seat as is the case on a smooth surface.

It is also much better for the clothing of the traveler, as the constant rubbing caused by the vibration against a hard surface very quickly wears the nap from the clothing and in the case of a smooth surface whatever dirt or dust lodges between the seat back and the back of the passenger is ground into the clothing, whereas with plush the dirt falls into the pile and remains in the back of the plush until removed by beating or the vacuum cleaner at the end of the trip. The back which holds the pile in place is very closely woven so that the dirt will not very easily sift through into the padding and hair beneath.

There is a mistaken idea that plush is uncomfortable in warm climates, but this is not the case. Mohair makes one of the coolest fabrics known when woven into cloth for suitings and dress goods, so that the objection is only imaginary and is caused by the nature of the weave, as a pile fabric would appear warmer than a flat surface. As a matter of fact there is much better ventilation in a plush, as the air has an opportunity to circulate between the fibres and through the back of the goods as it does not in other materials used for car upholstery.

Mohair has a great affinity for color and holds color longer than other fibres, so that plush looks better for a longer period than other materials and is more easily renovated when the coach is shopped. There are various methods of cleaning the seat and brightening and redyeing the plush which makes it appear almost as good as new.

The weave of plushes made in the United States is different from those made in other countries. Each tuft of hair in the pile is held in place by what is called the W weave instead of the V weave. That is, each tuft is held by two threads over and one under, whereas in the V weave there is only one thread over and one under each tuft. This doubly binds the pile to the back and it is not easily pulled out.

A number of Railroads are using Frieze of figured plushes, many of them having their own distinctive design which is used by that road only. This design is made by having a pattern or figure woven in a loop while in the background the fibre is cut, the cut fibre taking the dye in a deeper shade than the loop, which brings out the pattern in the same color but in a lighter shade than the ground. The Frieze makes a richer appearing seat and breaks up the worn appearance if the pile becomes laid down after constant wear.

Economics

Plushes for Railroad use are made in widths of 24, 28, and 30 inches and the pieces are from 40 to 42 yards in length. They are carried in stock in the grey or undyed state and dyed on receipt of orders, as most Railroads have their individual colors and an accurate match can thus be obtained. This leads to economy in repair work, as often a few cushions only in a coach need recovering and if the colors match exactly it is not necessary to recover the entire coach. By adopting one standard pattern and color the necessity of carrying a large stock at the shops is avoided, as was formerly the case when each new lot of coaches was upholstered in a pattern or color that was selected by whoever had had the purchase of the equipment in charge.

Grades

Our standard grades are known as quality 803 which is the lowest priced plush that is practicable for Railroad use, it being firmly woven low pile plush having remarkable wearing qualities. The other qualities most generally used are known as Nos. 853, 875, and 935, which vary according to the fineness of the stock used and the closeness of the weave. Our high pile plushes are qualities Nos. 554, 558 and 908 and those made with a linen warp are No. 215A, being a low pile, and No. 46B a high pile plush. The linen warp has an advantage over the cotton in that it does not stretch. The cotton will sometimes shrink when the cushions are washed and when they are put in use again will stretch with the weight of the passenger, thus necessitating retacking to take up the slack.

Many Railroads have adopted specifications for Mohair Plush. We are always willing to furnish copies of these specifications if they are desired, also samples of various qualities, colors and patterns of Bay State Brand Mohair Car Plush.

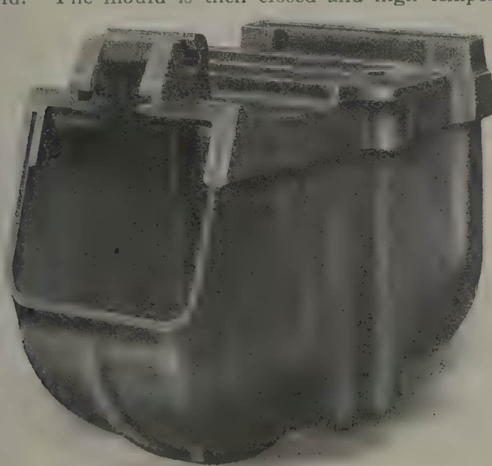
The McCord Journal Box

Description

McCord and Company have specialized on journal boxes for over twenty years and have been consistent in leading in improvements to this part of car equipment. They were first to introduce the malleable box; first to introduce an improved lid and first to substitute a coil spring for the inefficient flat spring used in keeping the lid in a closed position.

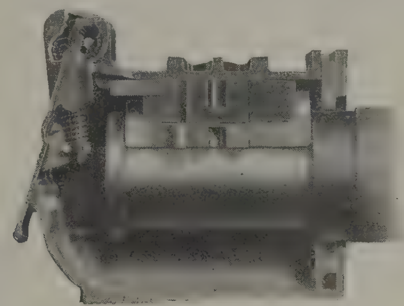
McCord and Company's latest development is a steel box where a pressed steel cellar is permanently attached to a massive cast steel top in the process of moulding, securing in this way a great increase in strength and a great reduction in weight.

The method of manufacture is interesting. The cellar is pressed cold from flange quality of steel plate. The cellar is then put into the mould in such a way that the top edges are exposed above the sand in the mould. The mould is then closed and high tempera-



ture steel is poured into it, forming the top. The exposed edges of the cellar are thus imbedded in the downwardly projecting flanges of the cast steel top. The union of the top and cellar is perfect, as there is a fusing or welding action, together with the shrinkage of the cast steel during the process of cooling. In this way an ideal distribution of material is secured. The rugged top is cast solidly to an oil tight wrought steel cellar.

A comparison in weights shows a great advantage in using the McCord box. The 5½x10 in. McCord arch bar box with lid weighs 64 pounds; the same box in malleable 95 pounds, and in grey iron 128 pounds. The saving in using the McCord steel box is, therefore, from 248 to 512 pounds per car over other boxes. This saving is made at the same time that increased strength is secured. The wear resisting qualities of steel are much greater than malleable or grey iron. This item is of importance, as there is considerable wear where the wedge has its bearing against the roof of the



box and against the stops, particularly against the front stops. The cast steel better resists the wear of the drop forged wedge than either malleable or grey iron.

The lid applied to this box is the McCord coiled spring device, which has proved so universally popular. The lid is held firmly against the entire box mouth opening by the center bearing action of its spring. This means a tight dust proof lid, which always remains tight. A dust proof lid means the use of less oil and waste, a reduction of brass wear and a reduction of hot journals. The lid can be furnished in either pressed steel or malleable iron with hinge pin or of the pinless type.

The fact that millions of McCord journal boxes are in use in the United States, Canada, and other countries, is an indication that the device is of superior merit.

Manufacturing Facilities

The plant where these boxes are produced is located at West Pullman (Chicago), Illinois, and is equipped to produce other pressed and cast steel work, having heavy and light presses, converter and electric steel furnaces. McCord boxes are also manufactured in grey and malleable iron for freight and passenger cars.

Couplers

Requirements

The principal requirements in M. C. B. Freight Car, Locomotive and Tender Couplers are as follows: Automatic coupling, the mechanism being so designed as to couple and lock when the knuckle is closed by the impact of coupling; lock-to-the-lock, so that the lock cannot accidentally become uncoupled without operating the uncoupling lever; lock-set, to hold the lock in uncoupled position in cutting cars; knuckle-opening, so that the knuckle may be fully opened ready for coupling by means of the uncoupling lever without the necessity of the trainman going between the cars to open the knuckle by hand.

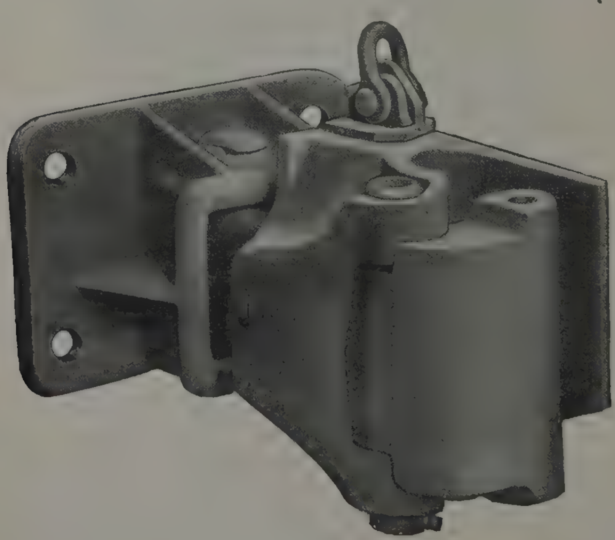
They should be substantially constructed of the best material, simple in design, have as few parts as is consistent with effectively performing the functions above stated, meet with the M. C. B. Standards and recommendations, and all the requirements of the Safety Appliance Laws.

The Pitt Coupler The Penn Coupler for Freight Cars, Engines & Tenders

These couplers are our latest developments in M. C. B. couplers. They have all the up-to-date desirable features together with the simplicity of the early Janney type. They are made of a high quality acid open-hearth steel thoroughly annealed, and designed to successfully withstand the severe usage of service.

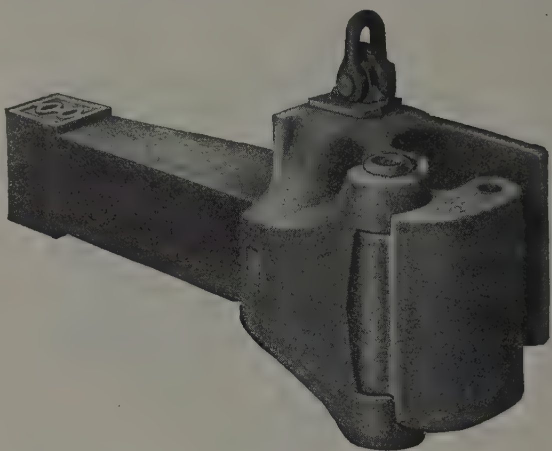
They have all the functions recommended or required by the M. C. B. Association and Safety Appliance Laws, and are economical to maintain, automatic in operation, have a lock-set, a lock-to-the-lock and a knuckle-opener.

These couplers are made in both the M. C. B. shank and pivot type. The shank type is suitable for use on freight cars and locomotive tenders in connection with



any standard draft gear, while the pivot type is used with a coupler pocket on either locomotive tenders or front of engine. The coupler pockets made by this company are of simple and efficient design for use on either front or rear ends; the flanges are made to suit the individual requirements of the application. They are heavily ribbed and designed to stand the severest service. The material used is the same high quality acid open-hearth steel as used in the manufacture of couplers, carefully annealed, producing a casting of uniform quality and great strength.

Especial attention is called to the large area of the locking surface (practically five square inches) on the locking block and the knuckle of the Penn coupler, and to the fact that no portion of the locking block extends



below the bottom wall of the coupler. The large area of the locking surface on the locking block and the knuckle insures durability.

Among the many desirable features of the Penn coupler is that of easy accessibility of parts, thus facilitating repairs. To remove the lock it is only necessary to take out the clevis pin cotter and lift out the trigger. After the locking block has been removed, the knuckle-opener can be lifted out through the opening in the top of the coupler. By this arrangement the necessity of first removing the knuckle pin and knuckle, in order to get at the locking block, is obviated. When the locking block is lifted by means of the chain on the uncoupling lever, it cannot come out, being prevented by the projecting lower end of the trigger.

With the knuckle open the locking block is held in such a position as to make coupling positive when the knuckle is closed.

The design and simplicity of these couplers reduces maintenance charges and keeps the equipment in service.

The quality of the material and the method of manufacture produces uniform metal of great strength.

M.C.B. Standard "D" Couplers

We are, also, manufacturers of the M. C. B. Standard "D" couplers for freight cars and locomotives.

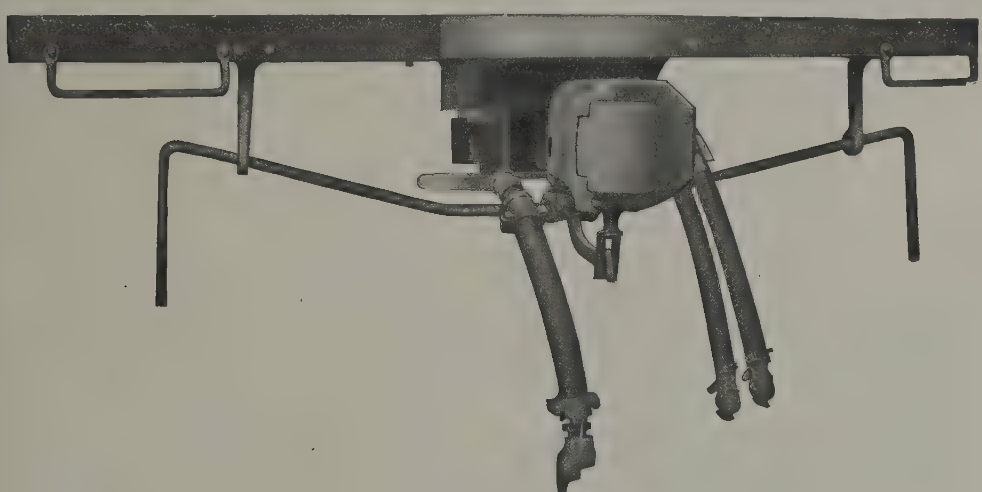
Manufacturing Facilities

This company is one of the oldest and largest manufacturers of cast steel specialties for railroad work. The factory and equipment are modern in every respect, the latest devices tending to improve quality and increase production are employed, and the organization is composed of men especially skilled in their line. All work is carefully inspected and tested by this company to determine any defects, and any product not meeting these tests is rejected. This method insures the durability and proper performance of all products.

Couplers

Introduction

This company was the original manufacturer of the M. C. B. type of coupler, and has manufactured and put in service many different designs of such couplers, following the evolution in railway equipment and requirements, embodying in the improved designs of couplers from time to time, as they have seemed desirable, new features and functions to keep them strictly up-to-date with service requirements and with the requirements of the M. C. B. Association and Safety Appliance Laws.



The latest types of couplers manufactured by this company embodying all the latest improvements are the Pitt couplers for passenger equipment and the Pitt and the Penn couplers for freight cars, locomotives and locomotive tender.

The Pitt Passenger Equipment Coupler

This coupler was designed especially to meet the requirements of passenger service, and in it have been embodied all the developments for perfecting passenger couplers over a long period of years. It was designed to meet the most severe conditions of service on heavy steel passenger equipment cars, and is in service on thousands of such cars. The experimental period of this type of coupler is now some years passed, and it has proven to be a thoroughly satisfactory and successful system.

Important Features

One of the important features of this equipment is its great flexibility of curvature. It is an important feature because it relieves side strains to the car and platforms in passing over curves and tangents and thereby increases the life of the car, as well as the life of the coupler equipment, and this flexibility of connection between the cars adds also to the smooth running of the train. This flexibility is accomplished in the Pitt equipment by a pivoted coupler head in connection with a coupler stem having wide lateral motion in the stirrup or carrying iron, both with spring controlled movement, normally keeping them on center line.

In addition to the features of curvature described other important features of this equipment are its great strength, secured by having an extra heavy coupler head and knuckle, with wrought iron or heavy cast steel stems. The coupler is the gravity lock type, with knuckle-opener and all up-to-date features, complying fully with the recommendations and requirements of the M. C. B. Association and the provisions of the Safety Appliance Law.

This coupler equipment can be furnished with either overhead uncoupling rods operating from one or both sides of the car and from the platform; from one or both sides of the car without the platform cut; or with underneath uncoupling rods operating from either one or both sides of the car.

The underneath system of uncoupling levers, as shown by the illustration, is recommended as being the simplest and probably the most efficient design. These uncoupling rods can be applied to the coupler from both sides of the car as illustrated, or from one side, either right or left, as desired. The rods are suspended below the platform so as not to interfere with train pipes or other platform attachments. These uncoupling rods rotate in uncoupling the same as the uncoupling lever on freight cars.

This coupler has the lock-to-the-lock and knuckle-opener operating in the same manner as those functions in a freight coupler.

The lock-to-the-lock positively prevents any accidental uncoupling, and the knuckle-opener can be operated by the uncoupling rod to open the knuckle either from a fully closed position or from any partially open position to the full range of its movement ready for the operation of coupling, without the trainman going between the ends of the cars.

Type "J" 35 Ton Capacity Locomotive Crane

Construction

This type of crane is distinguished by its flexibility, rapid operation, and large capacity considering the operating weight of the crane. In addition to the usual details found on a crane of this kind, the following features embodied in its constructon add greatly to the efficiency of the machine:

Jack Screws in the Trucks

The function of the jack screws in the trucks is to remove the weight from the truck springs to eliminate the tilting of the crane when rotating.

Swinging Outriggers

These outriggers swing out from the side of the car. This type of outrigger may be easily and quickly adjusted, and is out of the way when not in operating position.

Complete Locomotive Air Brake Equipment

This equipment consists of air pump, air tank, engineer's valve and all attendant mechanism. The brakes are applied to all wheels.

Double Power Drums

Both of these drums are operated by friction clutches. In connection with the main hoist drum, an outside band clutch is used. This clutch is powerful and makes the hoist drum adaptable to fall block, clam shell or drag line scraper bucket operation.

A "V" block clutch is used in connection with the auxiliary drum. This clutch is nearly as powerful as the outside band type and can be set so as to act as a slip friction when the drum is being used in connection with clam shell bucket operation.

Fifty and Seventy-Foot Sectional Boom

The boom is built in three sections, the upper and lower sections being 25 ft. in length, while the center section is 20 ft. in length. By removing the center section the upper and lower sections may be bolted together resulting in a boom 50 ft. in length.

Flexibility

The crane is so designed that by the addition of a few necessary details, it may be converted into a machine capable of efficiently performing the following operations:

1. Handling a 35-ton capacity fall block on the main hoist drum.
2. Handling a 5-ton ball and hook on the auxiliary drum.
3. Operating a drag line scraper bucket.
4. Operating a 2-line clam shell bucket.
5. Operating a 4-line clam shell bucket.
6. Driving piles by means of pendulum leads.
7. Handling a No. 10 pile driver attachment, which converts the crane into a standard railroad pile driver.
8. In addition to all of the foregoing, the crane is capable of handling a magnet, ample space being provided for installing a generator set.

The crane will also switch several cars with complete locomotive and train air brake control.

SPECIFICATIONS.

Hoisting speed on a single line is.......250′ per. min.
Line pull—main hoist..................15,000 lbs.
Line pull—auxiliary hoist..............10,000 lbs.
Sluing speed...........................4 r. p. m.

Travelling speed on a straight, level track ....300′ per min.
Tractive effort..........................11,000 lbs.
Size of air pump.......................8 x 8 x 10
Engines..................................10″ x 10″
Wheel base...............................16′ 11″
Diameter of wheels.........................33″
Size of journal.........................6″ x 11″

Type "J" 35 Ton Capacity Locomotive Crane

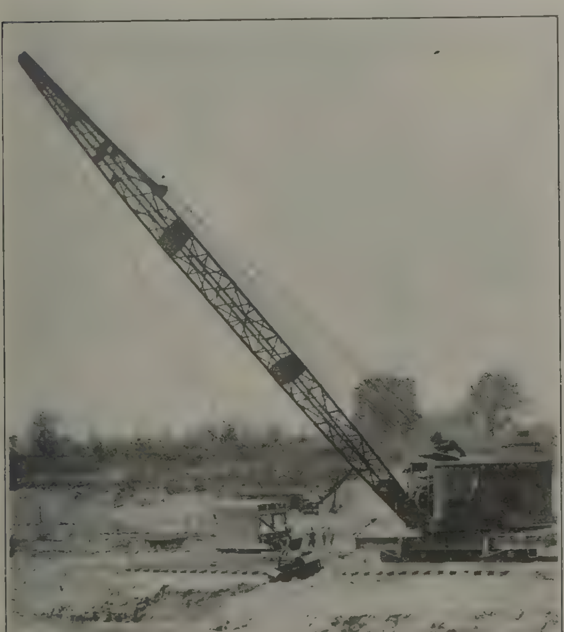
Gage ....4′ 8½″
Capacity of water tank..................475 gal.
Capacity of coal bunker..................2,000 lbs.
Weight of crane in complete working order .... 170,000 lbs.
Net shipping weight.................. 163,000 lbs.

Capacity

On a straight, level and solid track, with the weight relieved from the truck springs, the Crane will have a stability rating with and without outriggers and with the various lengths of boom as given below:

		Without Outriggers.	With Outriggers.
12-ft. radius,	50-ft. boom only.	50,000 lbs.	70,000 lbs.
15-ft. "	50-ft. " " .	39,000 "	55,000 "
20-ft. "	50-ft. " " ..	28,000 "	40,000 "
25-ft. "	50-ft. " " .	22,000 "	31,000 "
30-ft. "	50 or 70-ft. boom	17,000 "	26,000 "
35-ft. "	50 or 70-ft. boom	14,000 "	21,000 "
40-ft. "	50 or 70-ft. boom	12,000 "	18,000 "
45-ft. "	50 or 70-ft. boom	10,000 "	16,000 "
50-ft. "	50 or 70-ft. boom	9,000 "	14,000 "
60-ft. "	70-ft. boom only.	5,000 "	10,000 "
70-ft. "	70-ft. " " .	4,000 "	8,000 "

This same crane is also built in 40 tons capacity.



Arrangement

The boiler is mounted on the rear of the turntable, the water tank being at the right and the coal bunker at the left of the boiler.

The mechanism constitutes a self-contained unit, being mounted at the center of the turntable, the horizontal engines with long connecting rods, reduces vibration to a minimum.

The operating levers are located at the front and to the right-hand side of the mechanism, which position affords the operator a clear view of the work in hand at all times.

This crane is fitted with non-reversing engines in connection with which double friction clutches are used for controlling the operations of sluing, propelling and raising or lowering the boom. This arrangement has distinct advantages over the reversing engine arrangement as it eliminates the possibility of the operator becoming confused, thus endangering his own, as well as the lives of other people with whom he may be working, to say nothing of the possible damage to the machine. With the double friction clutches, together with the non-reversing engines, the operator always knows that when he places a hand lever in a certain position the crane will always respond in a certain direction to the operation controlled by that particular lever. With the reversing engine he must first determine in which direction his engine is running before he may safely attempt any particular operation.

To increase the simplicity of operation of a Locomotive Crane is an important step in the direction of ultimate efficiency. By the use of double friction clutches of the right and left hand type a single hand lever controls each particular operation. Place the hand lever in one extreme position and one clutch is engaged, bring the lever to a central position and neither clutch is engaged. Place the lever in the opposite extreme position and the other clutch is engaged. The point is that the operator of a Type "J" Locomotive Crane knows absolutely what his crane is going to do when he performs a certain operation, which operation, after a little experience, becomes reflex on his part as it requires no forethought, all of which makes for safe and speedy operation and consequent satisfactory service on the part of the crane.

Car Dumping Machine

Purpose

The primary object of a car dumper is to handle a large volume of coal, rapidly and at a minimum cost to all concerned.

To reduce depreciation in value, due to breakage, coal must be handled as little as possible and at the same time carefully.

A single handling is all that is required with a car dumper.

This machine will unload from 25 to 50 cars per hour. The variation is due, not to the possibilities of

the dumper, but rather to the yard layout. Usually the machine will dump more cars than can be handled in an ordinary yard. This emphasizes the fact that careful thought must be given to the track layout as well as to the dumper. With this dumper, cars of any size or weight may be handled without any adjustments.

Operation

The car to be dumped is brought up to the dumper on an inclined approach track, by means of a Rope Operated Barney Car. Arriving at the dumper, the car runs on to an "L" shaped cradle. The cradle and car are then raised to the proper elevation and rotated through an arc of 160°. As the car starts to raise it is automatically clamped to the cradle by means of four clamps. The coal is dumped into a triangular shaped pan which is hinged to a girder running between the two front posts. The coal is discharged from the pan into a telescopic chute provided with an improved method for trimming the coal. The telescopic chute eliminates 80 per cent of the usual cost of trimming a cargo of coal.

To operate a car dumper efficiently and reduce the breakage of the coal to a minimum, experience has established the fact that the coal must be dumped at a fixed relative height to the boat. When a boat is light it is naturally high out of the water. As the volume of coal increases the boat settles. This machine will dump at any desired elevation. Mechanism is also provided so that the pan may be raised or lowered so as to maintain its relative position to the point where the car is dumped.

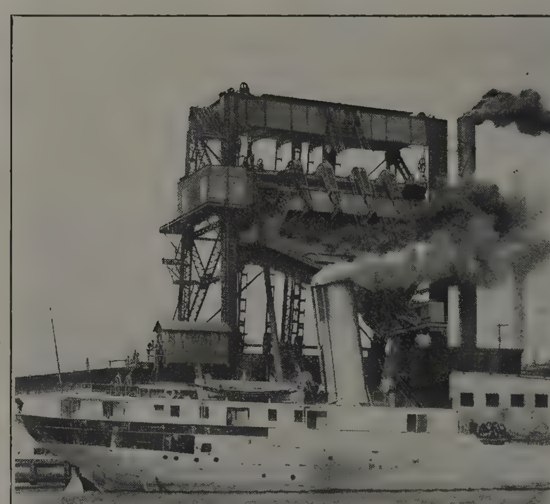
After the car has been dumped the operation is reversed, which releases the clamps on the car and returns same to a level with the approach track. The empty car is pushed off the cradle by the next loaded car coming on. The empty car passing down an incline from whence it is discharged into the yard by means of a kick-back.

Advantages

Considering the amount of coal handled and the fact that a car load is handled at one time, the first impression is that a car dumper must be cumbersome and complicated. This, however, is not the case. While the dumper is ruggedly built, yet it is astonishingly simple in design and operation.

The cost of operation is very low, as is also the cost of upkeep. Several of these dumpers have been in operation over twenty years, replacements in connection with which have consisted principally of wire ropes.

This car dumper is a development of the original car dumper which was designed and built about twenty-five years ago. All of the most important parts are covered by patents and are used exclusively on this particular dumper.



The earlier dumpers were built to handle a 30-ton car as in those days this was considered a large car. Later a dumper was designed to handle a 50-ton car, and a large number of dumpers were built of this size. Then came the 75-ton cars with steel wheels, and a dumper was designed to meet this condition.

A 100-ton car then appeared on a few roads, and in order to provide for the possible use of this equipment generally, purchasers of car dumpers desired one that would handle the 100-ton car. Most of the dumpers built within the last three or four years have been built for handling a 100-ton car, that is, a car containing 100 tons of coal. While the dumper of this capacity is not essential at most ports at the present time, it is very inconvenient to have a dumper that will not handle all the equipment that comes to it. The 100-ton dumper therefore has been installed by most purchasers and is strongly recommended because it provides for the future and because the large factor of safety and long life in case the larger equipment does not come into general use is an advantage.

Type "R" Simple Power Bucket

Construction and Operation

This bucket is of the two-line type and is constructed almost entirely of steel.

It opens wide and is especially adapted to the handling of any loose material.

The bucket is provided with a powerful closing arrangement consisting of two flat link steel chains winding on to a round spindle.

At the center of the spindle is keyed a large diameter power wheel upon which the hoisting line winds.

When the weight of the Bucket is thrown upon the hoisting line, the power wheel together with the spindle is caused to revolve, winding the closing chains upon the spindle.

The fact that the power wheel is of large diameter and the spindle of small diameter, accounts for the closing power developed.

The bale arms are forged steel, the scoops flange steel and the spindle cast steel with bronze bushings.

The scoops are fitted with heavy reinforcing plates which are beveled so as to provide sharp edges for cutting the material to be handled. The plates are usually made of flange steel and are easily replaced when repairs are necessary. When the service is unusually severe, the bucket may be fitted with manganese reinforcing plates, which are much more durable than the ordinary steel plates.

Rope guards and deflector sheaves are provided so as to keep the closing line in its proper place at all times, thus preventing the line becoming fouled.

The proper relation of three outstanding factors, the weight, the operating speed and the closing power determine the efficiency of a Clam Shell Bucket. All of these factors are dependent on each other and must be properly balanced in order to obtain the best result. A bucket may operate rapidly but lack closing power or it may have sufficient closing power and lack weight and so on.

The Type "R" Bucket is properly balanced and is absolutely efficient.

Type "R" Multi-Power Bucket

Construction

As the name implies, this bucket has a multiplied closing power which makes it adaptable to the handling of heavy, hard digging substances.

The Bucket may be used with or without teeth, depending upon the material to be handled.

The closing arrangement in general is of the same type as the Type "R" Simple Power Bucket, except that two part closing chains are used which in effect are the same as two two-part lines.

The chain is of the common round link variety which is easy to procure when replacements are necessary.

This type of bucket is built with different styles of scoops. Experience has shown that a style of scoop which will work successfully when handling one kind of material may not work successfully in other classes of materials.

The severe service demanded of clam shell buckets in everyday use requires sturdy construction, the best materials and accessibility for quick repairs when necessary.

All of these requisites are embodied in the Type "R" Multi-power.

Considering the closing power developed, the bucket operates very rapidly. It opens extremely wide, thus permitting the maximum power to be developed at the time when the scoops start to close, at which time it is always desirable to have abundant power available, in order that the scoops may be completely filled with the material being handled.

The operation of opening, or discharging material, is accomplished without a large amount of the closing line unwinding from the power wheel.

With this bucket it is possible for the operator to keep the opening and closing lines taut at all times which permits opening or closing of the bucket the instant the weight is thrown on either the opening or the closing line.

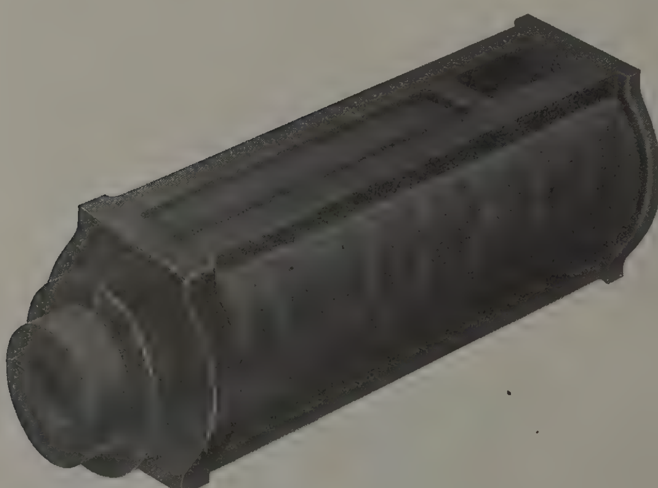
These are important factors which make for speedy and efficient operation.

Railway Specialties

**Miner
Class A-18-S
Draft Gear**

This friction draft gear represents the best practice in design, excellence of material, capacity and durability. All movable parts are secured in the cylinder.

Its wide established use has shown that safety in operating trains, economy in maintenance and efficiency of equipment are best obtained by means of this outstanding invention.

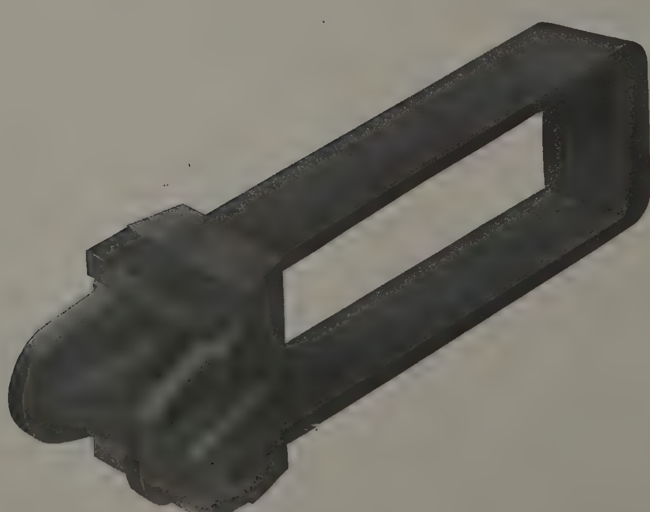


**Miner
Class A-2-S
Draft Gear**

For certain classes of service this friction draft gear is especially desirable.

It is exceedingly strong and durable, also has great efficiency relative to its cost. All interior parts are secured against displacement.

The merit of this device recommends it to a wide circle of purchasers.



**Miner
Combination
Yoke**

This invention combines very desirable qualities as the head is made of best heat treated cast steel, and the yoke strap of rolled steel.

In rebuilding equipment the old straps are utilized to good advantage with one form of this yoke head.

Wide use has demonstrated its desirability and success.

Railway Specialties

Miner Refrigerator Car Door Fastener

Opens and closes doors easily and with perfect functioning of the bolt and keepers.

It is so obviously superior in quality and performance that its universal popularity cannot be denied. Economy in maintenance, safety in operating trains, and entire satisfaction are insured through its use. Those who desire to obtain the necessary results never fail to specify this appliance which is in service on 40,000 cars.

Miner Ideal Safety Hand Brake

This device fulfills every requirement of safety, efficiency and capacity.

All working parts are simple, strong and housed against sleet and cinders. Operates with one hand. Pawl works automatically.

It embodies ideal constructive merit and simplicity.

Miner Roller Side Bearing

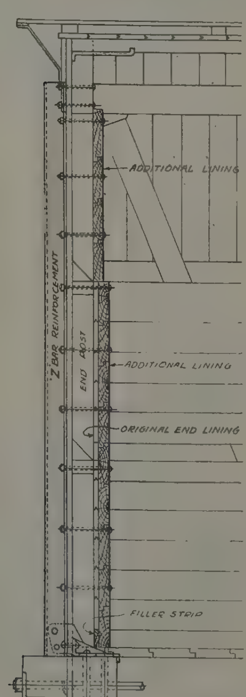
This appliance adjusts itself automatically to contour and position of opposing bearing. Many companies use it extensively. In design, performance, strength and durability it is unrivalled.

Railway Car Specialties

Burnett Box Car End Reinforcement

This reinforcement is designed for cars having either wood or steel end sills as shown in the accompanying illustration. It consists of outside Z-bars attached to the end sill by suitable castings, giving a connection of maximum rigidity and strength. The inside reinforcement consists of an additional substantial lining 1½ to 2 inches in thickness applied over present lining and extending from the car floor to the top plate and secured to the side plates. This provides sufficient strength to resist shifting loads and to make a grain tight end.

Burnett Box Car End Reinforcement



Box Car End Reinforcement

Advantages

1. Costs less than removing the old end and applying a new one of original design.
2. Lasts during the life of the car under ordinary conditions.
3. Provides a permanent and perfectly grain tight end.
4. Can be applied while ordinary repairs to the car are being made. Designs for top plate reinforcement will be furnished if desired.

Burnett Angle Cock Holder

The construction of the Burnett Angle Cock Holder is clearly shown in the accompanying illustration. The advantages of its uses are:

1. It holds the angle cock in proper position at all times and also prevents longitudinal movement of the train pipe.

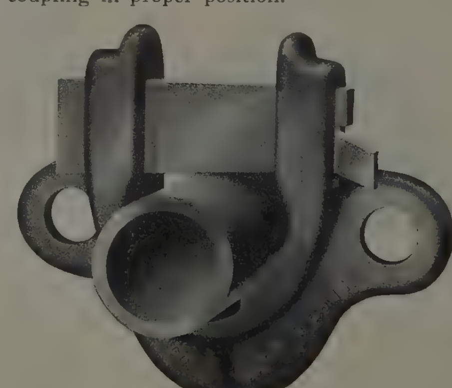
Burnett Angle Cock Holder

2. It prevents broken pipe nipples and leaks at hose couplings.
3. Pipes can be easily applied to and removed from cars.

Burnett Train Pipe Anchor

This train pipe anchor is designed to furnish for the whole train pipe the same security of fastening which the angle cock holder affords for its extremities.

1. Prevents logitudinal movement of the train pipe.
2. Prevents pipe vibration—the cause of loose joints, and holes in the pipe at center sills, bolsters, etc.
3. Pipes can be easily applied to and removed from cars of steel, wood or composite construction.
4. Increases efficiency of air brakes by keeping pipe and coupling in proper position.

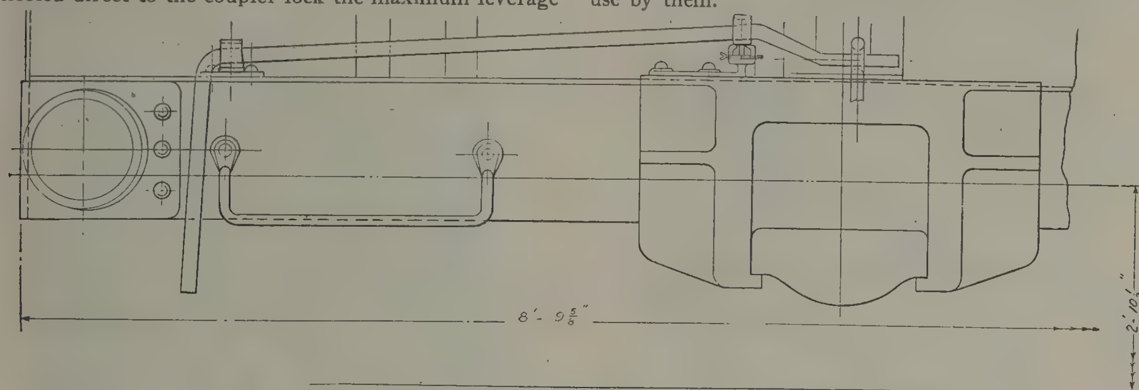


Burnett Train Pipe Anchor

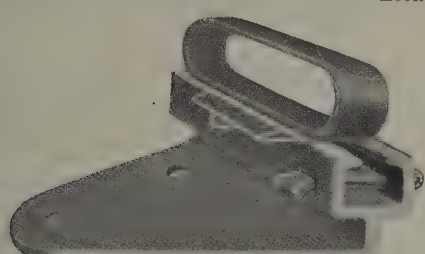
Railway Car Specialties

Economy Uncoupling Lever

All modern couplers are made with "lock set" and "knuckle-throwing" devices, and when equipped with a practical lever, there is no necessity for employees to go between the cars for any purpose. When the uncoupling rods are connected direct to the coupler lock the maximum leverage

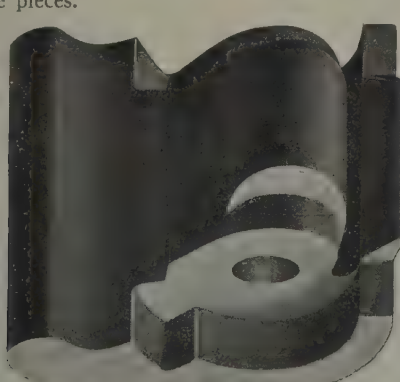


Economy Uncoupling Lever



Economy Uncoupling Lever Bracket

is provided for raising the coupler lock and throwing out the knuckle. The rod connects directly with the coupler lock, thus eliminating lost motion, and provision is made for every movement of the coupler in service. For lateral and up and down movements, the rod operates loosely in the link bracket as shown in the detail illustration. In comparison with the standard M. C. B. uncoupling device the economy center bracket reduces the number of parts per car by twelve or more pieces.



Rex Emergency Knuckle

Rex Emergency Knuckle

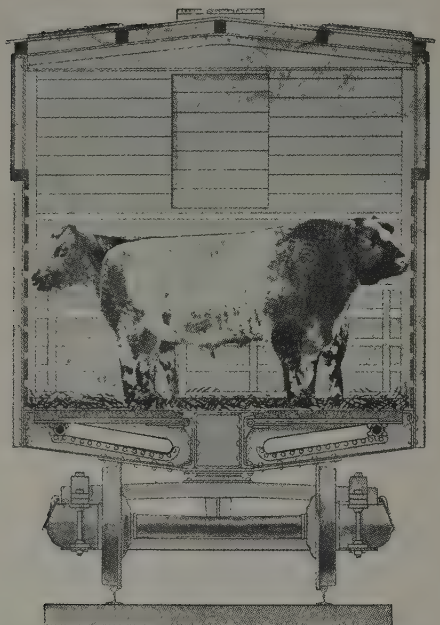
The Rex Emergency Knuckle is a solid steel casting having the strength to stand severe service. While it is applied as an emergency knuckle it can be depended upon to move the car to its destination. It is not necessary to interfere in any way with the mechanism of the locking parts of the standard coupler; merely remove the knuckle-pin (which releases the broken knuckle) and apply the "Rex" in its place. It fits any standard coupler. It has been endorsed by some of the leading lines throughout the country and is in use by them.

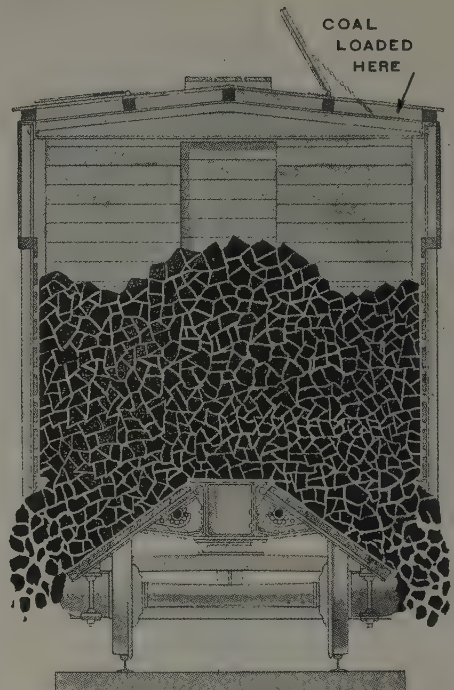
Klasing Car Brake

The Klasing Car Brake eliminates brake staff, stirrup and guides as well as the wheel and can be applied to any class of equipment. One of its advantages is that whether the brake is set or released its position is at all times indicated. The brake pull is on the short chain and there is no possibility of its becoming kinked. It may be applied either to the end, top or side of the car, and for every type of car less space is required than with brakes of the wheel design. On furniture cars, gondolas and hopper-bottom cars it can be applied to the end with no protection above the top. On flat cars it is applied to the side, rendering the entire floor space available.

Klasing Hand Lever Brake

General Service Stock Car





Adaptability

The General Service Stock Car, as shown in the illustration, conclusively proves the unquestioned adaptability of the General Service Car for the transportation of cattle. Nothing is lacking in this car, and its construction meets every requirement of a stock car. The positive action of the shaft absolutely insures a secure locking of the drop bottom doors.

Quickly Unloaded

Yet these same drop bottom doors can be immediately opened when this identical car is used for the carrying of coal. This feature means two things, minimum time spent in unloading and the maximum use of the car; cattle one way and coal the other, demonstrating the possibility of making one car do the work of two. Thousands of these cars in service.

General Service Gondolas

General Service Car

By the application of the General Service Car idea to the gondola, such a car can be used for lumber, steel billets, rails, etc.

At the same time it is suitable for coal, because it can be dumped—unloaded immediately.

Tens of thousands of these cars in service.

Solves the Problem

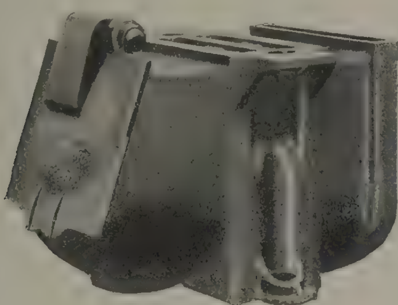
One great advantage of the General Service Car is that it is never hauled empty at a *Loss,* but is always hauled loaded at a *Profit.* Another is that the car is never standing idle, but is moving all the time because the load can be unloaded in just a few minutes by dumping, the doors closed, and the car reloaded at once. Another is the expense of unloading *Saved.*

National Coiled Spring Journal Boxes

Advantages

The design of this box and the material of which it is made afford the greatest possible strength and durability. Being cast in one piece, all dangerous seams are eliminated, and the strength and rigidity of the box are thereby greatly increased.

The great rust resisting properties peculiar to Malleable Iron, together with the extreme toughness and ductility of this material make these journal boxes



Arch Bar Type

especially desirable for both freight and passenger service where extreme weather conditions are to be encountered, and they have been found by both mechanical tests, and long and severe service, to be superior to either gray iron or pressed steel journal boxes.

The working surface of the hinge lug, as well as all of the operating parts, are inside the box where they are kept lubricated by the oil in the box, thus ensuring easy operation and protection from rust.

The hinge lug is so formed as to permit the application and proper operation of the ordinary M. C. B. Lid and flat spring, if in case of emergency this should be required.

The National Coiled Spring Journal Box conforms to all the essential M. C. B. standard dimensions and can be furnished for freight or passenger service, for application to any type of truck now in general use either of the M. C. B. Arch Bar, Pedestal or Special Types, and for all standard sizes of journals.

Description

Figures 1 and 2 represent longitudinal sections through the lid and front of box, in closed and open positions, and serve to explain the position and action of the operating parts.

The spring lever "C" pivoted to the inside face of the Lid "B" receives the thrust from a coiled spring "D" seated in a pocket in the lid, and transforms this pressure by fulcruming against the hinge lug "E" into a powerful direct inward pull against the center of the lid at right angles to it and the mouth of the pocket when the lid is closed.

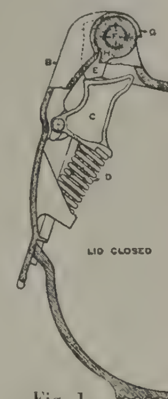


Fig. 1

This insures the equal pressure and even contact of lid on all edges of the box opening and secures a *dust proof and oil tight fit.*

The lid has a socket "G" which bears on a round trunnion "H" at either side of the hinge lug, and forms bearings for the lid so that, should the hinge pin "F" become lost, the lid itself will still be firmly held in position and will not also be lost.

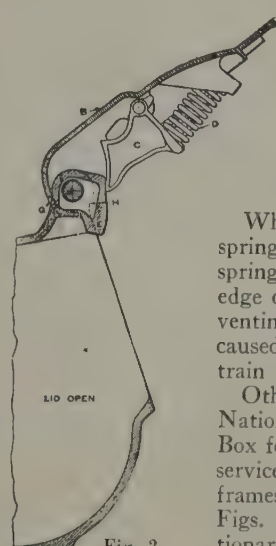


Fig. 2

When the lid is closed, the spring wedges the heel of the spring lever against the lower edge of the hinge lug thereby preventing excessive wear of parts caused by vibration of the lid while train is in motion.

Other illustrations showing the National Coiled Spring Journal Box for both freight and passenger service and for various types of side frames will be found on Page 627, Figs. 1054 to 1059 of the dictionary section.

National Quadruple Shear Yokes

Advantages

The National Quadruple Shear Yoke was designed to meet the demands for greater strength, made by the increased capacity of draft gears and couplers, heavier and more powerful locomotives, longer trains, etc. These yokes are made of the highest quality of open hearth steel and are capable of standing a pull of 700,000 pounds without failure.

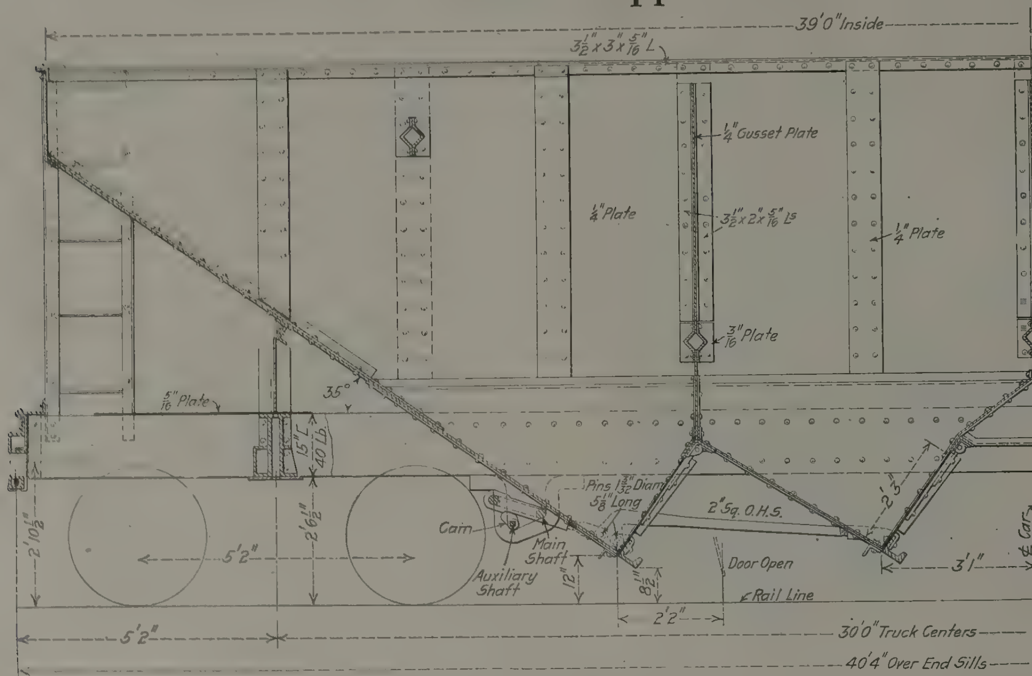
The pivot pin is in quadruple shear, thus doubling the shearing strength of the pin and making failure through bending practically impossible. The pin lugs are connected on either side by a substantial rib which prevents spreading of the outer pin bearings.

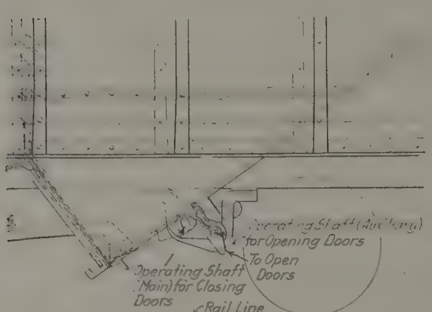
There is full buffing bearing between yoke and coupler butt, with the coupler in any position it may assume, thus eliminating all undue buffing stresses in yoke.

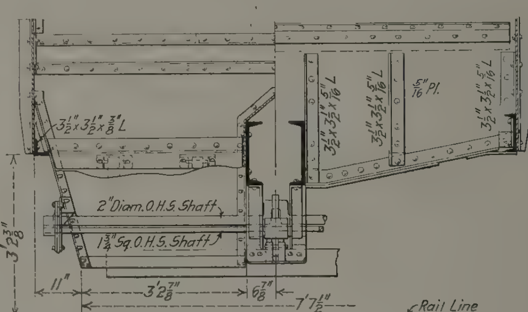
In case it becomes necessary to remove the draft gear or coupler, either may be easily removed without taking down the other.

The pivot pin is applied and removed from below, which in many cases saves both time and trouble.

Hillman Tandem Hopper Car







Hillman Tandem Hopper Car

The Hillman Tandem Hopper Car is of seventy tons capacity. The principal features are the arrangement of four pairs of inclined transverse doors in tandem, and a door operating and locking mechanism operated from either side of the car.

The main dimensions of the car are:

Length inside	39'0"
Width inside	9'5½"
Height from rail to top of car	10'9"
Truck centers	30'0"
Distance over end sills	40'4"

The hoppers are arranged in tandem, two pairs of hoppers being so constructed that one operating mechanism will open both pairs of doors simultaneously. This allows for the quick discharge of loading and half a car can be discharged at a time if desired.

Door adjusting eyebolts are eliminated, the adjusting feature being embodied in the link and clevis attachments between the doors and the operating mechanism.

By the employment of two shafts, main and auxiliary, a cam and the necessary locking parts, consisting of pawls and ratchet wheels, automatic opening of the doors is made possible from either side of the car and the operator is in no way endangered.

This is an ideal condition where it is necessary to discharge the load of the car into bins beneath the tracks and but a narrow foothold for the operator is provided upon the trestle.

Where possible, all door operating parts are made of forgings, special designs of castings being eliminated and repairs being correspondingly simplified.

The car is primarily designed for the carrying of coal, coke or cinders, but by shortening the length, employing but one set of tandem hoppers and increasing the slope of the end sheets, the softer grades of Hematite ores may be carried and a quick discharge obtained.

Dunham Door Device

This door mechanism is designed especially for the opening and closing of doors applied to the self-clearing hopper cars and hopper gondola cars of the fifty-ton types.

Other Features

Kelly Brake Jaw—A malleable iron brake jaw of simplicity and strength. The brake rod is upset in one end of the jaw, making a solid joint.

Empire Truck Bolster—A pressed steel bolster of thirty, forty or fifty tons capacity.

Machine Tools

Our Product

We furnish practically every type of machine tool required for car manufacturing shops and railroad car repair shops. We also build steam forge, steam drop and board drop hammers as well as electric traveling cranes, trolleys and hoists.

In addition to the special car shop tools illustrated below, our line includes Boring and Turning Mills, Lathes, Planers, Slotters, Boring and Drilling Machines, Bending and Straightening Rolls, Shears and Punches, Multiple Drills, etc. The tool room equipment made at our Pratt and Whitney Works completes the list.

Branch Offices and Agencies

Boston, Philadelphia, Pittsburgh, Cinncinnati, Cleveland, Detroit, Chicago, St. Louis, Birmingham, Ala., San Francisco, London.

For Canada: John Bertram & Sons Co., Ltd., Dundas, Toronto, Montreal, Winnipeg, Vancouver.

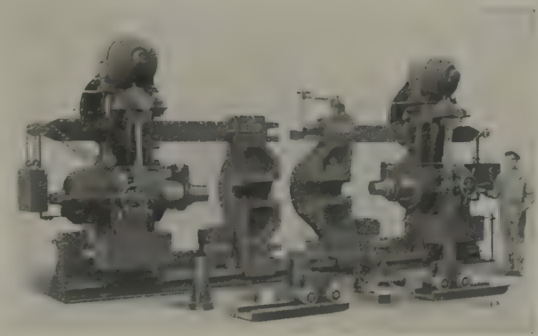
Car Wheel Lathes

Built in center-driven and end-driven types. The No. 3 end-driven machine will take wheels from 26 in. up to 52 in. diameter on tread, and will accommodate axle journals as large as 8″ in diameter. This machine has power traverse and pneumatic clamp for right headstock and is equipped with pneumatic tool clamps, calipering device and with either electric or pneumatic wheel hoist.

The center-driven machine takes wheels from 26 in. up to 42 in. diameter on tread. Driving gear, double herringbone type with automatically operating hinged segment. Tailstocks have pneumatic traverse and pneumatic clamping device. Face plates are equipped with "Sure Grip" drivers. Calipering device, pneumatic tool clamps and electric wheel hoist regularly supplied.

Hydraulic Wheel Presses

We build single-end presses of 200, 300, 400 and 500 ton capacities to take wheels up to 42 in. diameter on tread. Also double-end presses as illustrated, which will press both wheels on or off axle simultaneously, specially serviceable in shops where large number of wheels are handled daily. Two sizes of double-end presses are built, 400 and 500 tons to take wheels up to 42 in. diameter on tread.



Axle Lathes

These lathes are center driven and will turn wheel seats and journals at both ends of axle simultaneously. No. 2 Machine is intended for finishing wheel fits and journals, has swing over tool slide of 10 in.—maximum distance between centers, 8 ft. The No. 3 Lathe is a high

production machine, designed for machining axle forgings as well as rough machined axles. Has swing over tool slide, 13 in.—maximum distance between centers, 9 ft. 3 in. Both machines can be equipped with crane and hoist for handling axles.

Car Wheel Borers

Built in two standard sizes, 42 in. and 48 in., and also an extra heavy 48 in. size. The 42 in. machine is designed for the requirements of small railroad shops and will take wheels up to 36 in. diameter on tread. The 48 in. standard machine is designed to meet the requirements of car builders and railroad repair shops on both cast iron and steel wheels. Equipped with self-centering universal chuck and quick-acting crane for handling wheels. Hub facing attachment can be furnished to order. The 48 in. Heavy Borer is a high production manufacturing machine.

Locomotive Cranes

Product

This company manufactures Locomotive Cranes exclusively and aims to thoroughly cover the railroad field where cranes are used for many diversified purposes. For such service as coaling engines, ballasting, repairing washouts, driving piles, handling scrap, light wrecking service, and a great many other problems requiring solution on every railway system almost constantly, Ohio Locomotive Cranes have proven their efficiency and dependability under the most exacting conditions.

The entire resources and ingenuity of the company's organization is directed to the production of this one article and every effort is bent toward the possibility of bettering this machine.

Description

The company manufactures four sizes of cranes ranging from 15 ton to 30 ton capacity, inclusive. In the table here shown, each size is given and approximate capacity of each with separate radius of action. Size and specifications are also shown for Boilers and Engines necessary to operate each size of crane—their speed and capacity.

Pennsylvania Ry. Co., Dennison, O., 15 ton capacity, 4 wheel crane equipped with generating set and lifting magnet

Approximate Capacities

Size of Crane	10 Ft. Rad.	15 Ft. Rad.	20 Ft. Rad.	25 Ft. Rad.	30 Ft. Rad.	35 Ft. Rad.	40 Ft. Rad.	45 Ft. Rad.	50 Ft. Rad.
15 ton	[illegible]	22,500	15,300	11,500	[illegible]	7,300	6,100	5,100	.....
20 ton	40,000	29,900	20,700	15,600	12,300	16,100	8,500	7,200	6,200
25 ton	50,000	37,400	25,900	19,600	15,600	12,800	10,700	9,100	7,900
30 ton	60,000	45,100	31,300	23,700	18,900	15,500	13,100	11,200	9,700

By "Radius" is meant the horizontal distance center line of rotation to center of load.

Above Capacities are without Outriggers or Rail Clamps.

Boilers and Engines

Size of Crane	Diameter.	Height.	Work Pres.	No. Flues.	Size Flues.	Grate Area.	Horse Pwr.	Heatg. Surf.	Size of Engines.
15 ton	48"	96"	125 lbs.	132	2" x 66"	9.6 sq. ft.	29	395 sq. ft.	9" x 10"
20 ton	54"	96"	125 lbs.	168	2" x 66"	10.5 sq. ft.	38	565 sq. ft.	10" x 10"
25 ton	54"	96"	150 lbs.	188	2" x 66"	12.5 sq. ft.	[illegible]	565 sq. ft.	10" x 10"
30 ton	60"	96"	125 lbs.	232	2" x 66"	15.9 sq. ft.	[illegible]	685 sq. ft.	10" x 12"

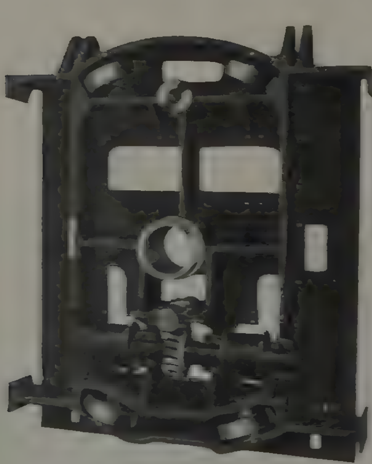
Rotating speed—1 to 5 rev. per minute.
Traveling speed—1 to 300 feet per minute.
Switching capacity—1 to 15 loaded cars.

Special Features

In the Ohio Locomotive Crane there is embodied many special features that make this machine distinctive and which commends its use especially to railroad service. It has been the aim of the builders to design a crane combining the utmost in strength and endurance. This has been largely accomplished by the substitution of Open Hearth Steel Castings for the Grey Iron Castings usually employed. This substitution has been carried out to such an extent that 90% of the castings entering into the construction of an Ohio crane are Open Hearth Steel.

The main base or bed casting is of one piece of steel weighing approximately 9000 pounds—and all the machinery being mounted upon this piece rigidity and maintenance of alignment at all times is assured. The pin with which the superstructure is fastened to the carbody is a hollow shaft having a cross sectional area of 90 square inches and is of high grade Open Hearth Steel.

By this design the common weakness of locomotive cranes, what is known as "broken back," has been entirely eliminated. No Ohio crane has yet ever been out of service on account of this fault. They absolutely cannot have a "broken back."



Bottom View of Main Base Casting

Locomotive Cranes

Wheeling & Lake Erie Ry., Huron, O., 20 ton capacity, 8 wheel crane equipped with pile driver leads and hammer

Safety Standards

The car, cab and trucks are built in accordance with the requirements of the Interstate Commerce Commission and all safety appliances are United States Standard.

The brake mechanism, etc., are in accord with Master Car Builders recommended practice, and all parts common to both cranes and cars are used of standard equipment. No special pieces are employed.

Boiler

The boiler furnished on all Ohio cranes is of the vertical fire tube type and is built in accordance with the code of the American Society of Mechanical Engineers, and is inspected and stamped for any and all states necessary by a qualified inspector of a reputable Boiler Inspection and Insurance Company, thus assuring the purchaser of the best product of its kind obtainable.

All the bearings of an Ohio crane are bronze and are interchangeable. It is necessary to have only one spare bearing on hand, as it will fit anywhere and may be placed in position in a very few minutes. No babbitt is used anywhere in the construction of this machine.

The boom raising and lowering device is peculiar to this crane and is positively self locking. No brake or similar device is used. The boom cannot be dropped accidentally.

Ohio cranes have non-reversing engines, eliminating mistakes on the part of the operator and having no links to wear and give trouble. Every operation of the machine may be performed independently or in conjunction with any or all others.

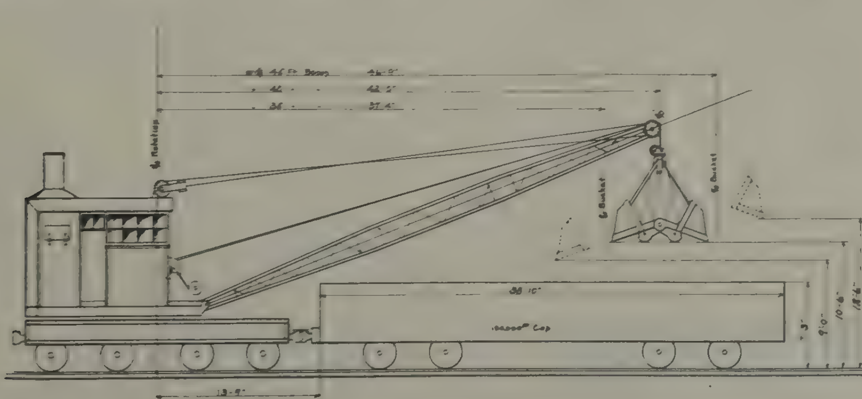
The drums are so designed that either of them will operate a fall block, or one of them may be used automatically for bucket operation, or the bucket may be

Pittsburgh & Lake Erie Ry., Pittsburgh, Pa., 25 ton capacity, 8 wheel crane used for construction work

raised open or without closing, all at the will of the operator and without altering the machine.

The gears are Open Hearth Steel with teeth cut from the solid stock.

The operator has an unobstructed view at all times and all operating levers are conveniently placed for his use.



Clearance Diagram Showing Length of Boom Required to Reach the End of a Gondola Car with a Standard Eight-wheel Crane

B. P. S. Railine
Paints, Varnishes and Enamels

Product

B. P. S. Railine Products comprise a complete line of finishing materials for the car and locomotive builder and for every kind of painting and finishing in connection with railroad work.

B. P. S. Railine Products are used by the largest railroads in the world and are recognized as the standard of excellence by leading authorities on paint and varnish products.

The paints, varnishes and enamels listed and described are a few only of the important B. P. S. Railine Finishes. It is impossible to give a complete description of the entire line as many conditions require special materials and a large number of our customers desire special colors to conform to their adopted standards, therefore, we make a specialty of supplying *Special Colors if desired.*

Manufacturing Facilities

Our complete manufacturing equipment, long experience and thorough knowledge of the methods of application and the conditions of exposure enable us to supply the best material for any kind of railroad work at the lowest cost.

Correspondence

Correspondence is invited in regard to any paint or varnish troubles with the object of introducing improved methods or reducing the cost of methods of finishing now in use. At your request, our representatives will investigate and give expert advice.

B. P. S. (Best Paint Sold) Railine are manufactured for all Railroad work.

B. P. S. Railine Gondola Black

A pure linseed oil and carbon black paint. This paint will withstand the severe treatment a Gondola Car is subjected to. Comparative tests prove it to be unequalled for the purpose.

B. P. S. Railine Special Enamels

B. P. S. Railine Locomotive Black Enamel

B. P. S. Railine Locomotive Black is a hard drying, oil-proof, jet black enamel. It is used very extensively for locomotive finishing and has proved superior to all other similar black enamels. Of equally high quality and durability are Railine Locomotive Enamels, Brunswick Green, Russia Jacket Enamel, Front End Finish Black, Cab Green, Smoke Stack Black.

Rail Black

Truss Plank Red Enamel, Head Lining Colors, Rattan Seat Enamel. These enamels are the best that can be made for the particular purposes for which they are intended.

B. P. S. Railine Station Paints

B. P. S. Railine Outside Station Paint

This paint is made from a perfected formula, the results of many years of experimental work and thousands of tests to produce an exterior paint in which is combined beauty of finish, maximum covering capacity and the utmost durability. Made in any color desired. Color card and samples free on request.

B. P. S. Railine Inside Station Paint—Gloss Finish

This paint produces a durable brilliant gloss enamel finish. It can be used on any surface—wood, brick, plaster or metal. It can be washed and scrubbed repeatedly without injury to the gloss finish.

Made in a large number of stock colors or special shades if desired. Color cards and samples free on request.

B. P. S. Railine Inside Station Paint—Flat Finish

Produces a soft velvety finish that reflects light without glaring high lights and shadows. This paint is unaffected by the excess of lime which so often destroys the ordinary wall finish. It can be washed repeatedly without injury. Made in a large number of beautiful shades. Color card and samples free on request.

B. P. S. Railine Varnishes

B. P. S. Railine Exterior Coach Varnish

This varnish is made to withstand severe exposure to the elements. It is tough and elastic and expands and contracts with the surface to which it is applied. It is uninjured by climatic conditions or sudden changes of temperatures.

B. P. S. Railine Interior Coach Varnish

The best varnish that can be made for all inside finishing. It is unaffected by hot or cold water—can be washed without injury to the gloss, will not turn white. Dries dust proof in eight hours and hard in twenty-four hours. Can be rubbed and polished.

B. P. S. Locomotive Finishing Varnish

A hard drying high gloss varnish that is not affected by water, oil or grease.

B. P. S. Railine *(Continued)*

B. P. S. RAILINE PASSENGER CAR BODY ENAMEL

Made especially to withstand severe exposure, works freely, dries hard overnight with a durable, elastic and brilliant finish.

Maroon — Pullman Color — Tuscan Red

Orange — Yellow

B. P. S. RAILINE FREIGHT CAR PAINT

A semi-paste paint. Ground very fine. Will stand more reduction, cover more surface and produce a better finish than any other freight car paint made.

Red — Brown

B. P. S. RAILINE REFRIGERATOR PAINT

Made in semi-paste and liquid form. Particularly adapted to meet the exacting conditions refrigerator cars are subjected to.

Orange — Yellow — Red

B. P. S. RAILINE TARGET ENAMELS

These enamels are non-fading and durable, cover one coat, work freely and dry quickly. Made also in White.

Yellow — Red — Green

B. P. S. RAILINE TRUCK AND PLATFORM ENAMEL

A high gloss durable enamel, tough and elastic, covers one coat. Made in the most serviceable colors, also in Black.

Brown — Olive Green — Pullman Color

B. P. S. RAILINE CABOOSE ENAMEL

A protective enamel which will withstand the roughest usage and severest exposure.

Orange — Red

B. P. S. RAILINE FLOOR PAINT

A very tough, elastic paint, dries perfectly hard overnight with a rich durable gloss. Can be washed or scrubbed without injury.

Buff — Light Yellow

Red — Slate

The colors shown represent our most popular stock colors but Special Colors can be supplied if desired. Samples free on request.

B. P. S. Railine *(Continued)*

B. P. S. Nobrac

Proper Protection

One of the chief enemies of every properly designed steel structure is rust. To insure the metal against its insidious action demands adequate initial protection and constant maintenance of that protection. And the best practicable protection that has been found is a sufficient film of good paint rightly applied.

From the double standpoint of economy and safety, the protection of a steel structure is as important as its construction. The study of protection is as necessary as the study of stresses and strains. The deterioration of a single member, regardless of the cause, may occasion a partial or total collapse of the structure.

The importance of proper protection is, therefore, obvious. It requires no argument.

The test of more than twenty-five years of use has proven the excellence of B.P.S. *Nobrac* as an efficient and economical protection for steel structures.

It would be idle for any manufacturer to claim that his paint can do it all. But it is our confident belief that with proper preparation and proper application *Nobrac* combines efficiency and true economy to a greater degree than any other paint manufactured.

Measured by the requirements that efficient protection demands, it shows the following merits:

Body

Because of the nature of the ingredients, the thorough grinding of the pigments and the accurate relation between pigment and vehicle, *Nobrac* has perfect body or covering quality. One coat, well brushed in, will cover the surface thoroughly—to much better purpose than two coats of paint with less body. It contains no pigments that tend to oxidize, or that are antagonistic to each other or to the metal itself. For these reasons it resists the action of deleterious gases better than any other paint.

Adhesion

Nobrac adheres so closely to the metal that it almost becomes a part of the metal itself. Its adhesion is so close that in case of mechanical injury only the exposed surface is open to the action of rust. Corrosion does not penetrate beyond the abrasion. This is true of *Nobrac* alone. And because of its close adhesion, *Nobrac* offers great resistance to the adverse conditions likely to cause mechanical injuries. In some instances it has stood twelve years before repainting became necessary.

Elasticity

The unusual elasticity of *Nobrac* which is retained for years, enables it to withstand the expansion and contraction resulting from extremes of temperature. At the same time, it is tough enough to resist frictional influences to the fullest degree; and it withstands cinder-blast from locomotives better than any other paint.

Drying

Nobrac contains a much smaller proportion of dryer than any other paint. Yet the dryer is so well chosen and so thoroughly incorporated that *Nobrac* dries in a reasonable time with a tough, elastic finish, under almost any atmospheric condition or temperature.

Durability

Repeated tests by disinterested parties have shown that *Nobrac* is the most durable protective coating made. It has double the life of an ordinary paint and affords perfect protection during its life.

Easy Working

Nobrac is ground to the last degree of fineness, with all ingredients perfectly mixed. It is, therefore, so extremely easy of application that the painter can cover 25% more surface with *Nobrac* in a given time than with any other paint.

Spreading Capacity

Nobrac will cover much more surface than ordinary paint. On ordinary surfaces one coat will cover 800 to 1,000 square feet per gallon. On structural work of the ordinary type, a gallon of *Nobrac* will paint five tons, one coat. The latter statement, of course, is only relative. One gallon will paint a greater number of tons where the members are extremely heavy, and fewer where they are light.

True Economy

The cost of *Nobrac* per ton per year is much less than that of any other paint used for steel protection. This is true despite the fact that it costs more per gallon than most other paints. With it 25% more surface can be covered, in a given time, than with an ordinary paint. This means a considerable saving in the cost of application and since the labor cost averages 70% of the entire cost of the typical job, this one merit is an important factor in economy. *Nobrac* covers much more surface per gallon than an ordinary paint; consequently an appreciably smaller quantity of paint will do the work. These facts, added to the proven longevity of *Nobrac,* make it a truly economical paint. In subsequent repainting of a *Nobrac* painted structure, it is never necessary to remove the old paint. Touching up damaged places and one coat of *Nobrac* is all that is necessary.

Selecting the Paint

Broadly speaking, the two factors most sought for in a paint for structural steel are thorough efficiency as a protection against rust, together with the utmost practicable economy.

It is unfortunately true that low price is too often mistaken as a synonym for economy.

But it is equally true that the most economical paint is the one that (1st) affords the greatest protection, and (2nd) requires renewal least often. These latter facts will be demonstrated in their proper sequence; let us first consider the paint-qualities that afford protection.

B. P. S. Railine *(Concluded)*

B. P. S. Nobrac

Body

Since the purpose of the paint is to interpose an impenetrable film between the metal and the influences that cause oxidation, the paint should have "body"—that is, the quality of completely covering the surface. For this purpose it is essential that the pigment should be ground extremely fine, to permit a close adjustment of the particles of pigment with relation to each other. It is also essential that the vehicle should be just sufficient to provide a suitable binder for the pigment, and to permit easy working, without thinning the paint beyond the limit of safety.

Adhesion

The pigment should adhere firmly to the metal—should not chip, peel, flake, nor powder off. This requirement also demands fine grinding. Moreover it is essential that both the pigment and the vehicle should be free from all corrosive tendencies, either with relation to themselves or to the metal. With two antagonistic elements, the weaker is sure to break down and thus open the way to separation from the metal.

Elasticity

To withstand vibration, and to withstand the expansion and contraction to which steel structures are subjected in temperatures that vary from 100 degrees to below zero, it is essential that the paint should be elastic. At the same time it should be sufficiently tough to resist frictional influences. For these reasons it is essential that the vehicle should not soften under the hottest sun, nor become brittle under zero temperature.

Drying

The drying-quality of the paint should be carefully investigated, since it is a well-known fact that too large a quantity of dryer in any paint is harmful, because of the oxidation it induces. Other things being equal, a paint that dries slowly is more durable than one loaded with oxidizing agents. Upon the other hand, a paint should dry uniformly, within a reasonable time, and with an elastic, tenacious film.

Durability

This factor is made up in part by perfect body or covering-quality, adhesion, elasticity, and the absence of a surplus of dryer. But it also depends largely upon the absence of any corrosive tendency in the materials themselves, and in their ability to withstand mechanical injuries and the action of deleterious gases.

In considering the question of economy, it should be remembered that we are considering the cost of protection, per year, rather than the cost of paint per gallon.

The labor of preparing the metal and applying the paint amounts to several times the cost of the paint itself. Under ordinary conditions, the cost of a painting job is about 70% for labor and 30% for paint.

Easy Working

Since the labor of painting steel structures is so large an element of the total cost of protection, it is important to select a paint that works easily under the brush. One man can cover as much as 40% more surface in a given time with a free-working paint, compared with the area covered in the same time with a paint that does not work freely. Fine grinding has much to do with making a paint easy of application. It is essential in a paint that is to be truly economical.

Spreading Capacity

This term is frequently confused with the term "body." As we have already explained, body is the quality of completely covering a surface. The spreading capacity of a paint is denoted by the extent of surface covered by a given quantity of paint. Other things being equal, it is plain that the paint that covers the greatest surface is the most economical. To assure spreading capacity requires fine grinding of the pigment, proper constitution, a just proportion of the vehicle to the pigment, and thorough mixing of the ingredients.

Price Per Gallon

The actual cost per gallon has very little to do with the cost of protection. It is by all odds the smallest factor; and yet it unfortunately seems to be the basis upon which most users determine their selection of a paint. Even where large users invite estimates for paint manufactured under a specific formula, the idea seems to be to obtain price-competition. The chemist who prepared the formula is usually not so well qualified as the manufacturer who has made paints the subject of years of study and experiment, and who has a reputation to maintain. And under the average formula, competition can produce a good, bad or indifferent paint. Placing the order with the lowest bidder is a certain invitation to inferiority. It follows, then, that there should be no comparison of price per gallon except with relation to the elements of proven efficiency, longevity, working-quality and spreading capacity. In short, the cheapest paint is that which affords thorough protection to the greatest surface for the longest period of time and with the least labor.

Nobrac Book

Write for a copy of the *Nobrac* Book which is a treatise on the preservation of steel and iron. This book contains information of much value to every one interested in the protection and preservation of steel and iron structures, also illustrations and descriptions of structures of all types in different parts of America showing the varied use of B. P. S. *Nobrac* and the wonderful results that have been secured.

Pantasote and Agasote

Pantasote

Pantasote is a substitute for leather, and is extensively used for seat coverings and window curtains in passenger cars.

Pantasote is a coated fabric, the gum used for coating purposes being absolutely waterproof, and not affected by climatic changes; it will not harden and crack with age.

For seat coverings, Pantasote is not readily distinguishable from leather. It is flexible, and will not crack under any conditions of service. It is lighter in weight than leather and costs about one-quarter as much as leather. Twenty years of service have demonstrated the fact that Pantasote is the best substitute for leather on the market. It is more sanitary than plush or rattan, as it presents a smooth surface and will not collect and hold dust.

The coated side of Pantasote car curtains is next to the window or weather. Being sunproof and weatherproof, the coated side acts as a protection to the inside of the curtain, allowing the use of many different fabrics, from cotton to silk damask, on the inside. The material being light in weight and flexible permits easy operation in rolling and unrolling on the curtain roller. Pantasote coating never becomes hard; therefore, the material is always soft and pliable, which is an important factor.

Agasote

Agasote is a fibre product, made under great pressure, homogeneous in its composition, waterproof and not affected by climatic conditions. It is extensively used for interior trim work on steel passenger cars as headlinings, wainscotings, etc. Being of a wood fibre composition, it has high insulation properties and acts in a dual capacity as an insulator against heat and cold, as well as for interior trim purposes. Agasote will permit of the finest finish, either in a solid color, decorated, or to imitate the grain of any kind of wood.

Interior of Steel Car on the New York, Westchester & Boston Railroad

This company maintains an extensive sales organization, with sales offices at 11 Broadway, New York City; People's Gas Building, Chicago, Ill.; and 797 Monadnock Building, San Francisco, Cal.

Car Equipment Springs

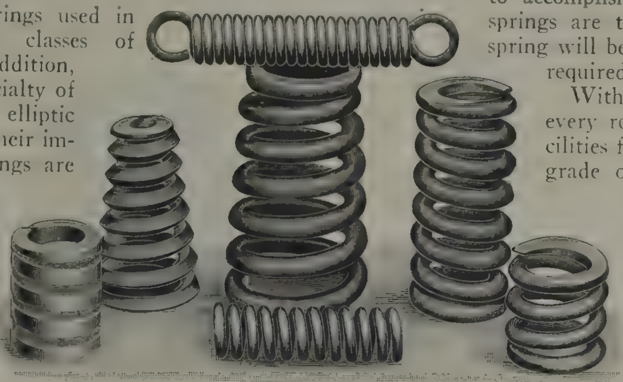
Product

It is the aim of the Pittsburgh Spring and Steel Company to manufacture all types of elliptic and coil springs used in all classes of car equipment. In addition, the company makes a specialty of repairing all classes of elliptic springs and by means of their improved methods, old springs are made to give service nearly equal to new ones. Vanadium steel springs are also furnished, especially designed to meet the hard service conditions constantly encountered in heavy car equipment service. Coil springs are made for every purpose.

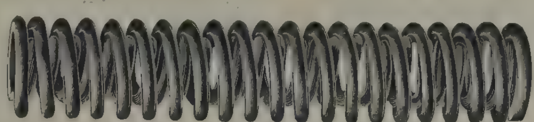
In case of any uncertainty of specifications, it is the desire of the company to co-operate fully in providing suitable springs and by indicating what it is desired to accomplish, giving space in which springs are to be applied, the proper spring will be furnished for the service required.

With equipment modern in every respect and exceptional facilities for turning out the highest grade of springs promptly, this company is in position to handle orders for all classes of springs with the minimum of delay.

The illustrations shown here represent only a few of the various kinds and styles of springs manufactured by the company.



Single Full Elliptic

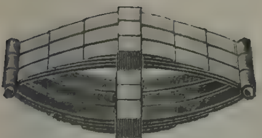


Double Coil

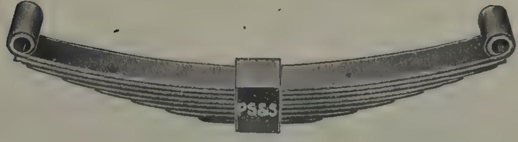
Duplicate Elliptic

Single Coil

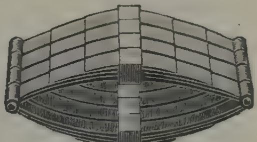
Cone Shape



Triple Elliptic



Half Elliptic—Scroll Ends

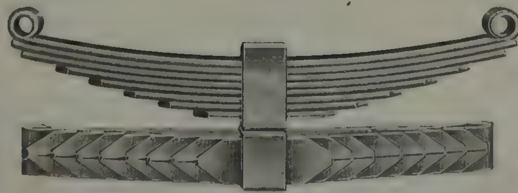


Quadruple Elliptic

Half Elliptic Boss End Buffer Spring With Lug Bands
Steel Ribbed and Grooved

Double Coil

Volute Draw Bar and Buffer Springs



Half Elliptic—Scroll ends—Suspension Spring
Steel Ribbed and Grooved

Two Coil Bolster Springs, Fitted Up in Steel Plate

Axles and Forgings

Products

Steel driving and trailing axles for steam and electric locomotives. Tender and engine truck axles, axles for all classes of cars, including steam and electric railways—elevated and subway service. Mine car axles, standard and narrow gage of **all** classes.

Forgings, hammered or pressed, iron, steel and alloys for locomotives such as main and side rods, crank pins, piston rods, etc. Forgings for engines, machine and marine service, sugar mill and bending rolls. Forgings designed to meet most exacting specifications and tests of American and foreign railway and marine standards. Also bars, angles and shapes.

Important Features

After many years of careful study and service tests of various designs and processes of making axles and forgings it has been found that the most satisfactory results have been obtained from strict adherence to the following:

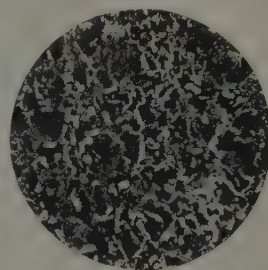
- Uniformity of material
- High tensile strength
- High elastic limit
- High ductility
- Degree of hardness for wearing purposes, durability
- Economy of material
- Factor of safety.

Special attention is directed to the Pollak Special Heat-Treated Process which insures against the ordinary defects in axles and forgings.

Billets: Their Treatment

Large square billets are used and hammered to desired sizes, and not re-rolled for example to the largest diameter of an axle as is often done but which should never be allowed since it is not sufficient to insure complete transformation of the structure of the steel.

The hammering process eliminates rolling entirely but does not produce, by constant working, molecular action so the molecules of the steel are brought together so closely that at completion the axles or forgings contain a homogeneous mass, forming a fine-grained product. This gives a uniformity of material and is an important factor of safety.



Before Treatment

After Treatment

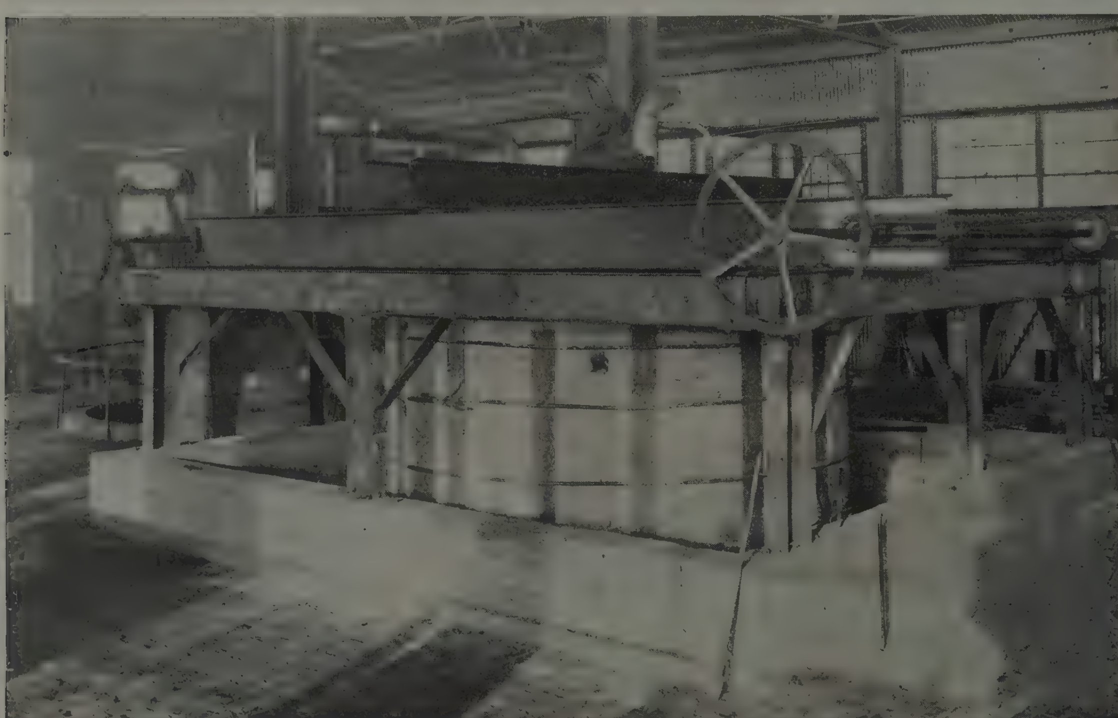
The result of this process is shown by the illustrations over the captions—Before treatment and After treatment.

Special Heat-Treated Process

Since during the process of manufacture, the temperature of steel is changed, and strains set up, it was found desirable to perfect a process which would prevent crystallization and other dangerous defects resulting from old methods.

The Pollak Special Heat-Treated Process is a modern scientific treatment, worked out in practice as well as in theory.

Axles and forgings are annealed at such temperature that the cross sectional area is heated uniformly



Vertical Furnace for Heating Axles

Axles and Forgings

and the strains due to forging and to cooling are no longer present.

The slightest variation from a fixed maximum temperature proves distastrous. If the temperature range is too high, there is a strong tendency for the metal to revert to its untreated condition, if too low the strains and stresses will not be disturbed or cured.

To acquire the desired results the elements of time, temperature and composition of carbon, manganese, sulphur, phosphorus and silicon have been carefully studied and specially designed furnaces and baths built to overcome defects in manufacture.

Annealing alone may overcome the strains but while that is going on, the properties of the steel have not been treated. High Tensile, High Elastic Limit, High Ductility and a degree of hardness are necessary. To attain these, all Pollak axles and forgings are quenched in a specially prepared bath which has the proper heat-dissipating powers to regulate and hold the steel at the required point. To refine the grain still further and insure complete control of these properties, a re-annealing takes place at a lower temperature.

Specifications for Heat-Treated Axles and Forgings

Process of Manufacture.

1. Steel under this specification shall be made by the open-hearth process.

Discard.

2. At least 30 per cent. discard must be made from each ingot to insure freedom from piping and undue segregation.

Method of Manufacture.

All axles under this specification shall be forged by hammering from a square billet under a steam hammer, and the billets constantly worked through to a common center. All billets shall be hammered sufficiently to insure a reduction of not less than 20 per cent.

Chemical Composition.

3. The steel shall conform to the following limits in chemical composition:

Carbon..........	Not over 0.60 per cent.
Manganese......	0.40 to 0.80 per cent.
Phosphorus......	Not over 0.05 per cent.
Sulphur.........	Not over 0.05 per cent.

Samples For Chemical Analysis.

4. Drillings shall be taken from the crop end of one axle, from each melt represented, parallel to the axis on any radius one-half the distance from the center to circumference, to determine whether the chemical composition of the heat is within the limits specified in Paragraph 3.

Tensile Test.

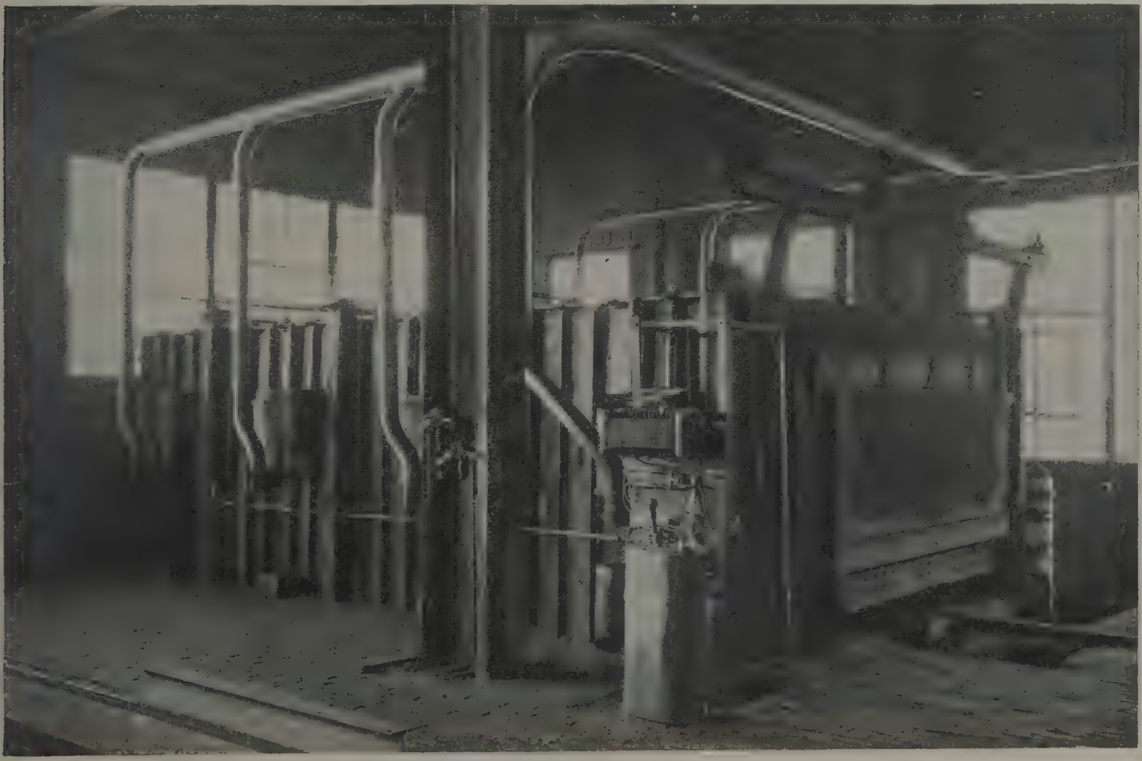
5. The steel shall conform to the following minimum physical properties:

Ultimate strength, lbs. per sq. in..	85,000
Elastic limit	50,000
Elongation in 2 in. per cent......	22
Reduction of area, per cent......	40

The elastic limit shall be determined by the drop of the beam. Above 40,000 pounds per square inch, each increment of load shall be not more than 1,000 pounds per square inch.

Specimen For Tensile Test.

6. The test specimen shall be standard, 0.5-inch diameter and 2-inch gage length, shall be used to determine the physical properties as specified in Paragraph 5. Test specimens shall be taken from the crop end of one axle from each treating-plant heat; if more than one open-hearth heat is represented in a treating-plant heat, a test shall be taken from each open-hearth heat represented.



Battery of Car Type Heating Furnaces for Heat Treating Axles and Other Forgings

Axles and Forgings

LOCATION OF SPECIMENS FOR TENSILE TEST AND COLD-BEND TEST.

7. Specimens for tensile test and cold-bend test shall be taken parallel to the axis of the axle, and on any radius one-half the distance from the center to the circumference.

RE-TESTING.

8. In case the physical results obtained from any lot of axles do not conform to those called for by Paragraph 5 the manufacturer shall have the privilege of re-treating such parts not more than three times, from which new tests shall be taken by the purchaser, and these shall govern the acceptance or rejection of the lot.

HEAT TREATMENT.

9. Each axle shall be allowed to cool after forging, shall then be re-heated to the proper temperature, quenched in some medium, allowed to cool, and then re-heated to the proper temperature for annealing. All heat-treating furnaces to be equipped with electrical pyrometers to insure the proper and uniform temperature.

QUALITY.

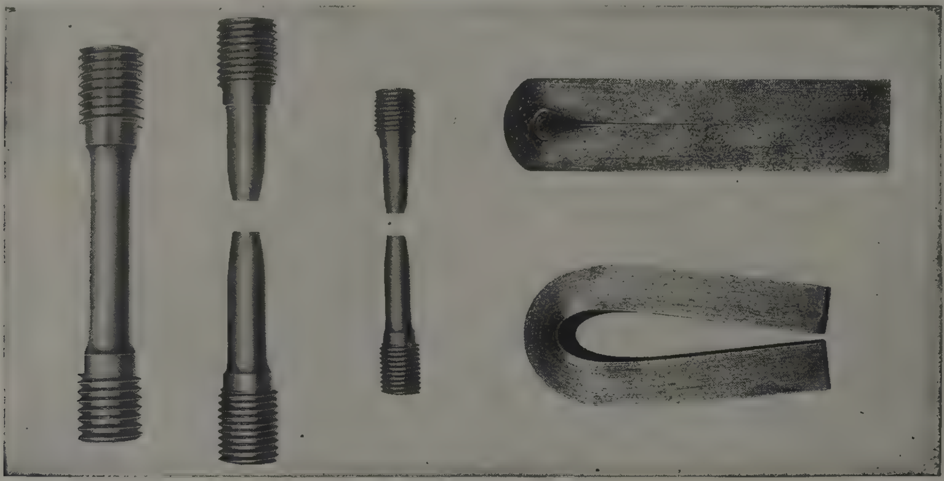
10. All axles shall be free from cracks, flaws, seams or other injurious imperfections when finished. Those which show such defects while being finished by the purchaser will be rejected.

FINISH.

11. All axles must be rough-turned with an allowance of ⅛-inch on surface for finishing. Turning must be done on 60 degrees centers with clearance drilled at point.

BRANDING.

12. After rough turning, the manufacturer's name, heat number, individual axle number and inspector's mark shall be stamped on one end of each axle, and in addition the order number is to be plainly marked with white lead on each piece.



Tensile and Cold Bend Tests

INSPECTION.

13. The inspector representing the purchaser shall have free entry at all times while his contract is being executed to all portions of the manufacturer's shop, which concerns the manufacturer of material ordered. All reasonable facilities shall be afforded to the inspector by the manufacturer to satisfy him that the axles are being furnished in accordance with specifications. All tests and inspections shall be made at the place of manufacture prior to shipment, facilities and labor to be furnished free of cost to the purchaser. The purchaser shall have the right to make tests to govern the acceptance or rejection in their

Cooling System

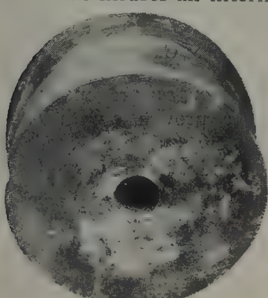
Axles and Forgings

own test room, or elsewhere, as may be decided by the purchaser, such test, however, to be made at the expense of the purchaser, and to be made prior to the shipment of the material. Unless otherwise arranged, any protest based on such tests shall be made within six days to be valid. Tests and inspection shall be so conducted as not to interfere unnecessarily with the operation of the mill.

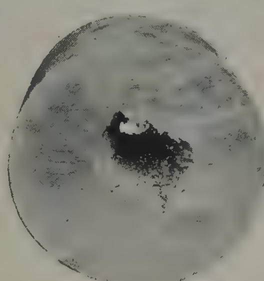
Hollow Axles

All large sections of forgings, such as locomotive driving axles, should be hollow bored, the size bore dependent upon the outside diameter of the axle or forging. As a general rule, for locomotive driving axles, the bored hole is between two and three inches in diameter.

Hollow boring is the best insurance of sound metal in such an important product as a locomotive driving axle. It insures an internal inspection of the steel for



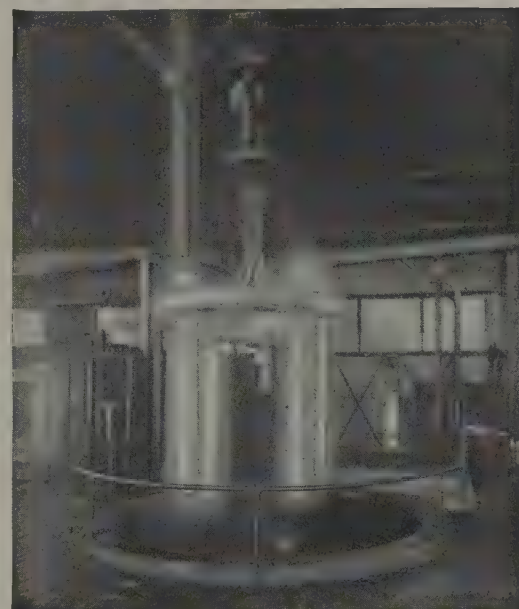
Driving Axle Bored Out, 12 in. in Length



Same Axle Showing Pipe Through Boring

detection of pipes, cracks, or defects of a similar nature. With the most extreme care, there is a degree of uncertainty in steel which cannot be ascertained more accurately than by a visual inspection, thus by hollow boring this end may be attained.

The hollow boring of axles is economical since there is less weight in the forging, and where parts are movable, as in rolling stock, it is a considerable item of saving to carry less weight in the supporting members of the locomotive, especially where there is no reduction in strength of these supporting members. The reason for the increase in strength, with a decrease in weight, is due to the heat treatment of a hollow bored locomotive driving axle, wherein the heat penetration



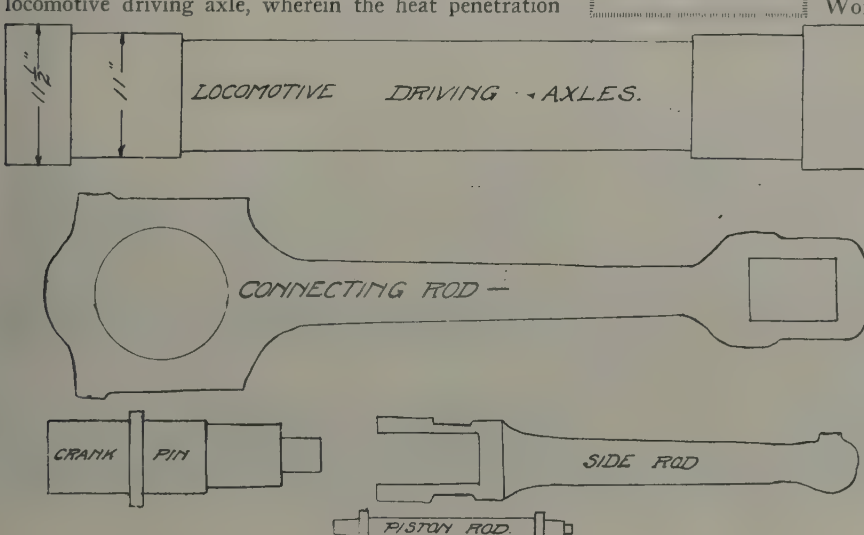
Quenching

is more uniform, as both the outer and inner portion of the axle is heated. In the tempering bath this same principle applies, so that we obtain a more uniform heat treatment and measurement of temperature on the axle itself. By the penetration, a much faster heat dissipation through hollow boring and finer grain structure is set up and a considerable improvement made in the physical properties of the steel forgings.

The Pollak process is chiefly care and experience, besides actual service tests on railroads throughout the United States. With the care in forging, boring, heat treatment, all of which is checked by our constant use of pulling and bending tests, as well as Brinnel hardness test, coupled with a constant use of a microscope, there is an invariable insurance of safety, due to a high grade product.

Sales Organization

The general sales offices are located at 120 Broadway, New York, N. Y., and the general offices at Cincinnati, Ohio. Works at Cincinnati and Chicago, Ill., U. S. A.



Foreign

The Pollak Steel Company is particularly well equipped to manufacture axles and forgings to meet standards and specifications of foreign governments and private owned railways and will give prompt attention to inquiries. Cable Address "POSCOSTEEL NEW YORK."

M. C. B. Gauges—Small Tools

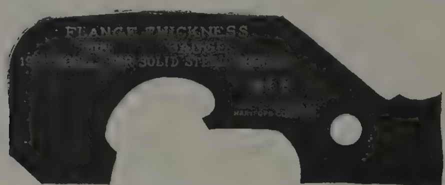
M. C. B. Gauges

Pratt and Whitney M. C. B. Gauges are made strictly up-to-date, any authorized change being at once incorporated in their design.

They include all standard gauges used in car manufacture and are of unusual accuracy and of such construction and finish that long life is assured.

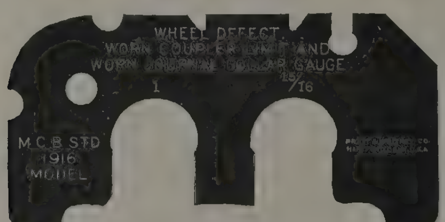
Besides those illustrated here, we make M. C. B. Limit Gauges for rod iron, Gauges for Automatic Couplers and New Knuckles, Decimal Measures, as well as the regular line of Snap Gauges, Plug and Template Gauges, all Standard Thread Gauges, and Pipe Thread Gauges.

Our Catalogues of "Standards and Gauges" illustrates them all and will be sent anywhere on request.



M. C. B. Standard Flange Thickness Gauge—Minimum

M. C. B. Standard Flange Thickness Gauge—Maximum



M. C. B. Wheel Defect, Worn Coupler Limit and Worn Journal Collar Gauge

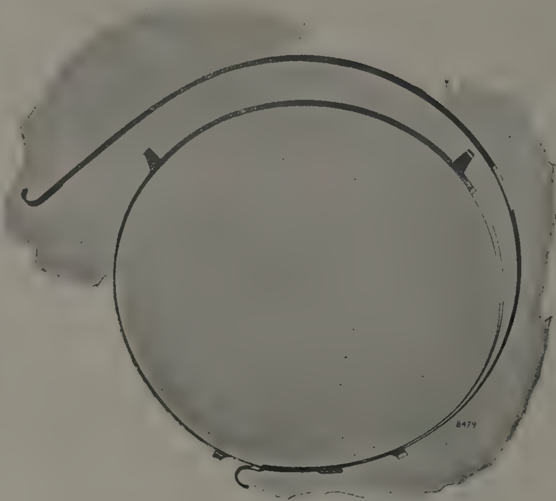
Small Tools

Pratt and Whitney Small Tools cover all requirements of this field. They include all styles of Taps, Dies, Milling Cutters, Reamers, Punches, Drills, and miscellaneous small tools.

Exceptional care and long experience in manufacture guarantee their worth.

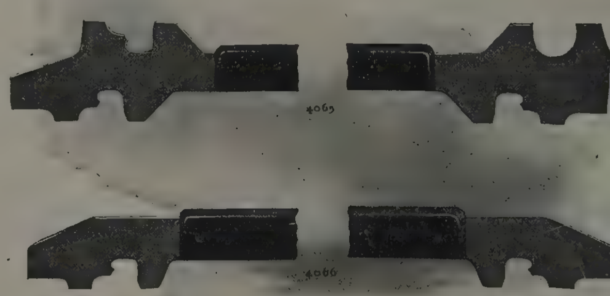
Offices and Agencies

Offices and Agencies, New York: 111 Broadway. Boston: 93-95 Oliver St. Philadelphia: 405 N. 21st St. Cleveland: 730 Superior Ave. Detroit: Kerr Bldg. Chicago: 571 W. Washington Blvd. St. Louis: 516 N. 3rd St. Cincinnati: 338 W. 4th St. Birmingham, Ala.: 2015 First Ave. San Francisco: 16 to 18 Fremont St. Denver, Colo.: Hendrie & Bolthoff Mfg. & Supply Co. Canada: Pratt & Whitney Co. of Canada, Ltd., Dundas, Montreal, Toronto, Winnipeg and Vancouver.



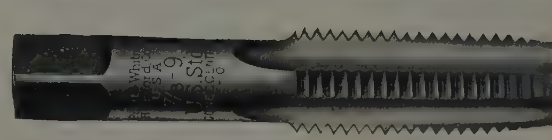
Car Wheel Circumference Gauges

Car Wheel Circumference Gauges are made of flexible tempered steel and are provided with convenient adjustable handles. Accurately graduated to conform to the M. C. B. Standard for Cast Iron Wheels, Solid Steel Wheels, and Steel Tired Wheels.



M. C. B. Standard Reference and Wheel Check Gauges

These gauges are made of steel of ample thickness and with hardened ends, the center being encased in wood, making the gauge easier to handle and reducing to a minimum errors due to expansion from handling. They are made only to order and prices will be quoted upon application.



Freight and Passenger Cars

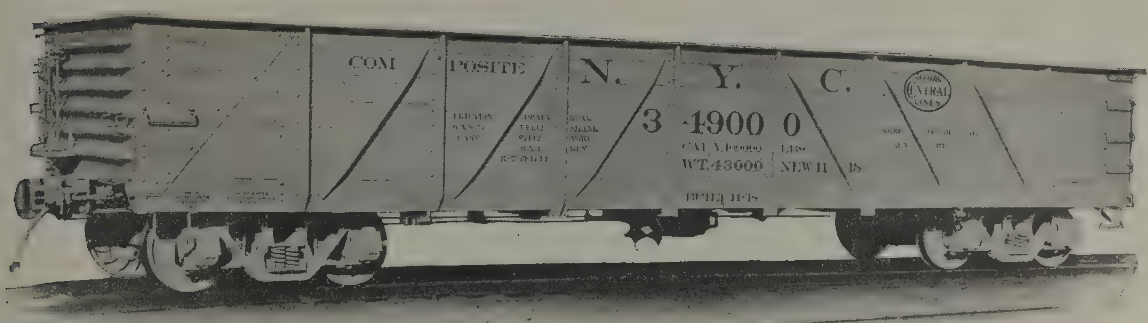
Products

We manufacture freight and passenger cars of every description. Also, castings, forgings, bolsters, brake beams, trucks, under-frames, and grey iron wheels.

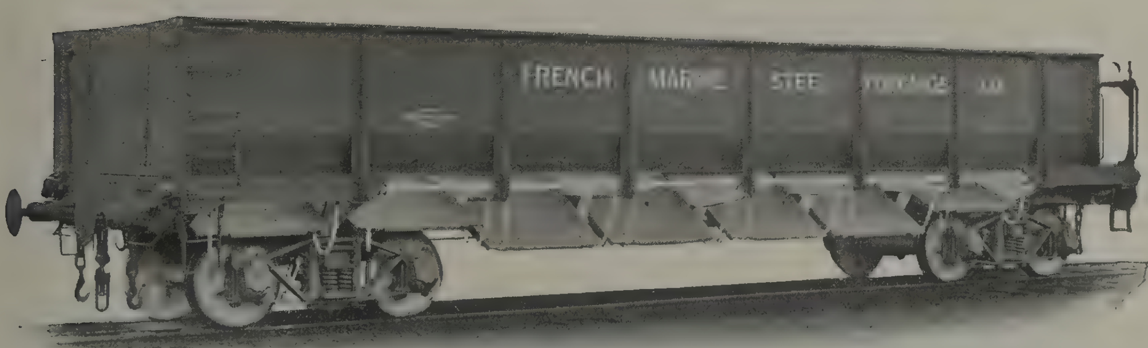
Complete facilities are maintained for repairing cars.

Sales and Manufacturing Organization

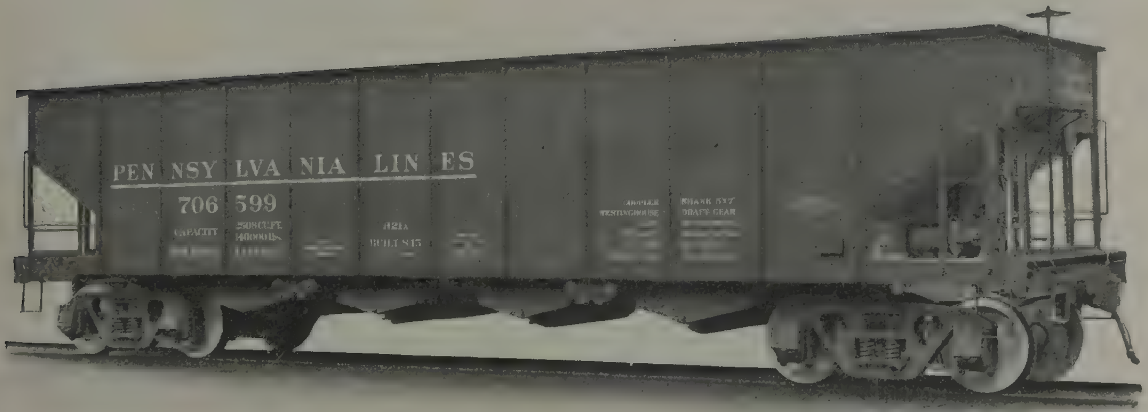
The works of the Pressed Steel Car Company and the Western Steel Car & Foundry Company are at McKees Rocks, Pittsburgh (North Side), Pennsylvania, and Hegewisch, Illinois. Sales Offices are located in New York, Pittsburgh, Chicago, St. Paul, and Washington, D. C.



New York Central Composite Car

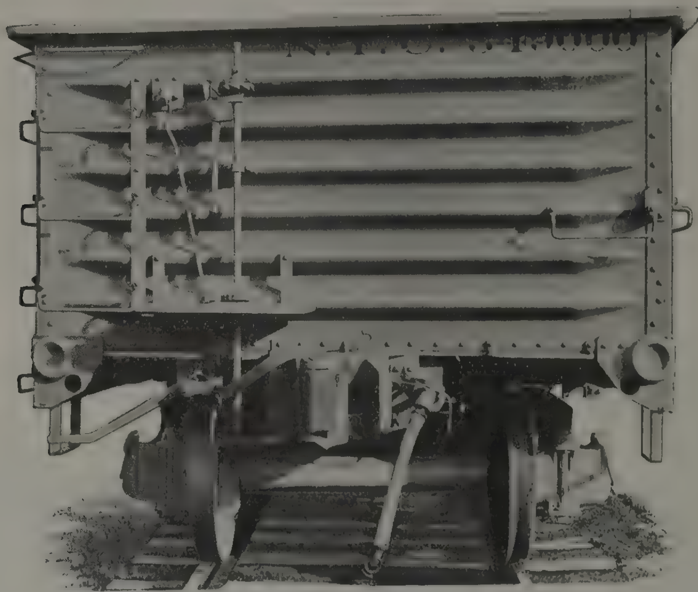


French Car



Pennsylvania Quadruple Hopper Car

Murphy Corrugated Steel End



Adaptability

The Murphy Corrugated Steel End is as adaptable to drop end gondolas and auto car end doors as to the ordinary house car or gondola.

Grain Proof

To prevent the leakage of grain it is flanged under the floor and around the corner posts.

Proof Against Shifting Loads

It effectively prevents the breaking out of the ends by such shifting lading as lumber, ties, shafting, pipe and brick.

Increases Inside Length

The inside length of box cars is increased by almost one foot, which will permit a 10% increase in minimum carload weights on all standard 36 or 40 ft. cars on which it is applied. There is no increase in weight, and this is due to the use of 3/16 in. steel for top plates and ¼ in. steel for bottom plates, all reinforced by 2¼ in. depth corrugations pressed into each plate.

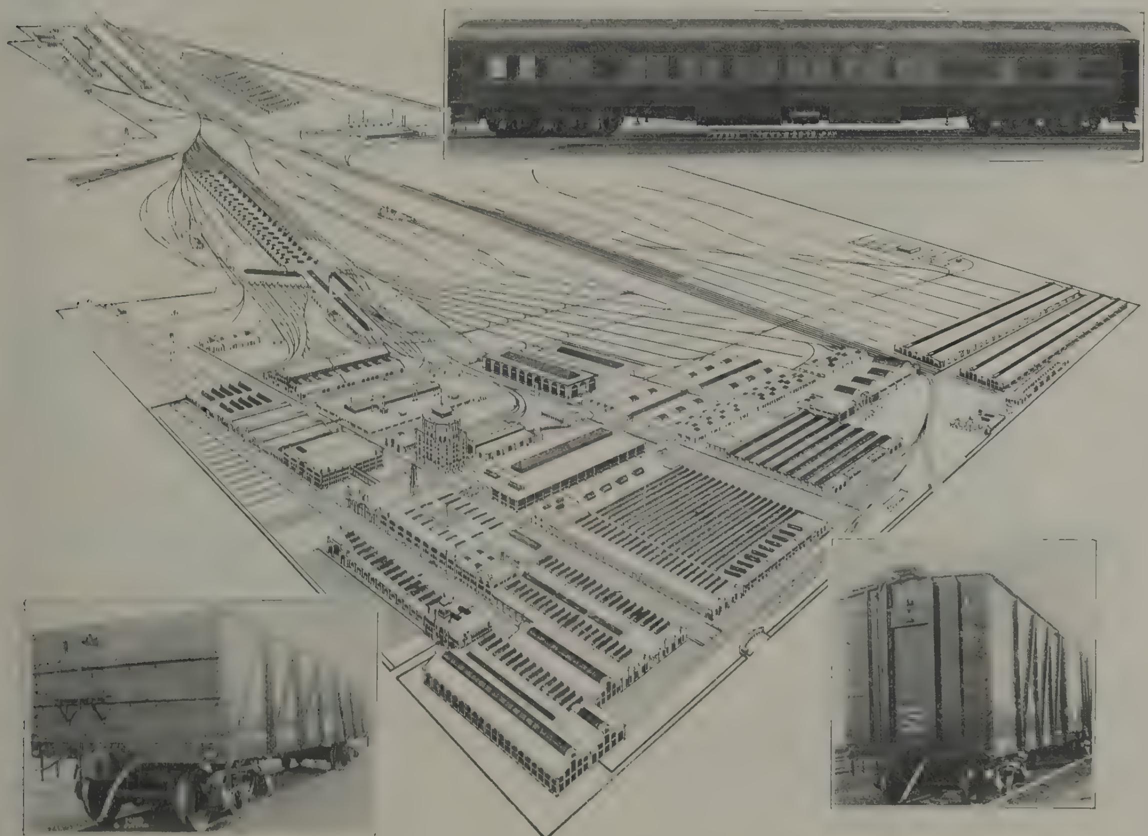
Simplicity

The steel end is made in one, two or three pieces depending upon the height of the car. This facilitates handling and makes replacement simple.

Passenger and Freight Cars

General

The name "Pullman" is universally recognized as a synonym for luxurious comfort and perfection in design and construction of Sleeping and Parlor Cars. The studious attention to every detail that would enhance the comfort of the traveler, as exhibited by the inventor of the Sleeping Car, George M. Pullman, compelled such recognition. Equal attention on the part of the designers and builders in bringing the Pullman car to its present state of perfection has served constantly to maintain Pullman supremacy.



The supremacy of Pullman built cars is not limited to the production of luxurious types of railroad cars. It applies equally to passenger cars of every description and to the design and construction of all standard types of freight cars, domestic and foreign.

Freight Cars

Of the industrial work of The Pullman Company, the building of freight cars forms as important a part as that devoted to passenger equipment. Since the freight car shops were opened over thirty-five years ago, more than 280,000 freight cars have been built, including every type in general use in America or abroad. The erection of a modern steel car plant has greatly increased the capacity for construction of high grade freight cars.

Pullman Methods

The Pullman reputation insures accurate adherence to specifications. The organization is trained to follow minute details in character of material and workmanship. This close attention results in continued satisfaction to the purchaser through the reduced cost of car maintenance.

Pullman recommendations, backed up by long and extensive experience in building and operation of cars, frequently have saved purchasers many thousands of dollars. Co-operation with railroad officials is one of the important advantages of Pullman service. Suggestions are offered freely, upon any point of design or construction of freight or passenger equipment.

Before leaving the Pullman shop, every car is subjected to rigid inspection to insure that it complies with all requirements of the specifications and drawings.

Pullman Plant

The manufacturing plant consists of over 100 buildings served by more than 100 miles of track within the shop enclosure, which is 400 acres in extent.

Passenger Coach and Freight Car Springs

Foreign And Domestic Springs

This Company manufactures all types of springs for use in foreign and domestic car equipment. The illustrations here shown are a few of the various types of springs used throughout the United States and many foreign countries for passenger coach and freight car equipment. There is such an infinite variety of sizes and so many variations in the different classes that it is impossible, within reasonable space, to include them all, but the illustrations will serve to give a general idea of our standard types. The best grades of material and workmanship are employed in the manufacture of all, and several of these types embody features of distinctive merit and utility, winning for us the highest award, first prize, Gold Medal, at the Louisiana Purchase Exposition at St. Louis.

Plant

The Company has four large spring plants most advantageously situated, the French Works being at Pittsburgh, in the heart of the steel district. The Scott Works at Philadelphia, central to the Atlantic Seaboard and convenient to Southern points. The Chicago Heights Plant recently built especially to take care of the North and Northwest territory, and which possesses every modern facility for serving the large section for which it was designed. At Detroit, Mich., the Company possesses the additional advantages of having their own rolling mills, while from the St. Louis Works, at East St. Louis, Ill., the West and Southwest can best be served. All are equipped with the most modern and up-to-date appliances, together with special machinery and automatically regulated furnaces for the manufacture of springs of the highest grade and serviceability. Thus the Company's facilities and equipment are unsurpassed,


Fig. 1

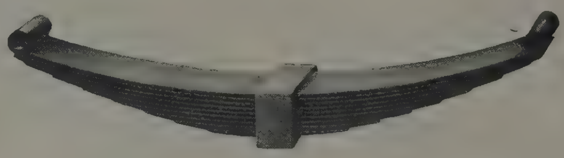


Fig. 2

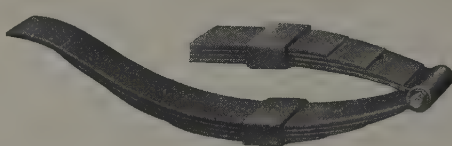


Fig. 3

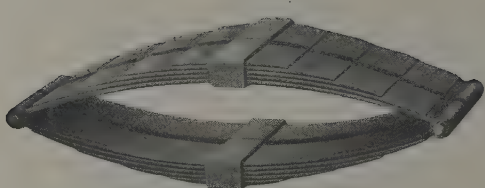


Fig. 4

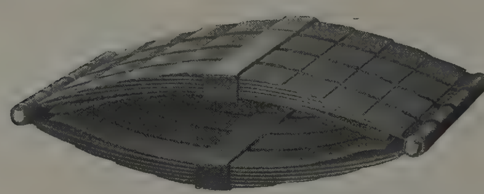


Fig. 5


Fig. 6


Fig. 7

Passenger Coach and Freight Car Springs

and with the knowledge acquired by many years' experience in this particular branch of manufacture, they are in a position to satisfactorily meet every demand made upon them.

Figure 1 illustrates single full Elliptic Spring adaptable for caboose cars.

Figure 2. Half Elliptic type, with scrolled eyes. Used in caboose construction. Made to any required capacity. Also made with scrolls reinforced and with scrolls bent under instead of over.

Figure 3. A three-quarter Elliptic Spring for use at front and rear ends of 4 wheel truck frames to prevent excessive oscillation. Made any size and capacity required.

Figure 4 illustrates Passenger Elliptic Spring. Doublet. Adapted for 6 wheel trucks. Made to any required capacity. Also used for 8 wheel caboose cars.

Figure 7. Equalizing Spring for passenger equipment. Made in any size or number of coils to any required capacity.

Figure 8. A group of Helical Springs showing various types and sizes for many diversified uses.

Figure 9 shows Passenger Elliptic Spring. Quintuple. Adapted for 4 wheel trucks. Made to any required capacity. Especially used for heavy coaches.

Figure 10 illustrates passenger Elliptic Spring Quadruple type with auxiliary plates. Particularly adapted to baggage mail and express service, where the loading is subjected to wide variations. Made to any size required.

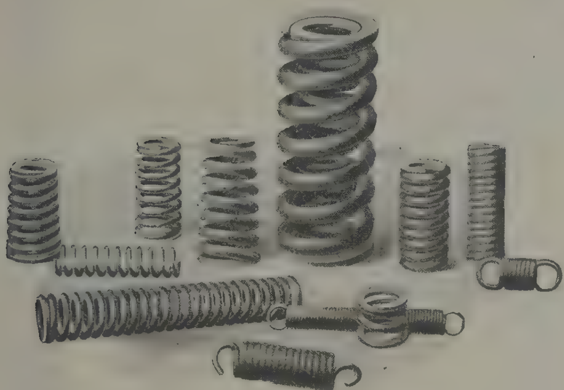


Fig. 8

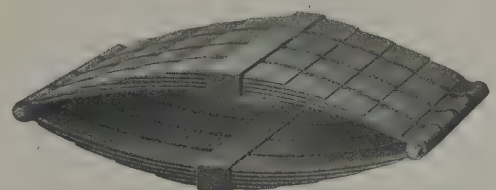


Fig. 9

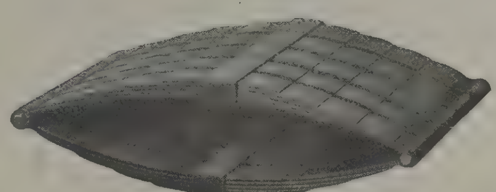


Fig. 10

Figure 5. Passenger Elliptic Spring. Quadruple. Adapted for 4 wheel trucks. Made to any required capacity.

Figure 6. Freight Bolster Spring. Four single coils encased in pressed steel plates. Adapted for cars of 40, 50 and 55 tons capacity.

Figure 11 shows double coil Draft Spring 8 x 7⅞ inches. Outer coil, 1 9/16 inches; inner coil, 1 inch. M. C. B. Class G. Capacity 30,360 pounds.

Figure 12 illustrates Volute Spring particularly adaptable at points requiring exceptional strength and rigidity where limited area restricts size.

Fig. 11

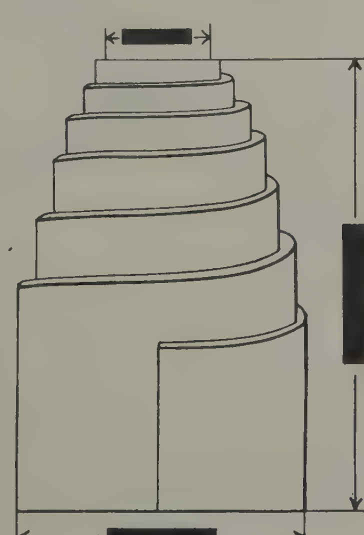


Fig. 12

Car Specialties

"Western" Angle Cock Holder

The "Western" Angle Cock Holder (Patented) (Fig. 1) locates the angle cock according to the M. C. B. Standard for freight equipment. This holder locates the cock properly and anchors it there thus preventing loss of air hose and cock, and also stops leaks in brake pipe. It puts an end to the loss of angle cocks caused by failure of switchmen to uncouple the air hose when cutting trains and switching cars, and prevents air brakes being made inoperative through angle cock being improperly attached to pipe.

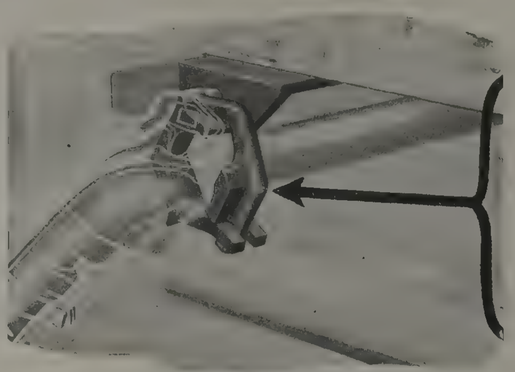


Fig. 1

"Sta-Rite" Uncoupling Lever Attachment

The "Sta-Rite" Uncoupling Lever Attachment (Patented) (Fig. 2) is used in place of uncoupling lever chains, and fits M. C. B. Standard uncoupling lever. It permits all possible coupler movements, and there is no chance of kinking. The "Sta-Rite" will never foul and affords the simplest method of doing away with chains, links, and clevises with pins and cotters. It offers the simplest and most effective means of correcting many of the defects reported under the classification of "Uncoupling Mechanism."

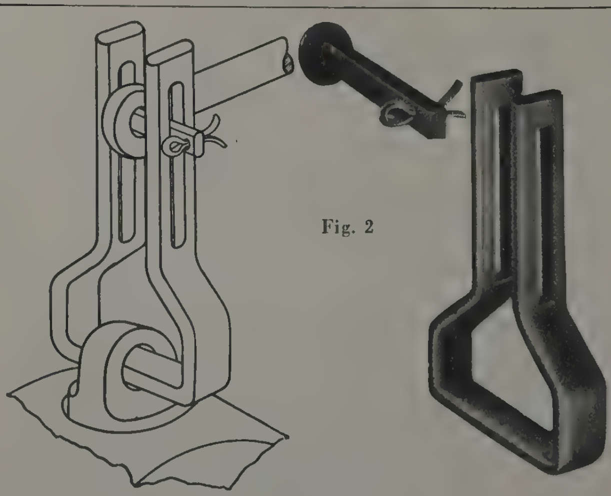


Fig. 2

"Perfection" Brake Ratchet

Shifting loads do not affect this type of hand brake as the "Perfection" Brake Ratchet (Patented) (Fig. 4) is located below the top of the car and out of the way of shovel buckets, long lading unloading machines, etc. The illustration shows the device in release, when, as it will be noted, the lever hangs vertically. The device is operative immediately the handle is raised, and the handle may be raised from any position and always positions itself perfectly. The handle can be released in any position without danger to the operator or end of the car.

Fig. 4

Spiral Pipe Clamps

The "Spiral" Pipe Clamps (Patented) for holding air brake pipe on cars, made by this company (Fig 3) are in one piece—no bolts, no nuts. They are made in all lengths of shank, and afford an effective means of accomplishing the result sought.

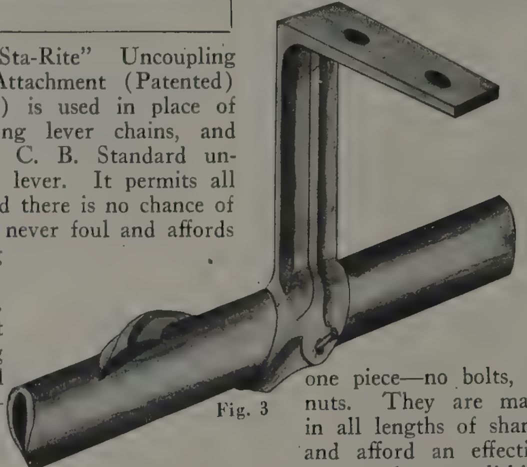


Fig. 3

"Iron Horse or Pedestal"

The Iron Horse or Pedestal (Patented) (Fig. 5) has a sheet steel form, malleable iron cap and base. It weighs but 150 pounds and can be easily handled — rolled about or carried by crane hooks. Diameters: Top, 8¾"; base, 20¼". Standard height, 48½" over all. Special heights made to order.

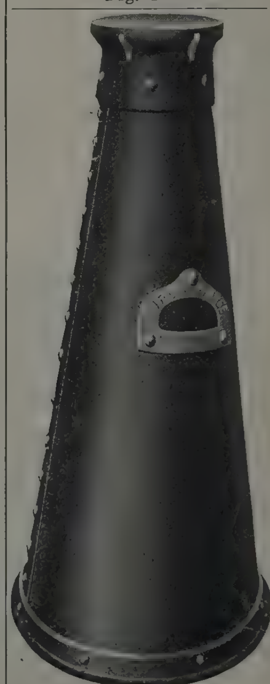


Fig. 5

Ore Handling Car

Advantages

In addition to building all types of freight equipment cars, we have developed and perfected an ore handling car for all classes of ore, wet or dry.

This car, loaded with 52 tons of wet ore is regularly dumped by one man, the doors closed and the car ready to return to the mines in 35 seconds.

The doors are positively locked without pawls or dogs. The mechanism is extremely simple and all parts are readily accessible.

Operating Mechanism

The door operating mechanism consists of links suspended from brackets secured to the draft sills at the ends of the lower portion of the hopper. The links at the two ends of the hopper bottom are connected by shafts extending under the doors and on these shafts rollers are mounted running in trackways on the doors. Near the end of the hopper body, short shafts are mounted in bearings, having applied thereto armed crossheads with curved links attached to the arms and to the door shafts.

A worm segment is mounted on each short shaft and the hub of the segment is supplied with a clutch member with a lug on it. Another clutch member is attached to each shaft to function with the lugs on the other clutch members. The lugs in the two clutch members are so proportioned as to permit of relative movements of the segment and shaft. Worms are mounted between the draft sills near the ends of the hopper body, located over and enmesh with the worm segments. A transverse shaft passes through the worms to rotate them and this shaft is mounted near the ends in bearings secured to the side sills. The ends of the shaft project beyond the side sills for the application of a wrench for manually operating it. Sprocket wheels are secured to the cross shafts and are connected by a chain so that when one of the shafts is rotated the motion will be imparted to both worms functioning with the worm gears.

When the doors are in closed position they are firmly held, account of having been rotated past the dead center, and the worm gearing forms a positive auxiliary lock without the use of pawl or ratchet devices. When the sub-shaft has been rotated sufficiently to overcome the dead centers of the link mechanism, the doors automatically open.

This car can be constructed to any desired capacity.

Track Devices

Product

The Reading Specialties Company manufactures many devices universally approved and used in railway service. These consist of Guard Rail Clamps, Tie Spacers, Portable Derails, Reversible Rail Benders, Rail Straighteners, Compromise or Step Joints, Replacers, Replacer Clamps. The illustrations shown below represent a few of the devices mentioned. The Company enjoys unsurpassed facilities, in plant equipment, expert supervision and skilled workmen, and these advantages, together with a rigid policy of selecting only raw material of the highest grade in an unfailing guarantee of a uniform quality product.

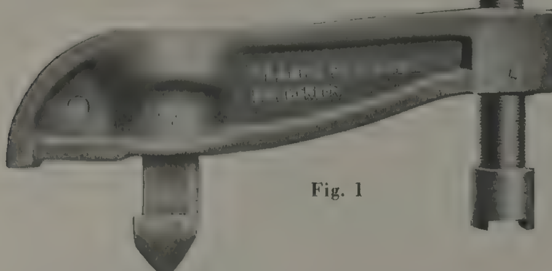


Fig. 1

Fig. 3

Figures 1 and 2 illustrate the Reading Reversible Rail Benders. A simple, rugged and economical device for bending rails, either right or left, within 10 inches from end of rail—without applying splice bars or another section of rail. They are also used in making guard rails and repairing frogs. Being reversible, one bender takes the place of two of other types. These benders have many advantages in design, including exceptional trunnion construction in the screw end which eliminates bending strain and allows screw to remain at right angles with the rail.

Figure 3 illustrates Compromise or Step Joint. The Reading Joint differs fundamentally from other step joints, in that it is cast instead of forged, permitting a distribution of metal so that the largest section is at point of greatest strain. There is no loss of strength due to machining or punching for bolt holes as in the case of the forged joints. The Company is equipped with patterns for all combinations of rails, and rail sections that may be desired.

Figure 4 illustrates Reading Guard Rail Clamp especially designed and built to withstand the destructive stress and shock strain constant in track service. Made of special heat treated steel; filler block and wedge same quality of metal as yoke. Yoke so designed that metal is distributed to points where greatest strain comes. In service, this Guard Rail Clamp permits a flexible swing movement which acts as a shock absorber, eliminates strain on yoke and lessens danger of stock rail being pulled in at this point. Made in three sizes.

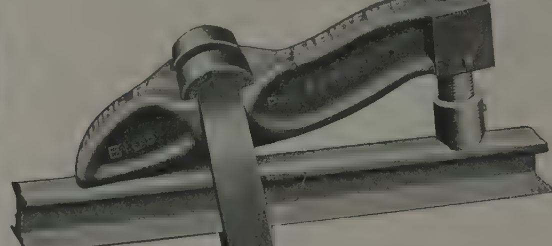


Fig. 2

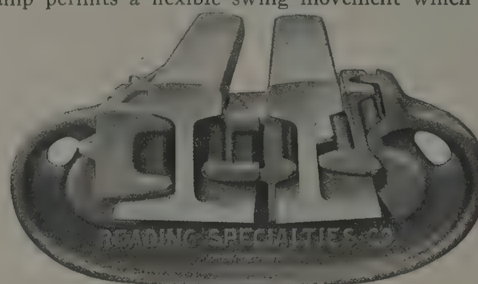


Fig. 4

Figures 5 and 7 show Portable Derail in release and locked positions. By means of a simple, powerful device, this derail is firmly secured to rail as target is raised and released when lowered. Adaptable for use anywhere for protection of equipment. One man carries it anywhere as it weighs only 36 lbs. Figure 6 shows Reading Replacers held in position by Reading Clamps. Note descriptions in cut shown.

Fig. 5

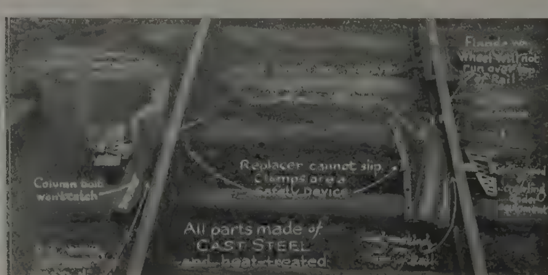


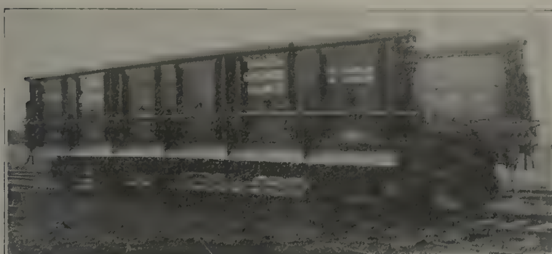
Fig. 6

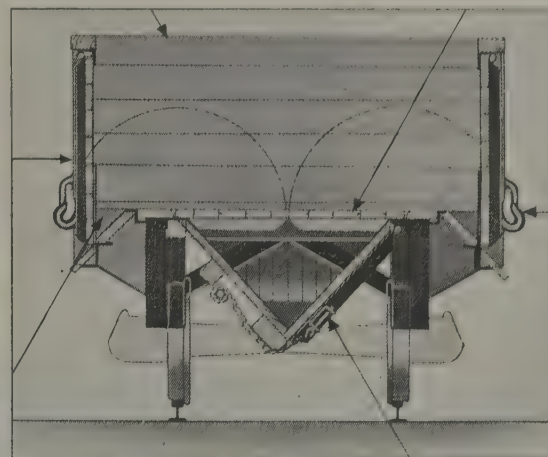
Fig. 7

The Improved Hart Convertible Car

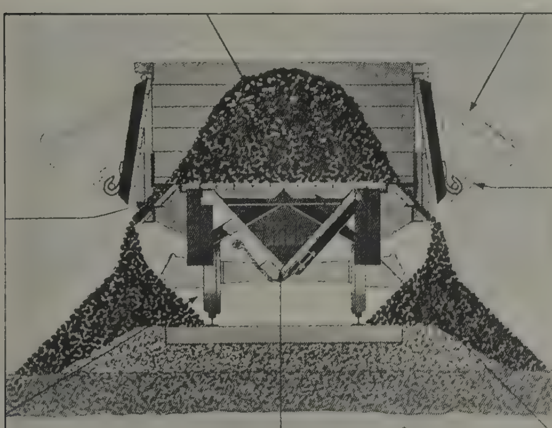
Highest Efficiency

The improved Hart Convertible Car has downwardly and outwardly sloping edges, large side door opening, few side stakes and rigid side frame, and is capable of the highest efficiency in side dump service.

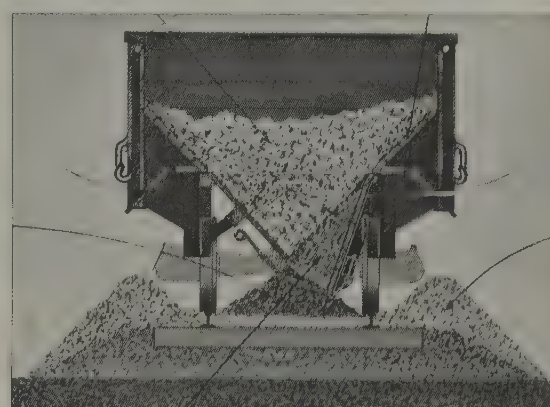




Cross Section of Car for Side Dump Service



Cross Section of Car Spreading Cinders on the Side
Half the Load Runs Out Saving Half the Cost of Unloading



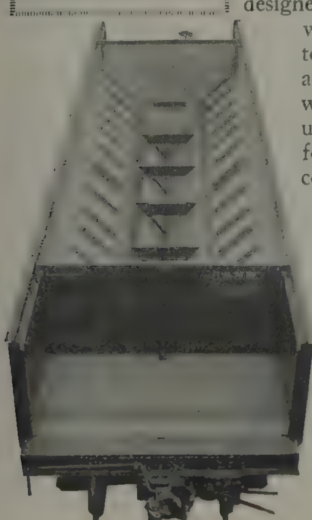
Cross Section of Car in Center Dump Service
All the Load Runs Out, Saving All the Cost of Labor

Hart Convertible Ballast and Coal Car

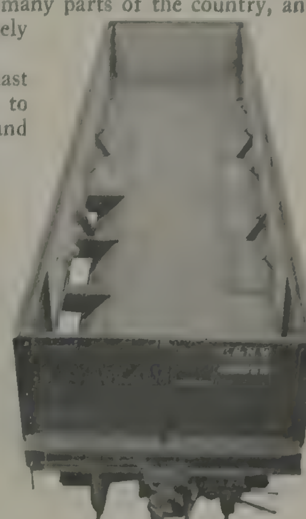
Quickly Converted

Illustrated below is another type of Hart Convertible Car known as the Hart Convertible Ballast and Coal Car. It is designed especially for use where unloading by a top plow is not necessary, and provides a car which, while retaining the valuable center dump ballast features, may be quickly converted into a drop bottom side dump gondola for coal traffic, as will be noted from the illustration. The vertical doors in the sides of the car are dispensed with, while the floor of the car is provided with doors dropping away from the sides of the car to discharge a load of coal or other dumpable material when the car is arranged as a gondola. This car has met with instant success in many parts of the country, and and is being very largely used.

The Rodger Ballast Car Company is glad to submit specifications and drawings of any of the Hart Convertible cars. Their engineering department is always at your service for the design of cars for special requirements.



As Ballast Car for Center Ballasting with ends set in



As Coal Car with drop bottom. One fourth of doors open.

Freight Car Repairs

General

The Ryan Car Company was established in 1906 with plants at Hegewisch, Chicago suburb, where rebuilding and re-enforcement of all kinds of freight car equipment, both steel and wood, has been brought to a state of highly organized efficiency and mechanical perfection.

Repairing, rebuilding and re-enforcing existing freight car equipment follows closely the paths of improvement suggested by the ever-changing conditions of service on American Railways so that definite programs governing this work are carried out by nearly all owners of freight car equipment.

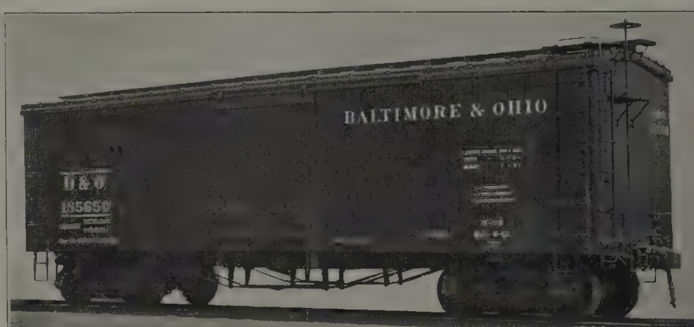
Our Engineering Department specializes in the subject of car re-enforcement, working out the ideas of our customers and submitting complete programs for the rebuilding of equipment to meet modern service conditions.

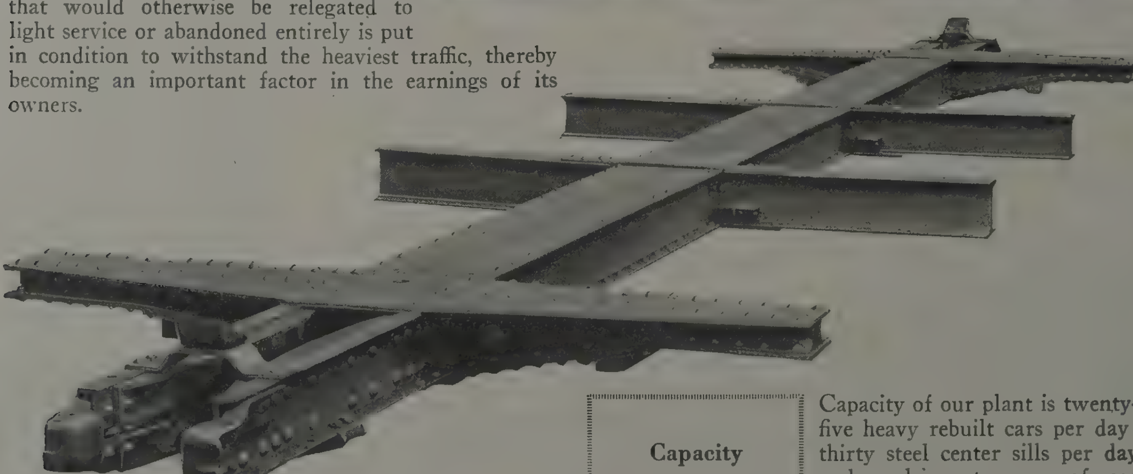
Great economies are effected as the result of this work and much equipment that would otherwise be relegated to light service or abandoned entirely is put in condition to withstand the heaviest traffic, thereby becoming an important factor in the earnings of its owners.

Steel re-enforcements of the type shown in illustration are manufactured in large quantities and applied by us or shipped to Railroads for application at their own repair shops.

Forgings

In our modernized Forge Shop all types of car forgings are manufactured for our own use as well as shipment to customers for application at their own shops.





Capacity

Capacity of our plant is twenty-five heavy rebuilt cars per day; thirty steel center sills per day and a large tonnage of car forgings.

Scarritt Car Seats

Scarritt Simplex Coach Seat

This seat was made after many years of study of that type of seat in which back moves forward and backward without reversing, and in offering this perfected seat, we feel that we have overcome all of the mechanical objections to this type of seat. It has the same comfortable contour that

The Fulcrum Moves in Reversing

has made the *Scarritt* seat so very popular with the traveling public. The seat and back cushions are not removable by the passengers, but are easily removable by one instructed to remove them. We avoid all guimps, bands and other unsanitary features in upholstery. We feel certain that this is to become very popular as our newest offering.

Scarritt Reclining Chairs

Scarritt Reclining Chairs embody the same comfortable lines as the high back coach seats and are made so that they

No. 69. Reclining Chair

may be easily operated by the passenger without the assistance of the porter or brakeman. The occupant has only to assume a reclining position and the chair accommodates itself to the desired position and remains there. These chairs are in use by hundreds of railroads and are very satisfactory.

Scarritt Reversible High Back Coach Seat

This is the seat that was originally designed by M. N. Forney, favorably known as an authority on railway appliances, machinery, and as a mechanical engineer. We have improved on the construction of this seat, but it still retains those features which were scientifically worked out by Mr. Forney. The seat and back are adjustable to fit the form and to be restful to the occupant. We believe this seat to be the most comfortable made, being resilient but not mushy, having no hard unyielding edges and yet being so constructed as to be very long-lived. A great many of these seats of the original pattern are being used daily and have been in constant use for twenty-five years. The construction is so simple and operates so smoothly that it is, in our opinion, a most satisfactory coach seat.

No. 34. Reversible Coach Seat

Scarritt Low Back Seats

Scarritt Low Back Seats for interurban and street car use are made along practical lines and have given satisfactory service for more than twenty-five years.

Facilities and Products

As the Scarritt Car Seat & Manufacturing Company have purchased the Car Seat and Chair Department of the Scarritt-Comstock Furniture Company and are operating in their new building, they are now in a position to design and make all kinds of car seats including caboose cushions. Furthermore, with their new and large facilities, they are able to offer prompt and efficient service on all orders.

Safety Electric Light

"Under-frame" System

The "Under-frame" car lighting electric equipment has the dynamo suspended from the under-frame or body of the car, instead of from the car truck. This method of suspension has eliminated many structural difficulties arising from the present designs of steel trucks and steel car bodies having the deep center sill.

Advantages

The advantages, demonstrated in actual service, are:

(1) Reduction of about 60 per cent in combined weight of dynamo and suspension.

(2) Removal of three-fourths of a ton of overbalancing weight directly from the car truck.

(3) Increased clearances between end sill or brake rigging and belt.

(4) Increased clearances between dynamo and track (*see illustration*).

(5) Moving parts of the suspension are located out of danger from ice, snow, flying ballast and dripping condensation from traps of steam heating systems (*see illustration*).

(6) Decrease in wear of generator and suspension parts.

(7) Increased accessibility for inspection and repairs. An inspection can be made without getting between the rails beneath the car.

(8) Ease of installation. This type of equipment accommodates itself to the standard positions of brake rigging and other parts beneath the car.

working in conjunction with a tension spring; the parts being so designed that the sum of these two varying factors is constant. Excessive belt tension is prevented and belt slippage is eliminated.

No adjustment of this belt tension device is required to maintain its proper operation.

Specifications

The dynamo is four pole, shunt wound, gives sparkless commutation and is furnished with the following capacities:—40 volts, 25 amperes; 40 volts, 75 amperes; 40 volts, 100 amperes; 30 volts, 25 amperes; 30 volts, 75 amperes.

The magnet frame is a one-piece casting, the supporting lugs being cast solid with the frame.

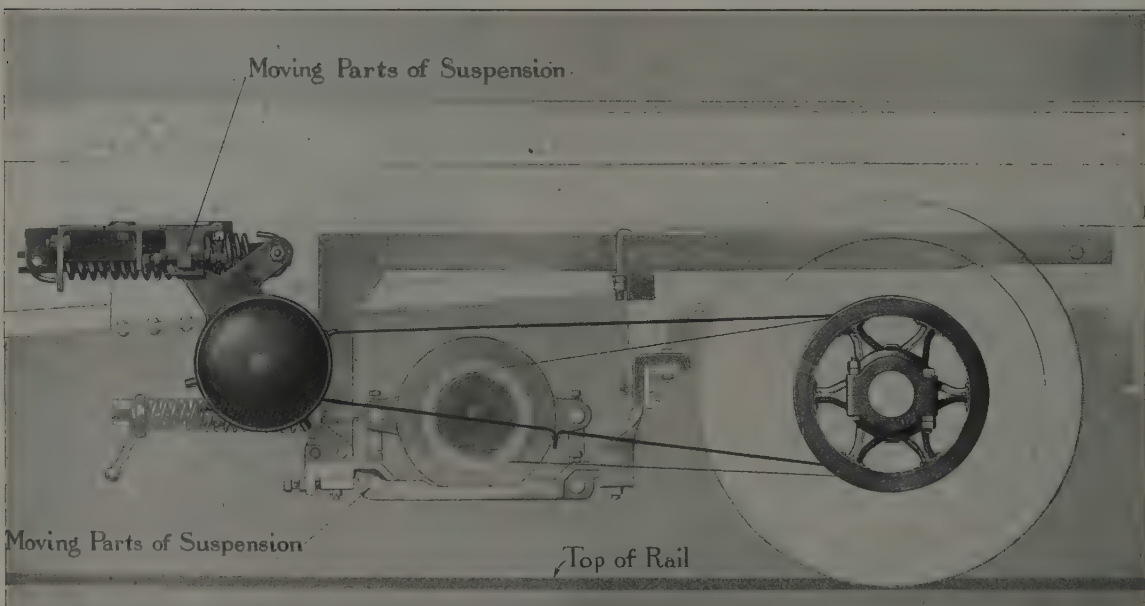
A hand hole cover is provided at the commutator end to facilitate inspection.

The field coils are oilproof and waterproof, held securely in position to guard against wear caused by rubbing against the pole pieces.

The armature is form wound, the conductors having fireproof insulation. The armature core is built up of transformer iron laminations, insulated after punching.

The commutator bars are of hard drawn copper, having liberal wearing depth and ample area to carry the maximum output of the dynamo. Best grade mica insulation is used, having the same rate of wear as the commutator bars.

Ball-bearings, of a type especially designed for this service, are used throughout. Grease grooves and felt washers prevent the entrance of dirt into the bearings



A Graphical Comparison of Size, Simplicity and Clearances between "*Under-frame*" Equipment and Equipment Mounted on the Car Truck

Constant Belt Tension

With body-hung dynamos, the changing angle between car and truck as well as the variable distance between centers of car axle and dynamo shaft must be taken care of. This is accomplished in the "Under-frame" system by a simple belt tension device which utilizes the weight of the dynamo,

and the leakage of grease into portions of the dynamo where it should not go.

Brushes are of high-grade carbon and provided with a device for maintaining constant pressure of the brush on the commutator. The direction of current from the dynamo is kept constant by rotating the brushes through an angle of 90 degrees whenever the direction of rotation of the armature is changed.

Safety Electric Light *(Continued)*

Truck Suspended Generators

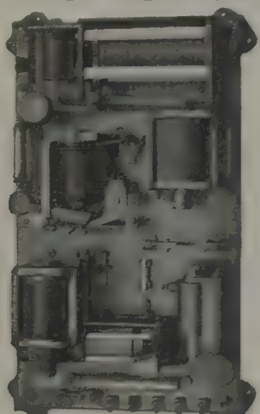
The design of suspension, employed where Safety dynamos are to be suspended from the truck, is simple, gives maximum strength and permits easy access to all parts of the equipment. All parts subjected to wear are lubricated from grease pockets, requiring no adjustment by the car builder.

Dynamos are furnished for truck suspensions with 1-K.W., 2.6-K.W., 4-K.W. (40 volts-100 amperes), and 4-K.W. (80 volts-50 amperes) capacities. The specifications are in other respects similar to the "Under-Frame" dynamo.

"Type F" Regulator

The Safety "Type F" dynamo regulator protects the dynamo from overload and the batteries from overcharge. The dynamo is controlled to give the proper output through changes in speed and changes in battery conditions.

Type "F" Dynamo Regulator

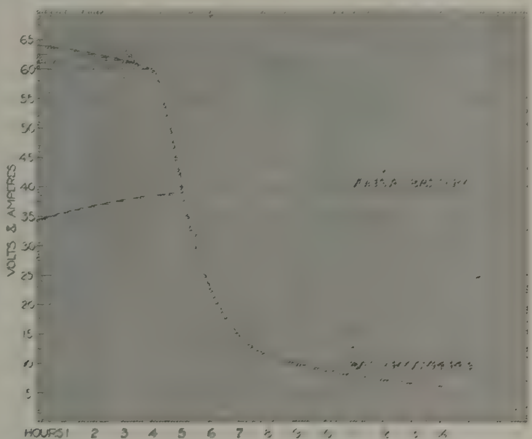


Type "F-1" Dynamo and Lamp Regulator

The Safety "Type F" lamp regulator consists of two parallel piles of carbon discs in series with the lamps. The resistance of these carbons is regulated by pressure, determined by the armature of a magnet, the windings of which receive lamp voltage.

A unique design of magnet and levers maintains a high degree of accuracy in voltage regulation without the use of any auxiliary control. Inverted air dash-pots, of the same type as on the dynamo regulator, are used on the lamp regulator.

Voltage coils on both dynamo and lamp regulators are compensated for change in voltage, due to heating of the coil windings, by zero co-efficient resistances placed in series with the coils.



Battery Charging Curve with Type "F" Dynamo Regulator

"Type F-1" Regulator

The Safety "Type F-1" regulator is used with the 1-K.W. dynamo on cars having small loads. Both lamp and dynamo regulators are mounted on the same panel, and their operation is practically the same as the "Type F" regulators.

"Type FR" Regulator

The Safety "Type FR" regulator can be used on non-passenger carrying cars where close lamp regulation is not regarded as essential. Fixed resistances are used in the lamp circuit. The main switch is of the solenoid type.

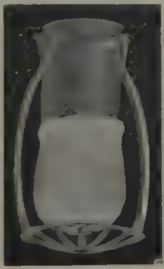
Pintsch Mantle Light

Where Used

On passenger coaches where light of good quality, ample quantity and low cost are essential factors. On mail cars where good illumination must always be available. On cars formerly equipped with oil lamps, where cleanliness is to be combined with simplicity and low cost of operation. As an auxiliary to electric light it incurs no operating expense when not used.

Advantages

By the use of special inverted mantle burners, the candlepower of Pintsch gas is increased more than threefold, producing a pleasing white light of 100 candlepower. Based on four hours burning a day, a two-tank Pintsch equipment will supply light for the average coach of total 600 candlepower for nearly 40 burning hours or over 9 days, without replenishment of the supply.



Pintsch Mantle

Minimum weight of the equipment. A Pintsch two-tank equipment is about one-third the weight of an electric lighting equipment, with an economy in haulage of from $10.00 to $20.00 per car month.

Simplicity of operation. This system is not affected by weather conditions, and having no delicate mechanisms, is not affected by the severe conditions of railway service.

Low cost of installation. The cost of the entire equipment including labor is about one-half that of electric light.

Pintsch Mantle Lamp No. 3583

Car Lighting Fixtures

Essential Features

Safety car lighting fixtures are especially built to withstand vibration and other severe conditions of railway service. They are designed to support and protect the light source and its reflector in proper relation for the best illumination.

Electric Center Fixture No. 19055

A well equipped photometric laboratory, together with extensive knowledge of car lighting and its exacting conditions, are used to select the best locations for lighting units and to select the best types of lamps and reflecting media for each class of car under consideration. The Safety Share-holder, the Pintsch Mantle, the Safety Lamp Socket, the Alukali Reflector and many other important car lighting fixture accessories are used exclusively in Safety fixtures.

Electric Pendant No. 8185

Operating Advantages

The Safety Shadeholder is a simple, rugged and sure device for holding reflectors or shades. Its principle is a series of flexible metal fingers engaging the neck of the reflector with a firm grip, but with sufficient elasticity to absorb the shock of vibration and to allow for expansion of glass reflectors. The metal fingers are reinforced by a locking cap which is easily and quickly operated when inserting or removing the shade.

Buffet Car Fitted with Safety Electric Lighting Fixtures

More than 275,000 Safety Shadeholders are now in service. Over 50,000 were sold during the year 1917.

All Safety fixtures, suitable for use on car ceilings or in such locations as require occasional refinishing, have the exterior or ornamental parts so arranged that they can be easily removed without disturbing the electric connections or interior frames This facilitates installation and inspection and saves the exterior of the fixture from paint mutilation.

Electric Bracket No. 19130

The Pintsch Mantle, used on gas lamps, and the Safety Socket, used on electric fixtures, are both the result of careful experimentation for railway service. The Safety electric lamp socket is heavily insulated, has a strong spring base-contact and is equipped with moulded wire leads and lamp grip-lock.

Finish

Standard metal (brass or bronze) finishes will be applied as required or enamel finishes (white or colored) can be furnished. Baked enamel finishes can be applied to cast iron fixtures where the class of service and construction of the fixture permit of cast iron.

Reflectors

As a result of careful laboratory and service tests, covering practically every type of light reflecting and diffusing media, we have selected a line of glass and metal reflectors and bowls for any car requirements. The Alukali reflector is a recent product made of all aluminum with a special reflecting surface for postal car lighting requirements.

Electric Semi-Indirect Lighting Fixture No. 19127

Designing and Illuminating Engineering

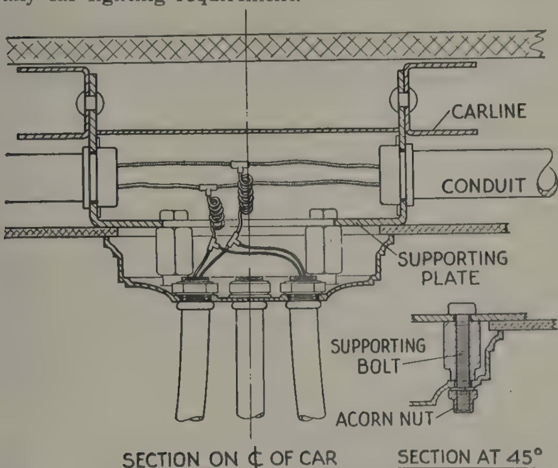
Our engineering and designing departments will submit designs of fixtures to meet exceptional requirements and will be

Electric Table Lamp No. 9860

Car Lighting Fixtures

(Continued)

glad to engineer any new illuminating propositions. We have a large variety of both gas and electric lighting fixtures, direct, semi-indirect, enclosing bowl, deck, lamps, bracket lamps, berth lamps, table lamps, candelabra, etc., available to satisfactorily meet almost any car lighting requirement.



Roof Connections and Construction for Electric Lighting Fixture

Sleeping Car with Pintsch Mantle Center Lighting Fixtures and Electric Berth Lamps

Vapor Lighting System

This Company has developed a vapor lighting system, mixing air with vapor of gasoline, for use on branch lines where conditions do not warrant the larger equipment necessary for the supply and maintenance of Pintsch mantle lighting or Safety "Under-frame" electric lighting.

Safety Electric Fans

Special Service

The proportions of passenger car interiors have exacted conditions which the ordinary commercial electric fans will not satisfy. To meet these special requirements, the Safety fan has been developed on entirely new principles, based on the desirability of moving air at a predetermined velocity uniformly throughout the entire length of a passenger car without causing excessive or harsh drafts at any point.

These Safety fans are giving entire satisfaction and have filled a long felt want in the ventilation and circulation of air in railway passenger cars.

Safety Fan No. 19140

Combination Fan and Lighting Fixture No. 19140-C

Operation

The principle of operation utilizes a series of revolving air deflecting planes which distribute the air currents to all required locations in the car, and provide a soft, cooling breeze at frequent intervals.

These fans are located along the center deck of the car at intervals of 6 feet or 9 feet, or in the center of the ceiling in staterooms. They are furnished with or without electric lights as desired; either two or four lights being used.

All parts are located below the car ceiling with the motor easily accessible for inspection. Ball bearings are used throughout.

Advantages

Equal distribution of the air currents throughout the entire length of the car. Avoidance of harsh, steady blasts of air on the head, which frequently result in colds and other discomforts.

Utilization of an efficient fan and a lighting unit in one fixture, avoiding overcrowded car ceilings.

Low cost of operation.

Distribution of air circulation on scientific principles.

Cast Steel Truck Specialties

Cast Steel Pedestal Side Frames

The Scullin Pedestal Truck Side Frame, illustrated in Fig 1, is of the I-section and is made of high grade open hearth cast steel. It is simple in design and properly proportioned, giving maximum strength and light weight. The uniform section facilitates manufacture and produces castings free from defects.

The jaws on each end of the frame engage with guides cast on the journal box. This construction, together with the weight of the car, securely holds the frame and journal boxes in their proper relationship when in normal service. A recess is provided in the frame at center top of journal box opening into which fits a lug cast on top of the Scullin journal box. Retaining bolts pass through the frame and the lugs, thus preventing the separation of journal boxes and frame in case of derailment.

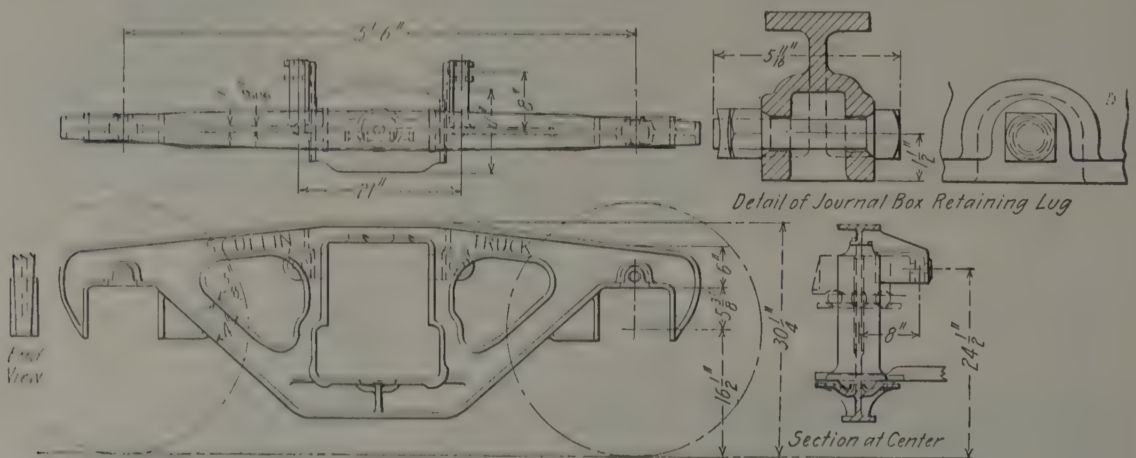


Fig. 1

In the spring plank seat is cored a concave recess, the center of which projects upward to engage with the hole in the spring plank, the arrangement closely resembling a truck center plate. This construction securely holds the truck member in proper relationship and at the same time permits flexibility in all directions without any undue strain being placed on any member. No rivets or bolts are used in assembling, the weight of the car holding the spring plank to its seat in the recess provided in the side frame. This feature permits quick assembly and by eliminating the rivets commonly used for joining the spring plank and side frame reduces the inspection and maintenance costs.

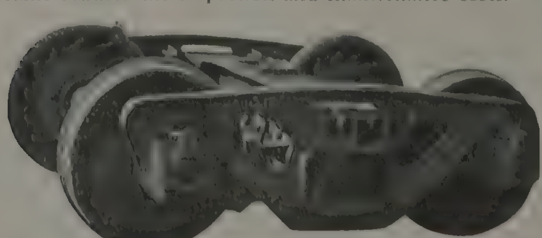


Fig. 2

The frame is made entirely in one piece, the use of the pedestal box eliminating the journal box tie bars, and the brake hanger supports are cast integral with the frame. The method of attaching the journal boxes decreases the cost and the time required in replacing wheels, as it is only necessary to remove two bolts, one from each journal box, and jack up the frame a sufficient height for the pedestal jaws to clear the journal box, in order to roll the wheels out.

Another type of cast steel side frame is illustrated in Fig. 2. This frame is similar to the type shown in Fig. 1 except in the method of attaching the spring plank. In this construction a standard 13-in. car truck channel is used. At each end two plates are riveted across the underside of this channel, between which fits the spring seat of the side frame, the weight of the car holding the two members together. Lugs are cast at each end of the spring seat to center the spring plank longitudinally with the side frame. These lugs together with the plates on the underside of the spring plank tend to keep the truck square and at the same time permit flexibility in a vertical direction without causing any undue strain on any part of the truck.

The method of attaching the spring plank permits of quick assembly and at the same time uses standard material. It is particularly valuable when it is necessary to dismantle the truck, as it does not necessitate tying up the car for any length of time. The general design and the method of attaching the brake hangers and journal boxes is the same with this truck as with the type shown in Fig. 1.

Fig. 3 illustrates the pedestal type of side frame with a special journal box primarily intended for use with trucks with rolled or forged steel wheels. The journal box is retained in the frame by a single horizontal stationary bolt. The retaining lug attached to the journal box is provided with a slotted hole to allow for vertical adjustment. After the truck has been used for some time and it is necessary to true up the wheels, a shim is inserted between the top of the journal box and the journal box bearing of the side frame. After the truck has been run in this condition for some time and it is again necessary to true up the wheels the shims are removed and a thicker shim inserted. The function of the shim in each case is to adjust the coupler height. Various methods of adjusting coupler heights where steel wheels are used have been employed. You will note from our construction that the shims are not required until the wheels have to be trued up. The shims are not required when the cars are built new, as is the case with most construction of trucks provided with means for coupler height adjustment.

Cast Steel Truck Specialties

Side frames can also be used with cast iron or cast steel wheels as with either of these types of wheels, shims above referred to are not necessary.

A side frame with divided journal boxes is illustrated in Fig. 4. This frame has the upper half of each journal box cast integral with the frame and the lower half secured by four bolts, two on each side of the box, a tight joint being maintained between the sections by means of felt gaskets. The boxes are designed to use standard M. C. B. lids, wedges, brasses and dust guards. This type of frame permits exceptionally easy replacement of the wheels. The removal of four small bolts from the journal box releases the cellar, and jacking up of the frame a short distance permits the wheels to be rolled out.

The frame illustrated is designed to use a standard channel spring plank riveted to the frame, but this type of frame can be modified to use any of the spring planks previously described.

A Scullin Cast Steel Side Frame is also designed to replace the arch bar frames. This type, illustrated in Fig. 5 uses the standard bolted type M. C. B. journal box with the tie bar riveted to a lug cast integral with the side frame. This frame follows the same general design as the other types. The one illustrated is arranged for a channel spring plank riveted to the frame, but any of the previously described types of spring plank seats can be furnished. Standard parts are used throughout in the construction of trucks with this type of frame.

The different types of Scullin Cast Steel Side Frames are built in any capacity required and are furnished with any type of brake beam hanger support. They fully comply with the M. C. B. requirements and recommendations as to weight, dimensions and deflection under load.

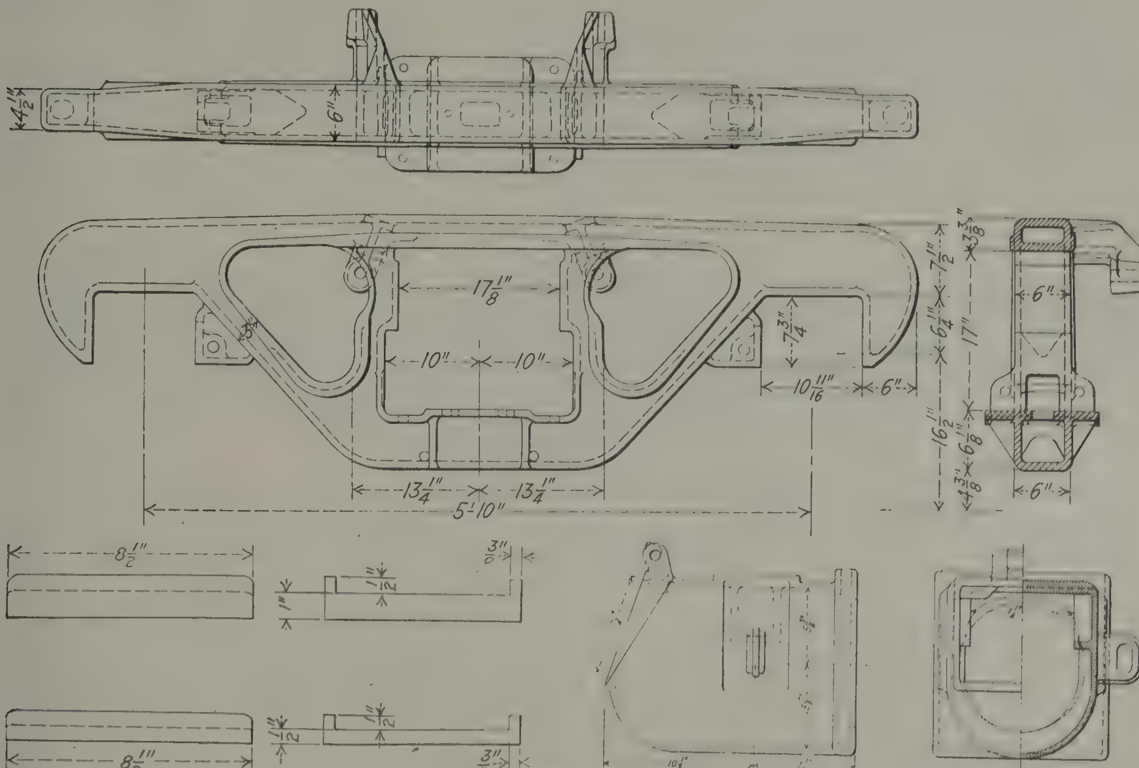


Fig. 3

Advantages Scullin Cast Steel Side Frames provide a one-piece construction which has many advantages over the built-up types It eliminates the multiplicity of parts and their heavy inspection and maintenance costs. It has greater strength and rigidity and therefore keeps the journal box in line with the journals, preventing the binding and pinching of the bearings and subsequent hot boxes due to too great deflection. It permits quicker replacement of the wheels, and therefore keeps the car in service a greater percentage of the time.

Fig. 4

Fig. 5

Cast Steel Truck Specialties

Scullin Spring Plank

The Scullin Equalized Spring Plank illustrated in Fig. 6 is simple in design and of ample strength to withstand the severe strains encountered in railroad service. It is made of an open hearth pressed steel channel, the ends of which are formed to engage the spring plank bearing cored in the side frame. The bearings on the spring plank

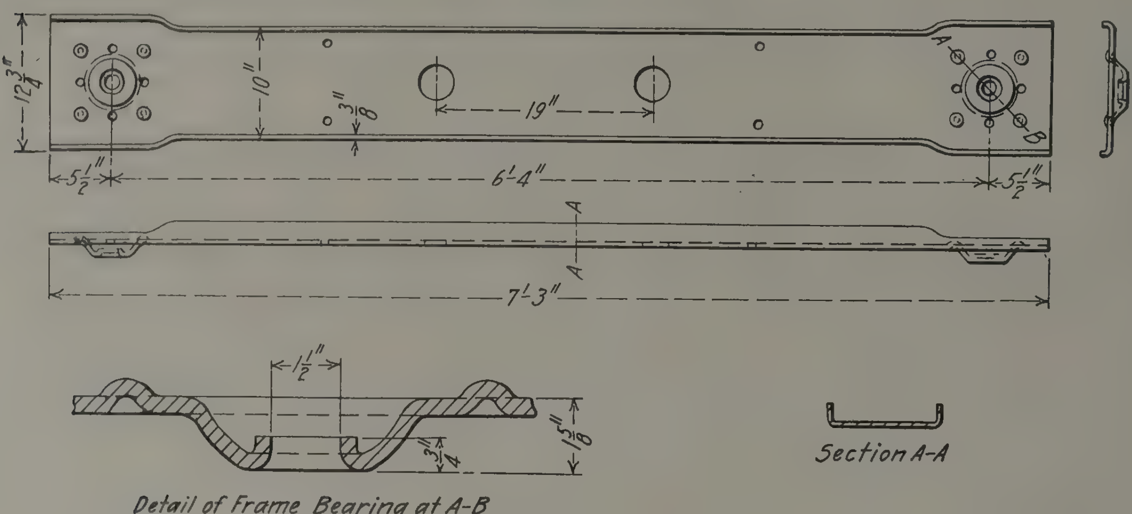


Fig. 6

are convex in shape with a hole in the center. This convex section fits in the corresponding concave section in the side frame and a vertical projection in the side frame engages the hole in the spring plank. The weight on the bolster securely holds the spring plank in place and the truck is relieved of any twisting or vertical stresses due to uneven or curved track. A combined equalized and articulated truck is thus obtained. This spring plank permits quick assembling and dismantling of the truck, no rivets or bolts being required to maintain the parts in their proper relationship. The method of application also decreases inspection and maintenance costs.

Fig. 7

Scullin Journal Box

The Scullin Journal Box, illustrated in Fig. 7, is designed for use with the Scullin cast steel pedestal side frames. It has a lug cast on the top which fits into a recess cored in the side frame and secured by means of a bolt passing through the side frame and lug, which holds the journal boxes and frame together in case of derailment. These bolts carry no load in service and are therefore not subject to wear.

These journal boxes are of standard M. C. B. design with the exception of the lug cast on the top. They are made of either malleable iron or cast steel. The bolt is of special design, having a countersunk head and nut, and lock nut.

Scullin Truck Bolsters

The Scullin Cast Steel Truck Bolster, illustrated in Fig. 8, is designed for use under 40-ton freight cars. It is of T section, properly reinforced and well able to care for the vertical loading, side and end thrusts. Each end directly over the spring seat is of box form and is reinforced by the vertical counterweb. The center plate and side bearings are cast integral with the bolster. This bolster is designed to meet the M. C. B. requirements and recommendations as to weight, dimensions and deflection under load. The illustration merely shows the general design; any modifications will be made which are necessary to adapt the bolster to a particular application.

The bolster illustrated in Fig. 9 is provided for detachable frictionless side bearings. It has cored holes in the side bearing pad to accommodate nearly all of the recognized standard side bearings. This bolster is of the most modern improved box section design and is in use on a number of U. S. R. R. A. new cars. The sections of metal are amply proportioned for the stresses due to the vertical, horizontal and lateral loads.

Cast Steel Truck Specialties

Scullin Body Bolster

The body bolster illustrated in Fig. 10 is especially adapted for reinforcing wooden underframe equipment. It is suitable for application to 40-ton cars, but a similar design can be furnished for heavier or lighter equipment, and its construction may be modified to meet the conditions imposed by any type of underframe. It is of I-section carefully proportioned and is well able to withstand the strains imposed in service.

This bolster is arranged to use channel center and draft sills for reinforcing the wooden underframe. Cored openings are provided through the web to permit the use of center sills continuous from end to end of the underframe, the bolster being secured to each sill by rivets. This application provides rigid construction well able to care for the buffing shocks and other strains received in service. It also permits easy construction, eliminates the multiplicity of parts and by providing continuous center sills relieves the rivets of buffing and pulling shocks.

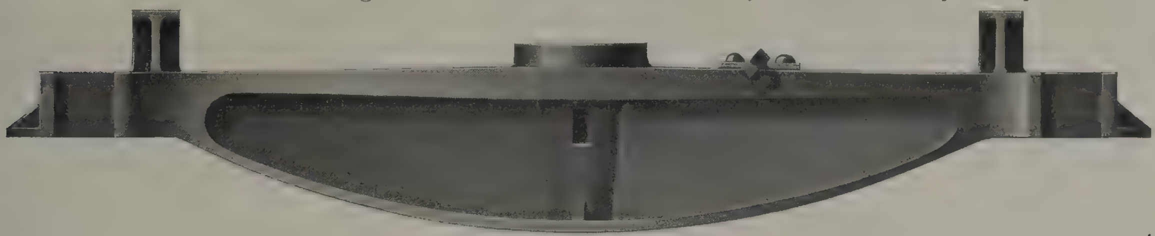


Fig. 8

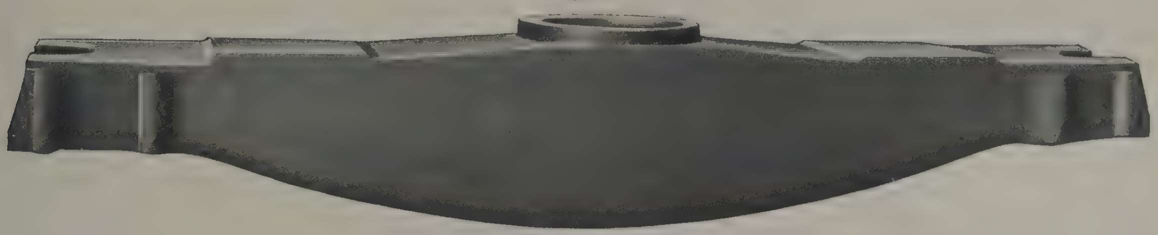


Fig. 9

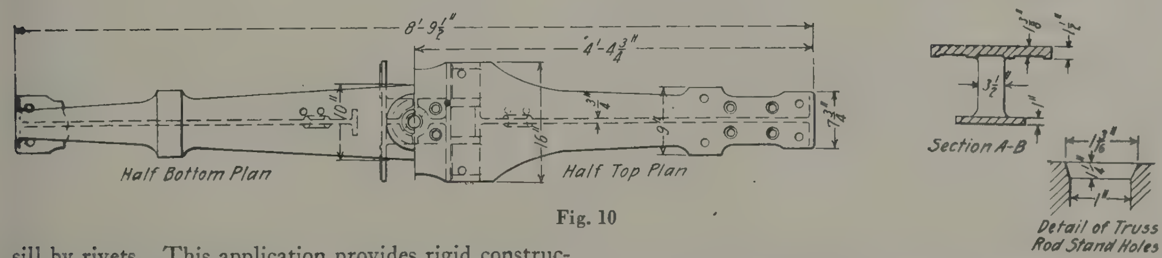


Fig. 10

Advantages

Cast steel truck and body bolsters being made in one piece eliminate the multiplicity of parts found in the built-up types. They furnish a rigid construction that tends to keep all parts of the truck and underframe square. They reduce maintenance and inspection costs, as there is nothing to jar loose. They keep the car in service a greater percentage of the time as they eliminate necessity for repairs.

Manufacturing Facilities

Our foundries are equipped with the most modern appliances for the manufacture of large or small steel castings, and the latest and best shop practice is followed in their production. The engineering, designing and manufacturing departments are composed of men with long experience in steel foundry work. All castings are properly proportioned and thoroughly annealed, eliminating internal strains and insuring a uniform quality of material. Physical and chemical testing laboratories are maintained to determine the qualities and properties of the material entering into the manufacture of the various castings and the entire output is subject to rigid inspection. Definite standards as to quality of material and workmanship are maintained, insuring only perfect castings leaving the shop.

The Schaefer Truck Lever Connection

The connection without a weld

The truck lever connections, on modern railway equipment with inside-hung brakes, are, of course, subjected to compression stresses.

The Old Method

The old method of making such a connection was to weld two flat pieces of iron together to form the jaws and then draw these down and weld onto a solid-round rod, one such a jaw being welded onto each end of the rod. This method produced a connection of considerable weight, highly inefficient as a column, and also with the ever-present uncertainty as to good or bad blacksmith work in the welds.

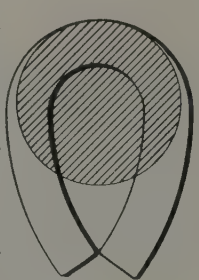
The New Method

These drawbacks were overcome some years ago by the Schaefer Equipment Company, of Pittsburgh, Pa., in their development of the Schaefer Truck Lever Connection; a highly perfected brake detail made from a single piece of open-hearth plate steel, drop-forged and pressed into suitable shape, and thus without welds of any kind.

How Manufactured

In the manufacture of these connections plate or bar steel is used, made according to specifications developed to be most satisfactory. The flat plate is first sheared to size and the ends are then subjected to a highly perfected drop-forging process, forming on each end the jaw structure, providing bosses of extra depth for brake pins and shaping the material so as to provide full strength in the jaws to resist compression loading, after which the bar is bent over into horse-shoe shape, completely closed in at the bottom, forming, thus, a hollow member from a single piece of steel.

Cross Section Comparison



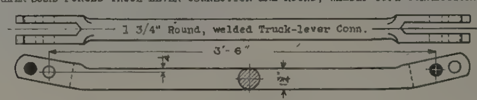
This illustration shows at a glance the reason for the greater rigidity of the Schaefer construction. The hollow member eliminates all inactive material at the neutral axis which also accounts for the high reduction in weight.

The Schaefer Truck Lever Connections are manufactured in capacities to meet the various brake load requirements for cars or engines up to the heaviest types in use, and with brake-pin holes arranged to meet the demands.

PITTSBURGH TESTING LABORATORY,
PITTSBURGH, PA

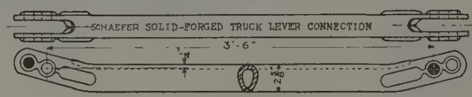
COMPARATIVE TESTS — TESTED FOR SCHAEFER EQUIPMENT CO.

SCHAEFER SOLID-FORGED TRUCK-LEVER CONNECTION and ROUND, WELDED TYPE CONNECTION.



Load, Pounds	Deflection, measured at middle of bar.	
1000	0"	
5000	5/64"	
6000	3/32"	
7000	1/8"	
8000	9/64"	
9000	5/32"	
10,000#	3/16"	Test bar was a standard
Load released to 1000	no set	connection, from stock.
Again 10,000	13/64"	
11,000	15/64"	
12,000	5/16"	
12,500	7/16"	
Load released to 2000	5/16" set.	

Failed, 13,000 pounds, bar bent at end supported in outer lever hole.



	LOAD, POUNDS	DEFLECTION, INCHES.	TEST DESCRIPTION.
Increased by steps of 1000# to	10,000	1/32"	These compression tests were
	13,000	1/16"	made under as nearly as
	15,000	1/16"	possible "service conditions",
	16,000	5/64"	being supported in an Olson
	17,000	5/64"	testing machine by 1" thick
	18,000	3/32"	blocks in the brake-lever
	19,000	3/32"	slots; one end was held in
	20,000	7/64"	the inner and the other end
	21,000	7/64"	in the outer hole.
	22,000	1/8"	Round bar failed at bend
	23,000	9/64"	at end held in outer hole.
	24,000	5/32"	The hollow bar deflected
	25,000	3/16"	uniformly throughout its
Load off to	15,000	1/8"	entire length.
	26,000	15/64"	
Failed,	26,900	Bar failed throughout its entire length.	

PITTSBURGH TESTING LABORATORY, by John M. Bailey
Secretary.

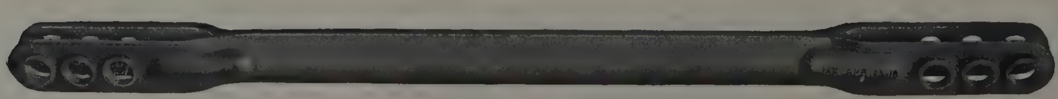
Above is a typical test report of the Standard offset Freight type of Schaefer Truck Lever Connection in direct comparison with a solid round type. Note ultimate load comparison of 13,000 pounds for round with 26,900 for Schaefer type. Respective weights were, for round, 36 pounds, Schaefer type, 22½ pounds.

Large Stock to Ship From

An extensive line of the standard freight car types is carried in stock at our Pittsburgh and Chicago storehouses, and prompt deliveries may therefore be anticipated.

The home office of the Schaefer Equipment Company is Oliver Building, Pittsburgh, Pennsylvania.

Two Hole, Standard Freight Car Type



Three Hole Type

Railway Electrical Engineer

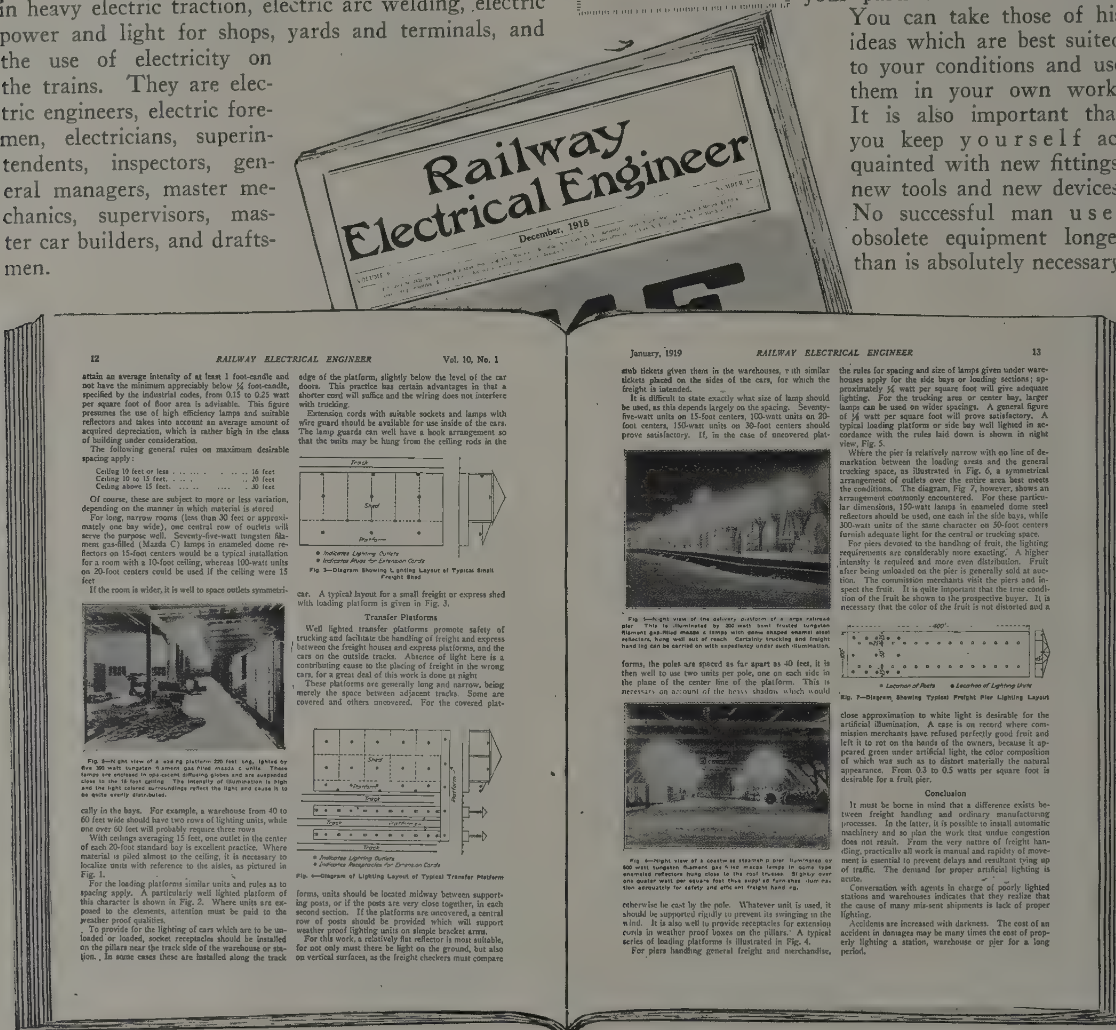
Whom It Serves

The men who read the Railway Electrical Engineer are those who are doing electrical work in the steam railroad field, and those who are responsible for having the work done. This includes railroadmen in all positions who are interested in heavy electric traction, electric arc welding, electric power and light for shops, yards and terminals, and the use of electricity on the trains. They are electric engineers, electric foremen, electricians, superintendents, inspectors, general managers, master mechanics, supervisors, master car builders, and draftsmen.

The Railway Electrical Engineer is also a medium for the interchange of ideas on practical subjects pertaining to electrical work on steam roads.

Why You Should Read It

You should read the Railway Electrical Engineer because it tells you month after month how the other fellow is doing your particular kind of work. You can take those of his ideas which are best suited to your conditions and use them in your own work. It is also important that you keep yourself acquainted with new fittings, new tools and new devices. No successful man uses obsolete equipment longer than is absolutely necessary.



How It Serves

The electrical problems of the steam railroads are treated from the railroad standpoint. Due consideration is given to all other railroad functions when discussing electrical problems—that is, the problem is not only electrical, but its solution must fit in with all other phases of railroad operation without upsetting established methods and practices which concern apparatus other than electrical. This is a phase that most electrical magazines do not cover. In other words the electrical engineer on a steam railroad must be first of all a railroad man and our publication takes up his problem from his point of view. Electrical developments are emphasized from time to time as their importance to steam railroad operation becomes apparent. Reviews of successful electrical installations on other roads are presented.

The Railway Electrical Engineer will keep you informed of new devices as they come out. Furthermore, it affords you a medium for the exchange of ideas.

What It Costs

After a man has been a subscriber for one year he has no difficulty in recalling one or more instances in which something he found in the Railway Electrical Engineer saved him a number of hours of time, saved him the need of buying expensive equipment or helped him to make a real job of the work he was doing. The same man will tell you that the advantage gained much more than offset the actual cost of a subscription. Therefore the cost is nominal.

Subscription: Domestic, $2.00 a year. Canada, $2.00 a year. Foreign, $2.50 a year.

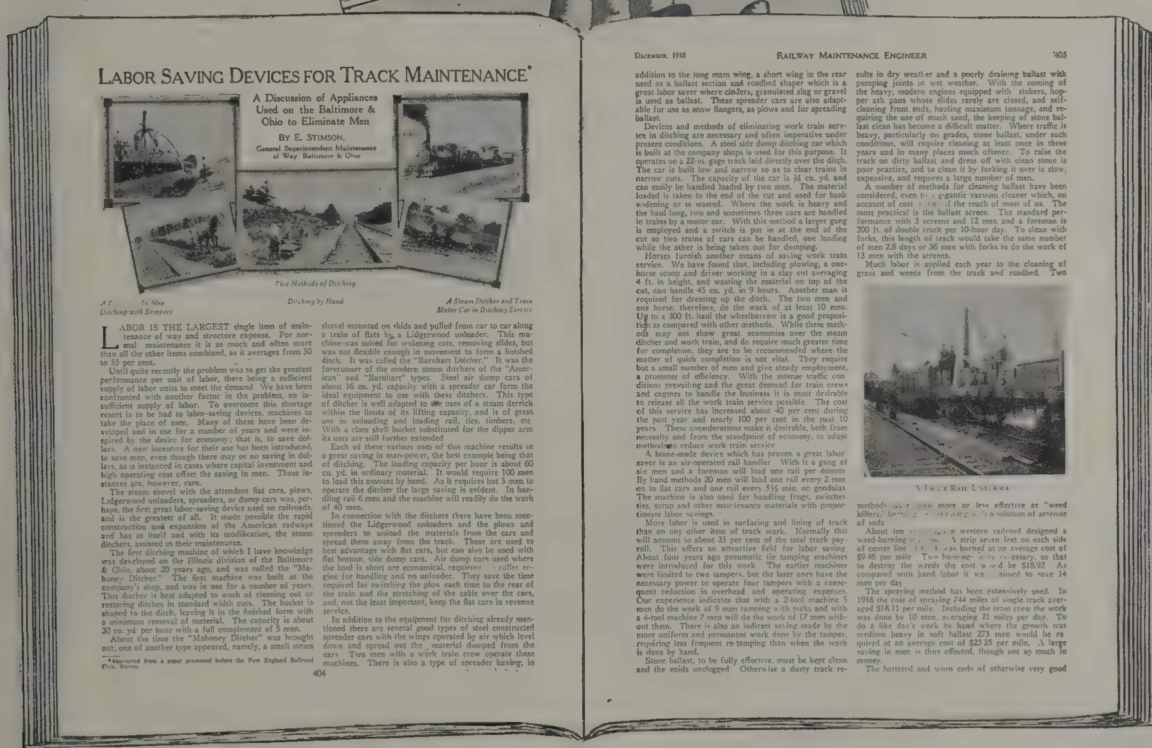
Railway Maintenance Engineer

A Working Tool for Maintenance Department Men

The Railway Maintenance Engineer, published monthly, is the only paper in the world devoted exclusively to railway maintenance department matters. It presents each month to its readers information of value to all engaged in the upkeep and improvement of the track, structures, and other fixed physical properties of railways. Its aim is to assist in the dissemination of information on up-to-date maintenance of way work, and to thus aid all employees of that department, whether chief engineers or section foremen, in handling their work more economically and efficiently, while affording the latter an opportunity to secure a greater knowledge which will be of service to them in securing advancement.

Who Use the Tool

Engineers and superintendents who have to deal with maintenance of way problems, supervisors of bridges and buildings, of water service and track, and the foremen and employees of every department on the right of way, find in every number of the Railway Maintenance Engineer some helpful suggestions to aid them in their daily work and increase the value of their services to their company, and thereby improve their own conditions as employees. No one man's knowledge or experience is sufficient to enable him under all the changing conditions of track maintenance, and the allied services, to grasp at once the best solution of a difficult problem.


December, 1918 RAILWAY MAINTENANCE ENGINEER 405

LABOR SAVING DEVICES FOR TRACK MAINTENANCE*

A Discussion of Appliances Used on the Baltimore & Ohio to Eliminate Men

BY E. STIMSON,
General Superintendent Maintenance of Way Baltimore & Ohio

Five Methods of Ditching

Ditching by Hand

A Steam Ditcher and Train Motor Car in Ditching Service

LABOR IS THE LARGEST single item of maintenance of way and structure expense. For normal maintenance it is as much and often more than all the other items combined, as it averages from 50 to 55 per cent.

*Abstracted from a paper presented before the New England Railroad Club, Boston.

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Why Maintenance Men Read It

This is the reason practical railway men, whether engineers or not, find the Railway Maintenance Engineer of real value. One assistant engineer says: "The Railway Maintenance Engineer is, in my estimation, the most able, efficient and practical railroad maintenance man's paper that I have as yet read. I look forward to its arrival each month. It is not too technical, yet full of what a man needs in keeping up the road."

A gang foreman says: "I am sure that if each track foreman would read and study carefully the meaning of it, it would enable each of us to render more and better service for his company." And, he might have added, by making his services of more value to himself as well.

Some other man engaged in similar work has met the same difficulty and disposed of it successfully. The Railway Maintenance Engineer is the clearing house of ideas and experiences in all classes of maintenance work.

Much Matter at Little Cost

The Railway Maintenance Engineer aims to cover and does cover from month to month the features of maintenance work that are uppermost in the minds of the men who read it. It does this by affording a field for the interchange of ideas and experiences developed among the thousands of thinking men in the maintenance departments of American railways. The subscription price in the United States, Canada and Mexico is $2 a year; in foreign countries, $2.50.

Railway Mechanical Engineer

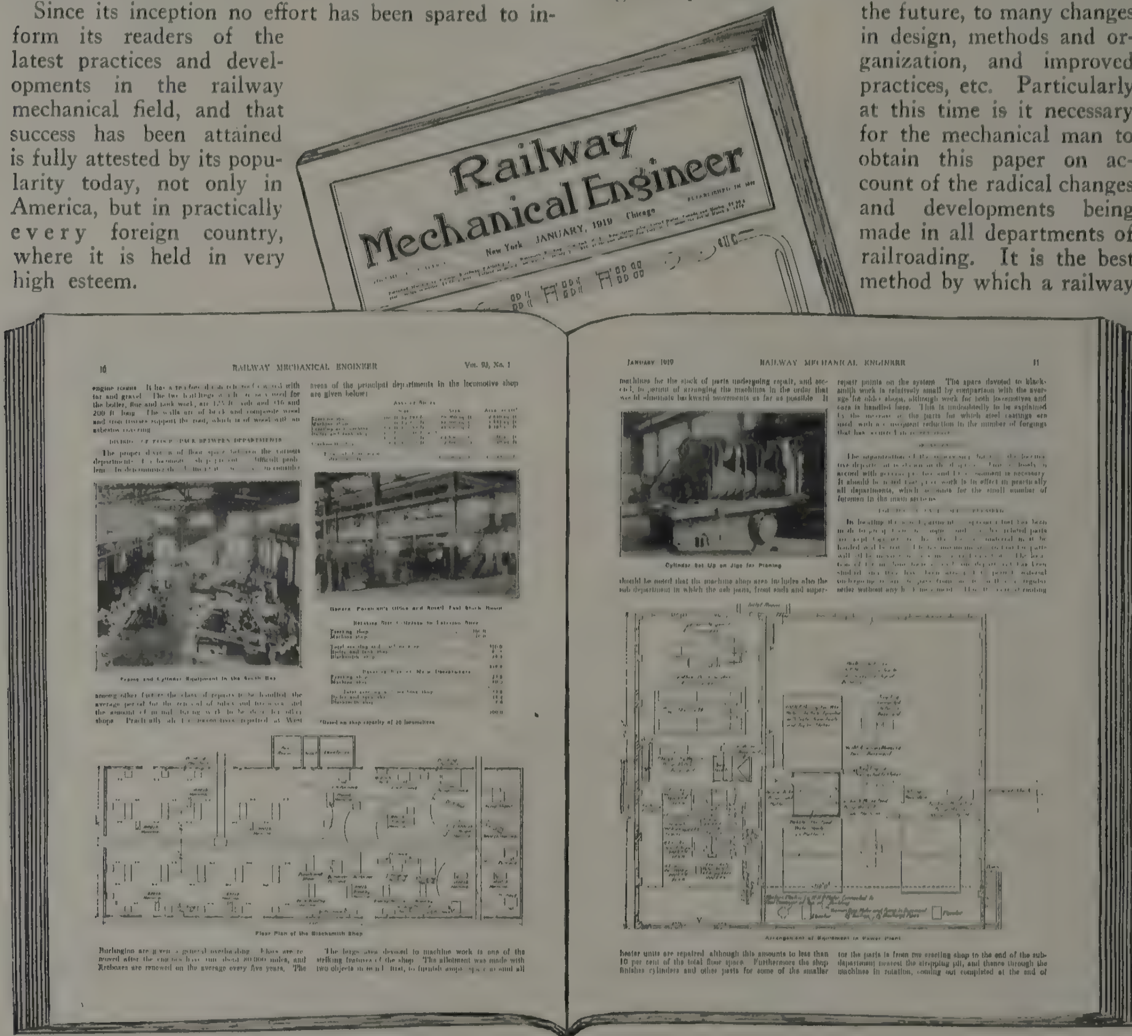
86 Years of Service to the Railways

The Railway Mechanical Engineer, then The American Railroad Journal, was established in 1832. It is the oldest technical paper in the world, and the only paper in this country specializing on railway mechanical department problems, railway shop equipment, and railway shop problems.

Since its inception no effort has been spared to inform its readers of the latest practices and developments in the railway mechanical field, and that success has been attained is fully attested by its popularity today, not only in America, but in practically every foreign country, where it is held in very high esteem.

Invaluable to Those Who Desire to Improve Their Condition

To those who are anxious to improve their condition and to perfect their practices, the Railway Mechanical Engineer will be invaluable. It is a well known fact that whenever improvements are sought the experience of the other fellow is first determined. The Railway Mechanical Engineer provides this. It has led, and will lead in the future, to many changes in design, methods and organization, and improved practices, etc. Particularly at this time is it necessary for the mechanical man to obtain this paper on account of the radical changes and developments being made in all departments of railroading. It is the best method by which a railway



Its Constant Purpose

The purpose of the Railway Mechanical Engineer is to keep its readers—the energetic men in the mechanical departments of railways—informed of the latest developments, both in theory and practice, in car and locomotive design and maintenance and shop operation. It aims to act as a clearing house of ideas for the benefit of its readers. Its editorial staff is not only made up of the men who are accredited as the editors, but a vast number of public-spirited, open-minded, energetic railroad men are always willing for the benefit of their brothers to tell of their experiences and the lessons they have learned in the pages of the Railway Mechanical Engineer.

mechanical department man may with but nominal expense keep in touch with the latest developments and up-to-date practices. As an investment, it cannot be overlooked.

A Big Investment at Small Cost

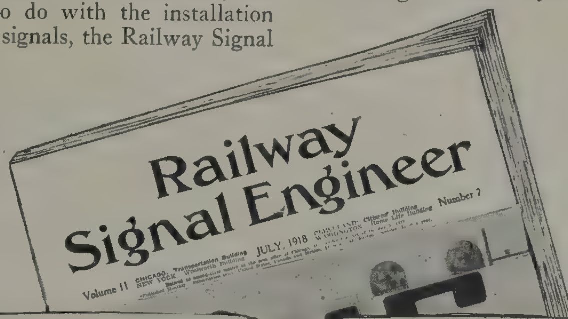
"A big investment," "A practical working tool," "A daily companion," "An aid to Railway Mechanical men." Such are the opinions railway men have expressed concerning this—"the oldest technical paper in the world" which is ever new and up to the moment in the information, data and facts which month after month it brings to the desks of busy men at an expense of but $2.00 per year in the United States, Canada and Mexico; foreign $3.00.

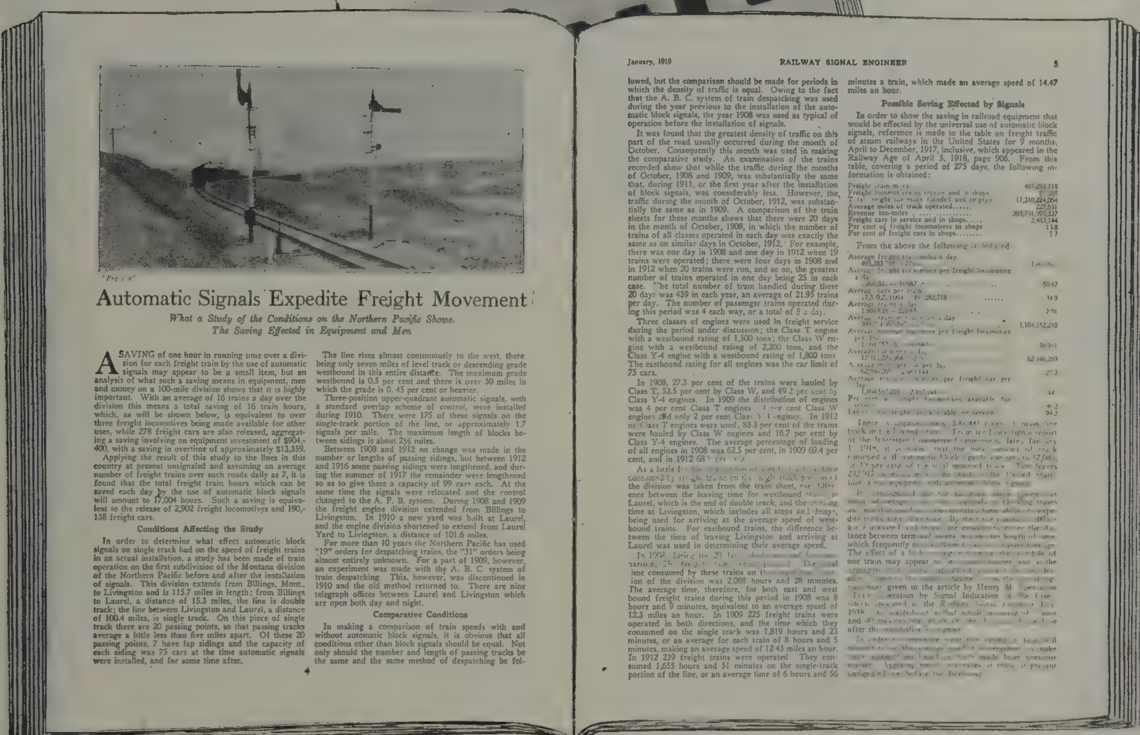
Railway Signal Engineer

Only Paper of Its Kind in Existence

The Railway Signal Engineer, published monthly, enjoys the distinction of being the only paper of its kind in existence. It is a tool designed especially for the use of those railway officials and their subordinates who must know how signals are made, erected, operated and maintained. To signal engineers and signal supervisors, maintainers, batterymen, machinists, draftsmen, towermen, lampmen and all others who have to do with the installation and maintenance of railway signals, the Railway Signal Engineer has proved a guide in which these men place the utmost confidence.

It is as valuable to the maintainer and men in the lower ranks of the signal service as to the signal engineer; and the subscription price puts it within their reach.




January, 1919 RAILWAY SIGNAL ENGINEER 5

Automatic Signals Expedite Freight Movement

What a Study of the Conditions on the Northern Pacific Shows. The Saving Effected in Equipment and Men

A SAVING of one hour in running time over a division for each freight train by the use of automatic signals may appear to be a small item, but an analysis of what such a saving means in equipment, men and money on a 100-mile division shows that it is highly important. With an average of 16 trains a day over the division this means a total saving of 16 train hours, which, as will be shown below, is equivalent to over three freight locomotives being made available for other uses, while 278 freight cars are also released, aggregating a saving involving an equipment investment of $904,400, with a saving in overtime of approximately $13,359.

Applying the result of this study to the lines in this country at present unsignaled and assuming an average number of freight trains over such roads daily as 7, it is found that the total freight train hours which can be saved each day by the use of automatic block signals will amount to 17,004 hours. Such a saving is equivalent to the release of 2,902 freight locomotives and 190,138 freight cars.

Conditions Affecting the Study

In order to determine what effect automatic block signals on single track had on the speed of freight trains in an actual installation, a study has been made of train operation on the first subdivision of the Montana division of the Northern Pacific before and after the installation of signals. This division extends from Billings, Mont., to Livingston and is 115.7 miles in length; from Billings to Laurel, a distance of 15.3 miles, the line is double track; the line between Livingston and Laurel, a distance of 100.4 miles, is single track. On this piece of single track there are 20 passing points, so that passing tracks average a little less than five miles apart. Of these 20 passing points, 7 have lap sidings and the capacity of each siding was 75 cars at the time automatic signals were installed, and for some time after.

The line rises almost continuously to the west, there being only seven miles of level track or descending grade westbound in this entire distance. The maximum grade westbound is 0.5 per cent and there is over 30 miles in which the grade is 0.45 per cent or heavier.

Three-position upper-quadrant automatic signals, with a standard overlap scheme of control, were installed during 1910. There were 175 of these signals on the single-track portion of the line, or approximately 1.7 signals per mile. The maximum length of blocks between sidings is about 2½ miles.

Between 1908 and 1912 no change was made in the number or lengths of passing sidings, but between 1912 and 1916 some passing sidings were lengthened, and during the summer of 1917 the remainder were lengthened so as to give them a capacity of 99 cars each. At the same time the signals were relocated and the control changed to the A. P. B. system. During 1908 and 1909 the freight engine division extended from Billings to Livingston. In 1910 a new yard was built at Laurel, and the engine division shortened to extend from Laurel Yard to Livingston, a distance of 101.6 miles.

For more than 10 years the Northern Pacific has used "19" orders for despatching trains, the "31" orders being almost entirely unknown. For a part of 1909, however, an experiment was made with the A. B. C. system of train despatching. This, however, was discontinued in 1910 and the old method returned to. There are nine telegraph offices between Laurel and Livingston which are open both day and night.

Comparative Conditions

In making a comparison of train speeds with and without automatic block signals, it is obvious that all conditions other than block signals should be equal. Not only should the number and length of passing tracks be the same and the same method of despatching be followed, but the comparison should be made for periods in which the density of traffic is equal. Owing to the fact that the A. B. C. system of train despatching was used during the year previous to the installation of the automatic block signals, the year 1908 was used as typical of operation before the installation of signals.

It was found that the greatest density of traffic on this part of the road usually occurred during the month of October. Consequently this month was used in making the comparative study. An examination of the trains recorded show that while the traffic during the months of October, 1908 and 1909, was substantially the same that, during 1911, or the first year after the installation of block signals, was considerably less. However, the traffic during the month of October, 1912, was substantially the same as in 1909. A comparison of the train sheets for these months shows that there were 20 days in the month of October, 1908, in which the number of trains of all classes operated in each day was exactly the same as on similar days in October, 1912. For example, there was one day in 1908 and one day in 1912 when 19 trains were operated; there were four days in 1908 and in 1912 when 20 trains were run, and so on, the greatest number of trains operated in one day being 25 in each case. The total number of train handled during these 20 days was 439 in each year, an average of 21.95 trains per day. The number of passenger trains operated during this period was 4 each way, or a total of 8 a day.

Three classes of engines were used in freight service during the period under discussion; the Class T engine with a westbound rating of 1,500 tons; the Class W engine with a westbound rating of 2,200 tons, and the Class Y-4 engine with a westbound rating of 1,800 tons. The eastbound rating for all engines was the car limit of 75 cars.

The average time, therefore, for both east and west bound freight trains during this period in 1908 was 8 hours and 9 minutes, equivalent to an average speed of 12.3 miles an hour. In 1909 225 freight trains were operated in both directions, and the time which they consumed on the single track was 1,819 hours and 23 minutes, or an average for each train of 8 hours and 5 minutes, making an average speed of 12.43 miles an hour. In 1912 239 freight trains were operated. They consumed 1,655 hours and 51 minutes on the single-track portion of the line, or an average time of 6 hours and 56 minutes a train, which made an average speed of 14.47 miles an hour.

Possible Saving Effected by Signals

In order to show the saving in railroad equipment that would be effected by the universal use of automatic block signals, reference is made to the table on freight traffic of steam railways in the United States for 9 months, April to December, 1917, inclusive, which appeared in the Railway Age of April 5, 1918, page 906. From this table, covering a period of 275 days, the following information is obtained:

Freight train miles	495,283,718
Freight locomotives in service and in shops	[illegible]
Total freight car miles (loaded and empty)	17,310,224,064
Average miles of track operated......	227,651
Revenue ton-miles	303,751,395,337
Freight cars in service and in shops.....	2,483,144
Per cent of freight locomotives in shops	13.8
Per cent of freight cars in shops........	5.7

What the Signaling Field Includes

The original purpose of signaling systems and signal apparatus was confined solely to considerations of safety. Probably that may be counted its chief function now; but if this purpose can be fulfilled and at the same time greater economy and expedition of freight movement secured, the application of the art serves a double purpose. Perhaps this thought is best crystalized in the slogan adopted by several of the principal manufacturers of signal apparatus—"Why stop a moving train to instruct it to proceed?" If this continuous movement can be secured with no sacrifice of safety, the question answers itself. How this has been done and is being done under the various and constantly changing conditions of railway operation is one of the functions the Railway Signal Engineer performs for its readers.

Why the Signal Engineer Is a Necessity

The Railway Signal Engineer is a necessity to all the men mentioned above because railway signaling is a highly technical art. Because the art of railway signaling is developing rapidly and the best literature of the subject is based on the knowledge that experience and study are adding, from day to day, the very basis of the articles placed before you each month in the Railway Signal Engineer. Books will not give you all of the more recent developments, but you will find them in this working tool of the signal man—which serves to preserve the experiences and ideas of practical signal men as they are encountered and as they are worked out because of difficulties that are immediately faced and *must* be worked out.

Practical as Well as Technical

But not all the work of a railway signal department is technical. The principles that are developed by the engineer must be put in practice and the apparatus for their application maintained by practical men. Their requirements, new "Kinks" for the effective and economical performance of their work, are as much a part of the field of the Railway Signal Engineer as are the developments of the principles of the art and the perfection of the necessary mechanical apparatus.

Subscription in the United States, Canada and Mexico, $2 a year; in foreign countries, $2.50.

Railway Shop Kinks

An Invaluable Aid to Advancement

This book, compiled by Roy V. Wright, Managing Editor of the Railway Age, consists of a selection of the Shop Kinks which have been printed in that publication. The descriptions of the Kinks have been carefully revised and in many cases amplified, and have been classified as far as possible according to the different shops or departments in which they are used.

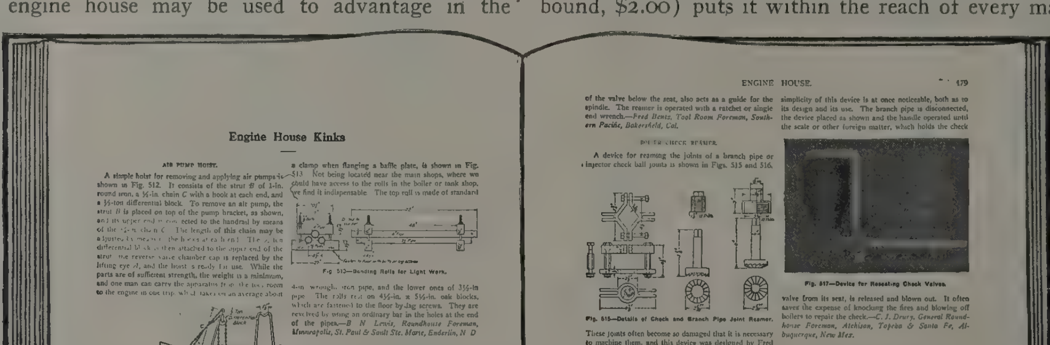
The contents deals with the hard, knotty problems Engine House men have to solve and shows how difficult repair propositions are handled in emergencies—on short notice and without failures.

What it Contains

This book, the contents of which shows the reader how the seemingly impossible is met and overcome, consists of seventeen chapters, 290 pages, 8½ in. x 11½ in. and 803 illustrations and covers machine shop kinks; erecting shop kinks; boiler shop kinks; oxy-acetylene welding and cutting; blacksmith shop kinks; locomotive department and general brass foundry kinks; tin and copper shop kinks; engine house kinks; car department kinks; general; steel freight car kinks; passenger car kinks; planing mill kinks; blacksmith shop kinks; car; air brake kinks; oil house kinks; paint shop kinks; and miscellaneous kinks.

Convenient and Useful

Though the Kinks are classified as listed above, the classification in some cases has had to be made on a more or less arbitrary basis—for instance, most of the Kinks which are used in the engine house may be used to advantage in the erecting shop—and therefore a very complete index is inserted which greatly adds both to the convenience and usefulness of the book to busy railroad men in different departments. In short, this is a book of practical everyday service to busy men and its price (cloth bound, $2.00) puts it within the reach of every man.



Engine House Kinks

AIR PUMP HOIST.

A simple hoist for removing and applying air pumps is shown in Fig. 512. It consists of the strut *B* of 1-in. round iron, a ½-in. chain *C* with a hook at each end, and a ½-ton differential block. To remove an air pump, the strut *B* is placed on top of the pump bracket, as shown, and its upper end is connected to the handrail by means of the ½-in. chain *C*. The length of this chain may be adjusted by means of the hooks at each end. The ½-ton differential block is then attached to the upper end of the strut, the reverse valve chamber cap is replaced by the lifting eye *A*, and the hoist is ready for use. While the parts are of sufficient strength, the weight is a minimum, and one man can carry the apparatus from the tool room to the engine in one trip, which takes on an average about

Fig. 512—Hoist for Removing and Applying Air Pumps.

four minutes, after arriving at the engine he can set it up in half a minute, making a total of 4½ minutes to have it ready for use after leaving the tool room. The same amount of time is required for removing and returning it. Where a hoist of this kind is not used, the ordinary method is to remove the pumps by means of a timber about 20 ft. long, clamped to the back edge of the roof of the cab. Two men are required to handle the timber, and it usually requires about 38 minutes to transport it to the engine and apply it, and 20 minutes to remove and return it. The new device is, therefore, about ten times as efficient as the ordinary method.—*C. J. Lindgren, Roundhouse Foreman, Chicago, Burlington & Quincy, Aurora, Ill.*

BENDING ROLLS FOR LIGHT WORK.

A simple bending rolls for light work in an engine house, such as forming the petticoat pipes or for use as a clamp when flanging a baffle plate, is shown in Fig. 513. Not being located near the main shops, where we could have access to the rolls in the boiler or tank shop, we find it indispensable. The top roll is made of standard

Fig. 513—Bending Rolls for Light Work.

4-in. wrought iron pipe, and the lower ones of 3½-in. pipe. The rolls rest on 4½-in. x 5½-in. oak blocks, which are fastened to the floor by lag screws. They are revolved by using an ordinary bar in the holes at the end of the pipes.—*B. N. Lewis, Roundhouse Foreman, Minneapolis, St. Paul & Sault Ste. Marie, Enderlin, N. D.*

BOILER CHECK REAMER.

A hand reamer for truing worn seats of boiler check valves is shown in Fig. 514. The check, outlined in the illustration, for which this reamer was designed, has a flat seat, the outside diameter of which is the same as the diameter of the hole in the check body through which the cutter must be inserted. It is necessary, therefore to

Fig. 514—Boiler Check Reamer.

have an offset cutter so as to provide a sweep, when the tool is in operation, sufficient to extend over the entire seat face. The brass nut screws into the threads of the valve body and acts as a guide for the spindle. There are two cutting tools, both of which are used at the same time. The 2½-in., or main seat cutter, is offset 3/32-in. The 2-in. cutter, which removes the scale from the bore

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ENGINE HOUSE. 179

of the valve below the seat, also acts as a guide for the spindle. The reamer is operated with a ratchet or single end wrench.—*Fred Bentz, Tool Room Foreman, Southern Pacific, Bakersfield, Cal.*

BOILER CHECK REAMER.

A device for reaming the joints of a branch pipe or injector check ball joints is shown in Figs. 515 and 516.

Fig. 515—Details of Check and Branch Pipe Joint Reamer.

These joints often become so damaged that it is necessary to machine them, and this device was designed by Fred Bentz, tool room foreman at Bakersfield, so that the

Fig. 516—Assembled View of Check and Branch Pipe Joint Reamer.

joints could be repaired without removing the check or pipes from the locomotive. The assembled view shows the device in place on a branch pipe.—*Elmo N. Owen, General Foreman, Southern Pacific, Bakersfield, Cal.*

BOILER CHECK VALVE LIFTER.

The device for reseating check valves shown in Fig. 517 can be made at an expense of about $1.50. The sticking of boiler checks is one of the chief troubles in a roundhouse, and is especially annoying and expensive if it happens when a locomotive is ready to go out. The simplicity of this device is at once noticeable, both as to its design and its use. The branch pipe is disconnected, the device placed as shown and the handle operated until the scale or other foreign matter, which holds the check

Fig. 517—Device for Reseating Check Valves.

valve from its seat, is released and blown out. It often saves the expense of knocking the fires and blowing off boilers to repair the check.—*C. J. Drury, General Roundhouse Foreman, Atchison, Topeka & Santa Fe, Albuquerque, New Mex.*

BOILER CHECK VALVE LIFTER.

A very handy check valve lifter is shown in Fig. 518. The drawing shows the lifter as used on a consolidation engine check valve with a flat seat. Often after the engine is steamed up a chip or piece of scale lodges under the valve and prevents its closing. The check lifter is then used allowing the obstruction to be blown off the

Fig. 518—Check Valve Lifter.

seat. It is applied by merely disconnecting the branch pipe. With this lifter it is possible to open a check against 200 lbs. steam pressure.—*D. P. Kellogg, Master Mechanic, W. F. Merry, General Foreman, and C. H. Goodwin, General Gang Foreman, Southern Pacific, Los Angeles, Cal.*

BOILER TEST HOSE, SAFETY CLAMP FOR.

A strong safety clamp for the hose which is used for testing locomotive boilers in the engine house, is shown

Book Department

1 2 3 4 5 6 7 8 9

No. 1—Government Ownership of Railways

By Samuel O. Dunn, Editor of Railway Age, 400 pages, 5 in. x 7½ in. Gives information as to the comparative results of private and public ownership and management of railways in various leading and typical countries, and directs serious consideration to the question of what—in view of the experience of other countries with state ownership and management, and of the conditions existing in the United States—would probably be the results of the adoption of government ownership of railways in this country. Price, cloth bound, $2.00.

No. 2—Regulation of Railways

By Samuel O. Dunn, Editor of Railway Age. Finished since the United States Government assumed control of the Railroads and reviewing fully the policy which has been followed in the regulation of American railways, especially during the last ten years, pointing out both the weak and the strong points of the system, the ways in which it has done harm and the ways in which it has been of public benefit. Size, 5 in. x 7½ in., 330 pages. Price $2.00 f. o. b. New York; $2.15 elsewhere.

No. 3—Railway Signaling in Theory and Practice

By James B. Latimer. 420 pages, 5 in. x 8 in., 140 illustrations, including much valuable data on mechanical interlocking, methods and mechanism of automatic block signal protection, joint work, contracts and estimates. Price, cloth bound, $2.50.

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No. 5—Railway Shop Kinks

Compiled by Roy. V. Wright, Managing Editor of the Railway Age, 290 pages, 8½ in. x 11½ in. and 803 illustrations. It covers machine shop kinks, erecting shop kinks, boiler shop kinks, oxy-acetylene welding and cutting, blacksmith shop kinks, locomotive department and general brass foundry kinks, tin and copper shop kinks, engine house kinks, car department kinks, general, steel freight car kinks, passenger car kinks, planing mill kinks, blacksmith shop kinks, car, air brake kinks, oil house kinks, paint shop kinks, and miscellaneous kinks. Price, cloth bound $2.00.

No. 6—Track Deformations

By G. Cuenot. Translated from the French by W. C. Cushing, Chief Engineer of Maintenance of Way of the Pennsylvania Lines West. 147 pages, 6 in. x 9 in., illustrated. Price, cloth bound, $2.00.

No. 7—Electric Locking

By James Anderson, Signal Inspector of the New York Central Railroad Lines West. 214 pages, 6 in. x 9 in., fully illustrated by diagrams. Price, cloth bound, $2.00.

No. 8—Letters from an Old Railway Official

To His Son, and To His Son, A Division Superintendent.—By Charles Delano Hine. Every ambitious young railroad man ought to read these two books. They are short letters, compact, of an easy and agreeable style and both lively and humorous as well as instructive. Size of books 5½ in. x 7½ in., first series 179 pages, second series 232 pages. Series I bound in cloth, $1.50. Series II bound in cloth, $2.00.

No. 9—Rights of Trains on Single Track

By M. W. Forman, 477 pages 4 in. x 7 in. Contains 1,166 questions and answers, 82 examples of orders and comments and discussion. Price, cloth bound, $2.50.

Standard Tank Cars

For All Liquid Commodities

Standard Tank Cars are indispensable to the Petroleum and Acid Industries. Abbattoirs, packing houses, paint, soap and roofing manufacturers depend upon them. Foundries and rolling mills use them to obtain oils and pickling acids. The list could be extended to include many other liquid commodities on which great and small industries depend.

Standard Construction

The Tank, underframe, and truck construction of Standard Tank Cars is of extra heavy design, and they comply with and endeavor to anticipate the requirements of the Master Car Builders' Association, Interstate Commerce Commission and Federal Safety Appliance Committee. The best Engineering practices of the day and the most careful standards of workmanship are incorporated in Standard Tank Cars.

Special Features

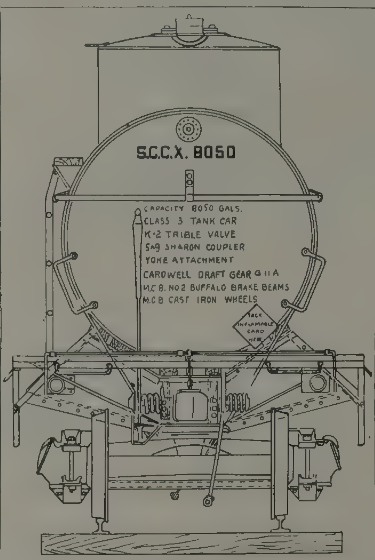
These Cars are center anchorage made so as to allow the tank to be removed from underframe without cutting rivets. The Tanks are supported by built-up body bolsters of the necessary width and strength to allow raising of car under load. Cast Steel combination striking plate and end girder tie, allowing for the radial movement of coupler, giving the Master Car Builders' friction draft gear coupler clearance when going around curves. Westinghouse automatic freight car air brakes. Malleable iron push pole pockets attached to body bolster.

General Specifications

Tank designed for a bursting pressure of 300 pounds per square inch. Steel in tank of the grade known as Open Hearth Steel, good uniform quality. Cast iron outlet valve winged type, seated in valve chamber by means of a ground joint. All Tank Seams are double riveted, lap joints well calked inside and outside.

Rivets are best quality boiler rivets. Tank bands, threaded and secured to underframe with nuts and nut locks. Trucks are cast steel side-frame type, fitted with cast steel truck bolsters which have an even distribution of metal giving a maximum vertical strength with side flanges on top and bottom members increasing its strength transversely. Slabbing to be No. 1 Yellow Pine.

Couplers, air pipe, and fittings, brake material, hand rails, wheels, journal boxes, wedges, bearings, are all of Master Car Builders' Standard.



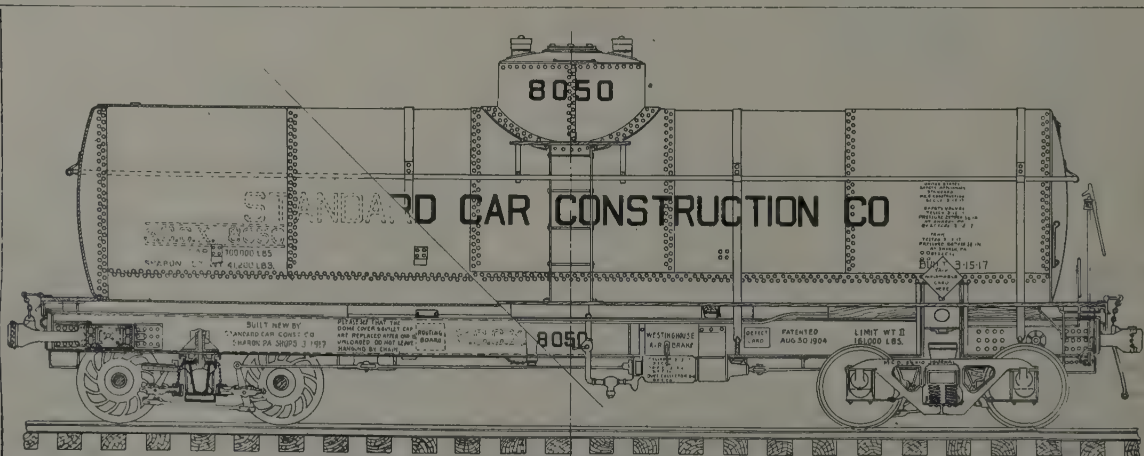
END VIEW

Advantages

It is our honest belief that Standard Tank Cars have built-in service qualities that offer you an exceptionally good investment. They are so constructed that they give maximum service at lowest maintenance cost. Standard Tank Cars incorporate various improvements in design and construction that have proved of value in increasing capacity and expediting handling. Our ability to make prompt deliveries on any order, due to our splendid facilities and large supplies of material, recommends our proposition to your preferred attention. Standard Tank Cars for Prompt Deliveries.

Offices and Works

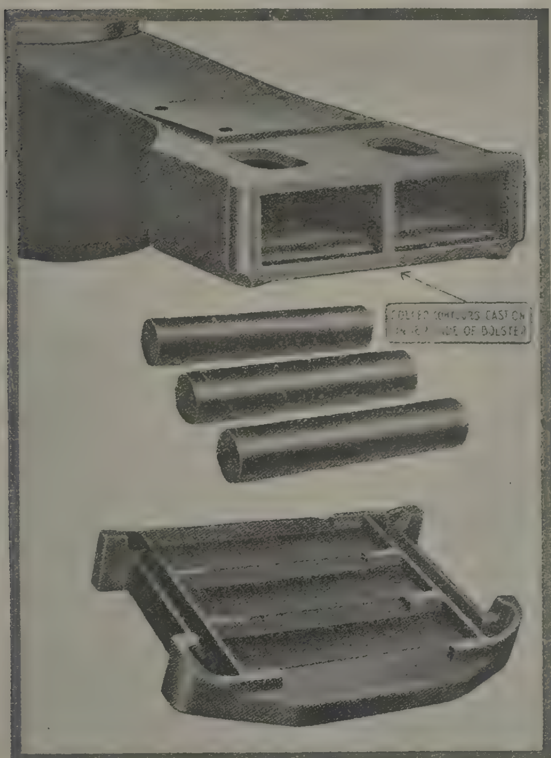
Our plant is at Sharon, Pa. Branch offices, Wright Bldg., St. Louis, Mo.; Peoples Gas Bldg., Chicago, Ill.; 108 So. Fourth St., Philadelphia, Pa.; Woolworth Bldg., New York City, N. Y.



SIDE ELEVATION

Railway Supplies

Barber Lateral Motion Roller Bearing



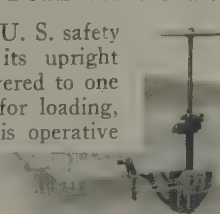
The Barber Lateral Motion Truck Device is in use on every prominent type of freight car truck frame and bolster now in use.

Typical design used on 45 railroads and standard on 35 roads. Several hundred thousand cars are now equipped with the device and have been in service for many years.

Barber Lateral Motion Journal Box

The Barber Roller Bearing Lateral Motion Journal Box can be applied to any truck and is interchangeable with standard box brass and wedge. It reduces the wear on the flanges and journal bearings and lessens the possibility of derailment. It is particularly desirable for the middle pair of wheels of six-wheel trucks, relieving the end thrust between brass and journal collar.

Barber Drop Down Brake Shaft



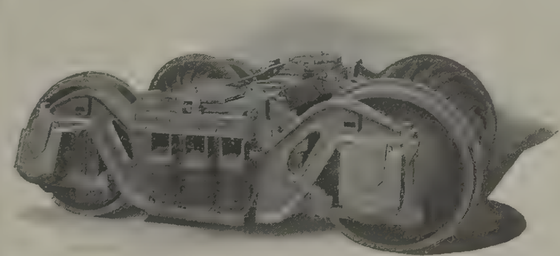
This Shaft meets the U. S. safety appliance standard in its upright position and may be lowered to one side to give clear deck for loading, and in this position it is operative for holding the car on the siding. It is simple in design, durable and dependable.

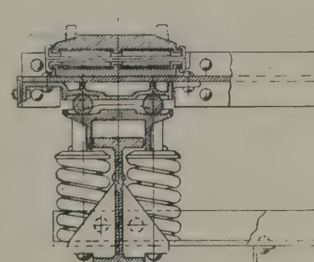
Barber Roller Side Bearing

It is made with malleable iron housings, special hard iron steel bushed rollers and equipped with pins of rolled steel shafting case hardened. Height and layout of rivet holes are made to suit any requirements.

This bearing is suitable for both passenger and freight equipment. It is simple in design, efficient in use, inexpensive, unlimited in its scope of movement and is maintained at minimum cost.

Barber Double Action Roller Bearing Lateral and Radial Motion Truck



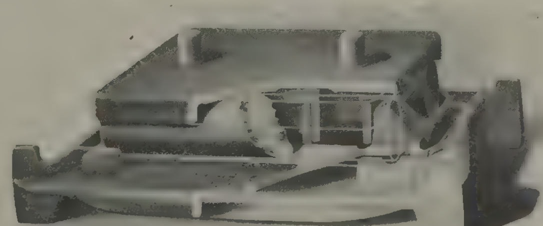


This truck is fitted with Barber Cast Steel Side Frames and Barber Lateral and Radial Roller Devices and is equipped with a rolled steel I-beam bolster.

The Lateral and Radial Truck is also made in arch bar Side Frame type with special interlocking columns.

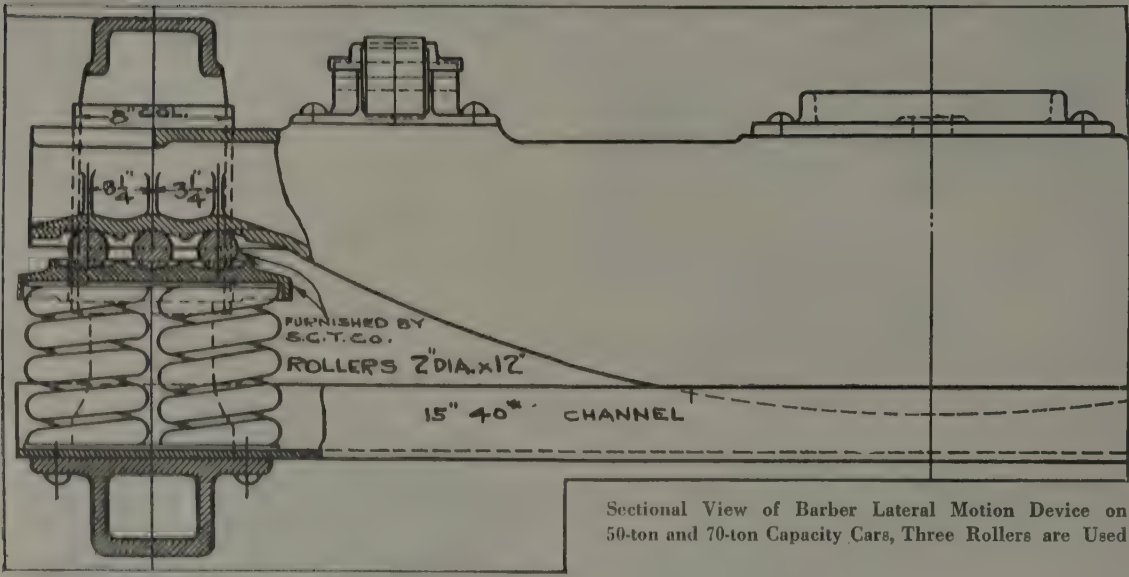
The entire load is carried at four points of the car body directly on the centers of the truck side frames by Lateral and Radial Motion Rollers which allow for free curvature of the trucks. This type of truck is especially designed for heavy capacity cars, 70 tons or more, and no load is carried at the center of the truck bolsters.

Barber Interlocking Roller Cap and Seat for Barber Lateral Motion Truck Device



This type of roller is used on freight cars and is designed to lock the roller cap to the roller seat and relieve the wear on the truck columns.

Barber Lateral Motion Freight Car Truck Device— As Applied to Various Types of Trucks

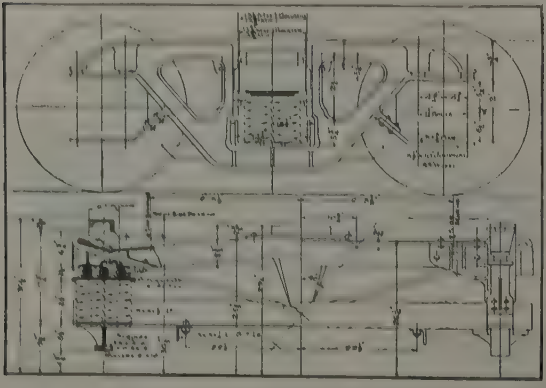


Sectional View of Barber Lateral Motion Device on 50-ton and 70-ton Capacity Cars, Three Rollers are Used

Thoroughly Tested

The Standard Car Truck Co.'s trucks and devices are the result of experience and natural development in meeting the requirements of cars of increasing weight and capacity. Every improvement and change of design, which changing conditions have demanded since the company's organization in October, 1895, has been thoroughly service-tested before final acceptance. They are now prepared to furnish details for Trucks, Side Bearings, Center Plates and Four Point Bearing Cars from thirty tons to one hundred and ten tons capacity.

Materials furnished are carefully inspected and tested before leaving the factory, not only for the faults of workmanship but for physical and mechanical defects. Castings are designed after long experience to give best service results, and run free from flaws in modern foundry practice. The quality of steel and careful hardening processes used in manufacture insure rollers and parts that will give maximum wearing results and freedom from breakage.



Trucks

Our lateral motion truck devices are the original and only simple effective substitutes for swing hanger trucks. They will decrease flange wear and train resistance and absorb shocks to trucks, car body and track with only a small increase in cost over rigid trucks and without increasing dangerous wearing or breaking parts.

Center Plates and Side Bearings

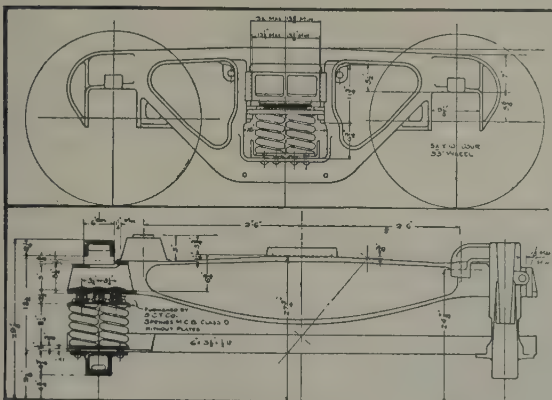
The roller bearing center plates have stood service under high capacity cars. They are practical. They give free radial action to trucks, reducing drawbar pull and wear on wheel, flange and rail.

After seven years of service Side Bearings are still in good condition. They do not wear flat or get out of place. The parts are few and make a perfect roller side bearing.

Four-Point Bearing Car and Trucks

These are a new departure in car and truck construction and our patents cover car body, truck and side frame complete. Five of these cars have seen service varying from one to five years, have been test-loaded 50 per cent over capacity, and all have records clear from failure or derailment. Flange wear is reduced to a minimum. Truck and body bolsters reduce the weight and eliminate the possibility of breakage from load. The trucks are double action and the body is designed for the four point support.

Barber Lateral Motion Freight Car Truck Device—As Applied to Various Types of Trucks



Saves in Repair Bills

The argument holds with reference to freight equipment, though complaint of the absence of such protection can come only in the form of large claims for damaged freight, damage to rails, derailments, and in bills for repairs to trucks and truck parts.

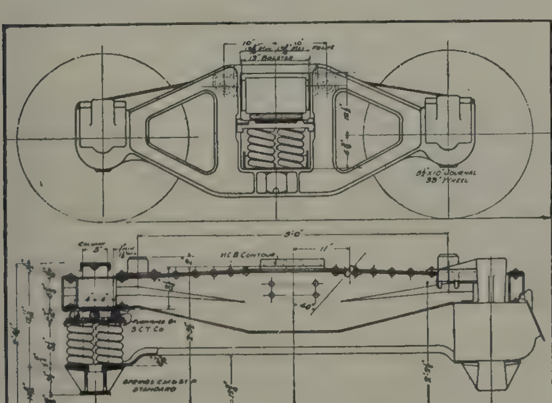
Records of railroad companies that have used the Barber Roller Device for many years show that by its use the life of wheels, rails journals and brasses and all truck details is greatly prolonged and that the financial saving resulting from its use in freight service is out of all proportion to its cost.

The avoidance of derailments and accidents due to broken wheel flanges is an important consideration.

Trailer Truck and Tilting Brake Staffs

The Barber DeVoy Trailer Truck simplifies the parts necessary for a lateral action of trailer wheels under locomotive fire boxes. It is giving good service under a large number of locomotives.

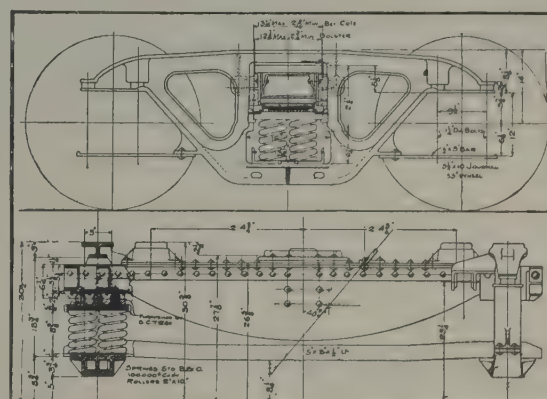
A drop brake staff which meets the U. S. Safety Appliance Standard in its upright position and which can be lowered to one side giving clear deck for loading and still be operative for holding the car on the siding.



Barber Lateral Motion Truck Device

The Barber Lateral Motion Truck Device is desirable for use on freight car trucks.

All passenger, mail, express, baggage, dining and sleeping cars are equipped with some design of lateral motion truck, to make them ride easy and eliminate derailments; therefore, if lateral motion is absolutely necessary in passenger car service it is of as great benefit in freight service.



It makes easy-riding cars, without shock from side-lurching, and eliminates a common cause of derailment.

Endorsements

Officers of roads having thousands of freight cars equipped with the Barber Lateral Motion Truck Device are entirely satisfied with its use. One of the many users said:

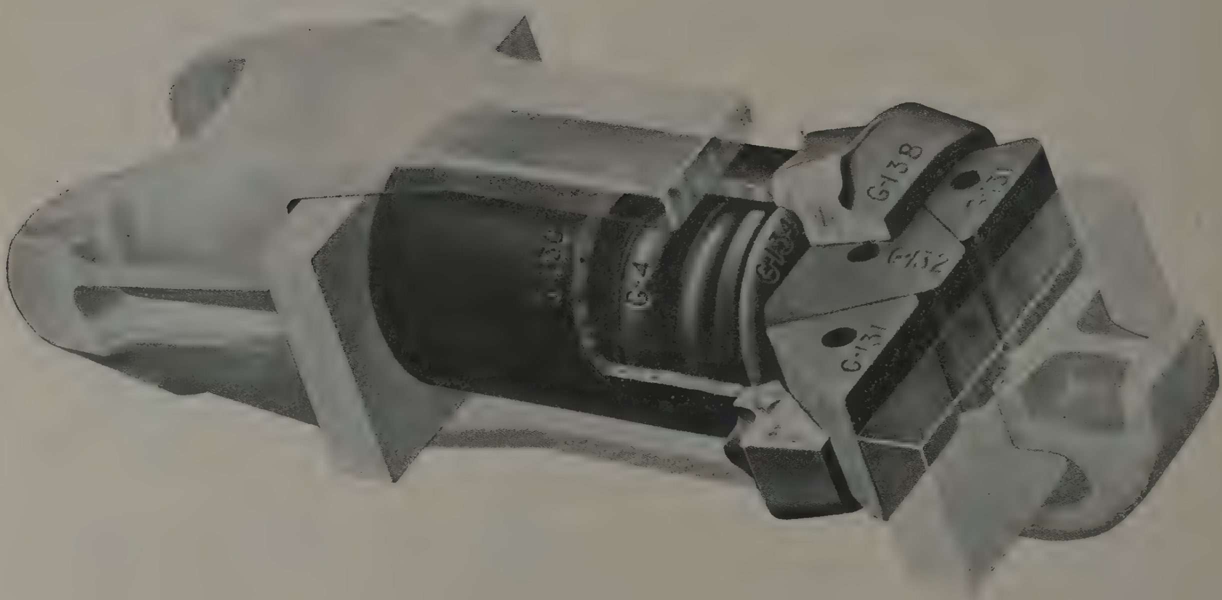
"I have believed for a long time that your Roller Device was a valuable addition to the ordinary freight truck and my belief has been best demonstrated by the fact that for a great many years I have had the device put on all freight cars which I have ordered or had anything to do with the ordering."

An executive officer says:

"The Barber Lateral Motion Truck Device adds great economy to freight car equipment and at the same time is a 'safety device,' and if it saves the life of only one of my freight crews it surely has paid for its installation, to say nothing of the saving in wear and tear of rolling stock, rails and roadbed."

The Barber Lateral Motion Truck Device is applicable to any of the well known types of freight car truck frame and bolster now in use and has been made the standard on many of the most important roads in the United States. Particulars of its service with any kind of truck will be furnished on application.

Sessions-Standard Friction Draft Gear, Type K



Description

The Sessions-Standard Friction Draft Gear, type K, illustrated, is formed of a double coil spring and three friction blocks, all contained in a steel housing. There is a steel plate interposed between the spring and the friction blocks. The steel housing consists of a steel tube 9/16 inches thick, resting on which is a forged steel friction box. This steel housing will sustain a load of one-half million pounds without distortion, and prevents the springs from going solid and being overstrained under excessive blows, besides protecting all the working parts of the gear from breaking.

Details

The working parts of the gear are: a double coil spring, weighing 87 pounds; a forged steel spring-bearing plate, and three triangular equal-angled friction blocks. These working parts are all of a size sufficient to insure the greatest resistance to breakage and wear. Every part of this gear is made under the most rigid scrutiny as to composition of the metal, and strict conformance to dimensions. The friction blocks are made of a special mixture of iron, for the purpose of obtaining the proper friction and toughness.

The capacity of the gear is 180,000 pounds, and the travel is 2 inches. The reactive force, or recoil, is 23,000 pounds, being sufficient to insure at all times a positive release and a perpetual readiness of the gear for operation at any point in the stroke of the coupler. The resistance of the gear under compression is proportionate to the length of the stroke; in other words, under one-half the stroke, or one inch compression, one half the capacity of the gear has been reached.

The dimensions of the gear, at the friction box end are 12½ inches x 9 inches; at the butt end of the gear the dimension is 9 inches outside diameter of the round barrel; the over-all length is 20⅛ inches, in other words, it goes into the standard draft pocket of 12⅞ inches x 9⅛ inches x 20⅛ inches between followers.

The small number of parts forming the gear, as shown in the cut and named in this description, preclude the possibility of incorrect assembling and emphasize the strength and simplicity of the design of the gear. This strength and simplicity guarantee sureness of operation and the greatest continuous longevity of effective service.

The illustration shows the gear as it was applied to 50,000 of the 100,000 cars purchased in 1918 by the United States Railroad Administration. While this illustration shows the application with a cast steel yoke, the gear can be applied to cars or locomotives with any design of draft yoke or draft attachment that provides a draft gear pocket of the standard dimensions.

Murphy X L A Flexible Roof

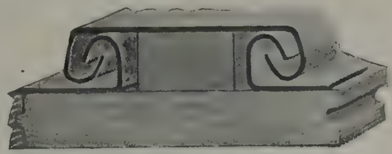
Pivoted Roof

The X L A Flexible Roof is particularly designed to give the utmost freedom of movement in all directions.

To accomplish this result each sheet is placed in an individual frame, is independently pivoted, and the weight of the running board is removed by putting it on the parting strips. This insures complete flexibility and is a guarantee against cracked sheets due to the weaving of the car frame.

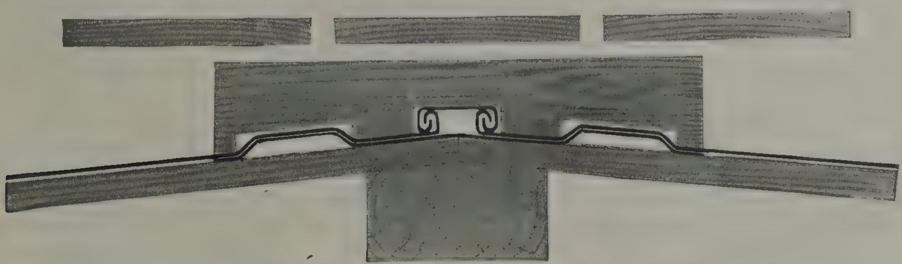
Other Types

The Standard Railway Equipment Company not only manufacture X L A Flexible Roofs, but also Murphy-Winslow improved inside roofs, plastic roofing and various types of carlines to meet any conditions.

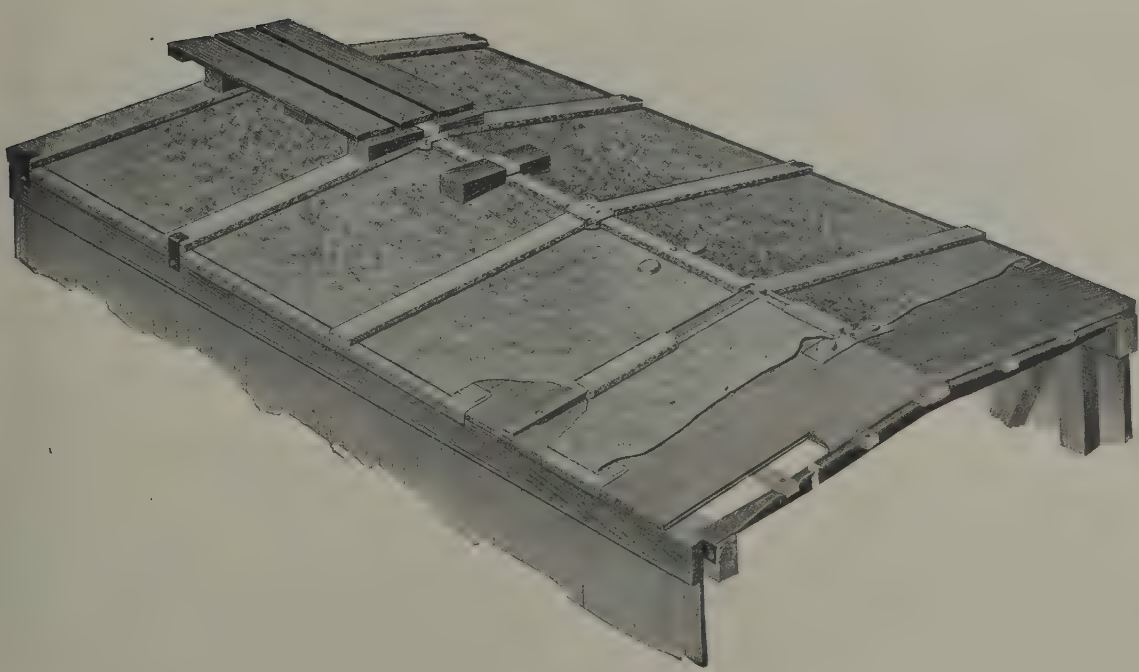


Section Showing Flexible Connection of Roof Sheets

Section Showing Flexible Eave Construction

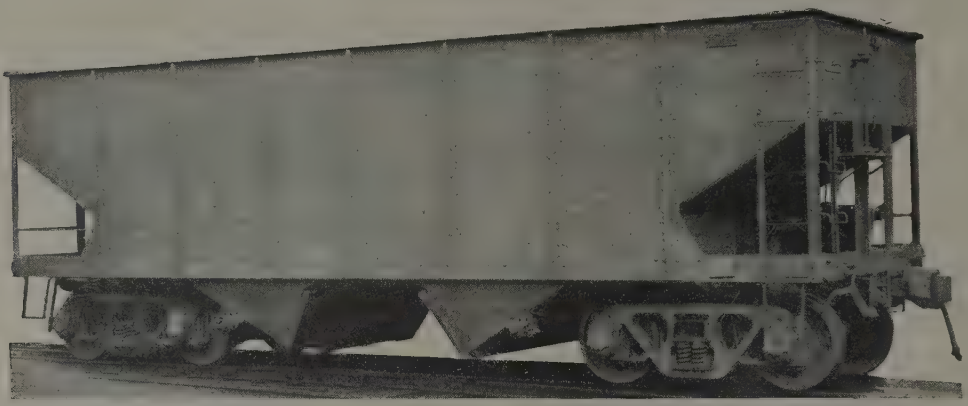


Section Showing Method of Pivoting Roof Sheets



Murphy X L A Flexible Roof

STANDARD STEEL CAR COMPANY, PITTSBURGH, PA.



OFFICES:

Pittsburgh, Pa. Frick Building

New York . . . . 170 Broadway

Chicago . . . . Fisher Building

WORKS:

Butler . . . . Pennsylvania
New Castle . . . . Pennsylvania
Ellwood City . . . . Pennsylvania
Verona . . . . Pennsylvania
Middletown . . . . Pennsylvania
Hammond . . . . Indiana
Baltimore . . . . Maryland

OFFICES:

Pittsburgh, Pa. .... Frick Building
New York .... 170 Broadway
Chicago .... Fisher Building
London E. C. .... Salisbury House, Finsbury Circus
Rio de Janeiro .... 107-109 Avenida Rio Branco
Buenos Aires .... 46 Reconquista

WORKS:

Middletown .... Pennsylvania

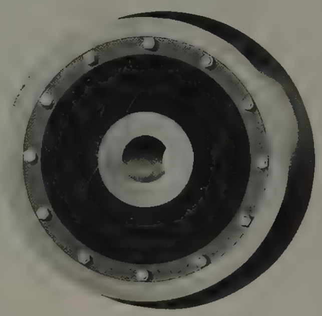
Rio de Janeiro .... Brazil

Cable Address .... "Midstandus" Pittsburgh

"Standard" Steel Car Specialties

Tires

"Standard" tires are made from open hearth steel ingots from which the porous portion is wholly eliminated, insuring homogeneity, solidity of the metal and a high factor of safety. The selection of the material is made with the greatest care, and systematic tests, both chemical and physical, are made of the output from all departments. The "Standard" brand is recognized as a mark of superior quality, establishing for the company the reputation of supplying material which is not excelled. The capacity of the Works has been increased until it is now sufficient to supply the entire requirements of the United States.



"Standard" Bolted Type Steel Tired Wheel

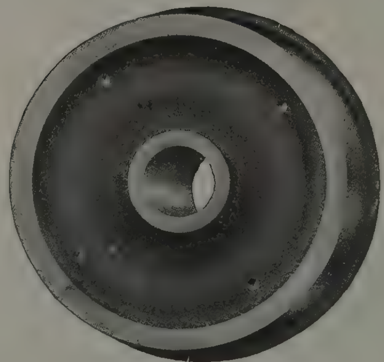
Steel Tired Wheels

All types of steel tired wheels are manufactured by this company, but we recommend the bolted type, as it can be retired in any railway shop without skilled labor or special machinery. The type of construction, as illustrated, was introduced by this company in 1902 and has been adopted by the M. C. B. and M. M. Associations as the standard type of wheel tire fastening. Should the tire be worn beyond the safety limit and break, there is no danger of the tire coming away from the center. With the rolled steel center this wheel is the most economical and best wheel made. It has given universal satisfaction in severe, fast service where durability and a high factor of safety are the principal factors to be considered.

Rolled Wheels

Rolled Wheels

Solid forged and rolled wheels were introduced into America in 1904, in which year we began their manufacture. They were offered as a substitute for cast iron chilled wheels, which had proved inadequate for modern service. Their success has been so marked that the demand for steel wheels to replace the cast iron wheels under all types of equipment, from the lightest to the heaviest, is constantly increasing.



"Standard" Rolled Wheel

The solid wheel is just as important as the steel tired wheel, each type standing for equal merit in the class of service for which it was designed.

Springs

Springs

Great care is used in the selection of the material and systematic tests are made of the work of each department to insure uniform high quality, thoroughly equipped chemical and physical laboratories being maintained for this purpose. "Standard" springs are especially designed for the service and conditions under which they operate. This feature, together with the quality of the material and the work-

"Standard" Elliptic Spring

"Standard" Steel Car Specialties

Springs *(Concluded)*

manship, produces a spring that has long life, and will give satisfaction in the most trying service.

All "Standard" full elliptic springs are constructed with "block ends" and sectional type unless they are specially ordered with the "scroll ends."

The coil spring is used in groups and is made in single, double or triple coils.

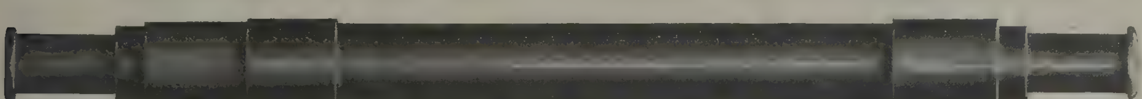
The manufacturing facilities and equipment of this company are unsurpassed. Our mills are equipped with the most modern machinery and automatically regulated furnaces which maintain the proper temperature for the making of spring steel. This, together with long experience, insures the highest grade product obtainable.

"Standard"
Nest of Coil Springs

Axles

Axles

To secure safety in service and long life it is essential that locomotive axles be made from steel of the proper composition, forged under proper conditions and carefully annealed or heat treated. For "Standard" axles Openhearth steel made to exact specifications is used. The axles are forged under steam hydraulic presses or under steam hammers of adequate capacity and a special heat treating department is maintained for securing annealing or heat treatment under proper pyrometric control. All axles after completion are carefully inspected and all heat treated axles are subjected to a proof drop test. Axles of any design or weight, either special or M. C. B. standard, can be furnished to meet the requirements of any practical specification.



"Standard" Axle

Products and Sales Organization

Products and Sales Organization

The "Standard" brand on your material is an assurance of eventual economy. It insures long, safe and efficient service with low inspection and maintenance costs.

In addition to the specialties previously described we also manufacture rolled steel gear blanks, rolled steel rings, steel crusher-rolls and shells, steel pipe flanges, steel and iron forgings and steel and malleable iron castings.

The home office of this company is located at Philadelphia, Pa., and the plant at Burnham, Mifflin County, Pa. Branch offices are also maintained in the following cities: New York, N. Y.; Richmond, Va.; St. Louis, Mo.; Chicago, Ill.; San Francisco, Cal., and London, Eng.

LOCK "DS" NUT

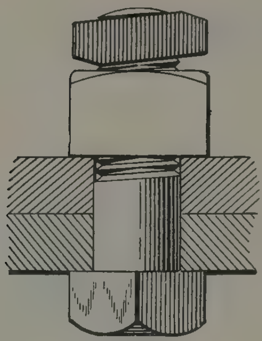


Fig. 1

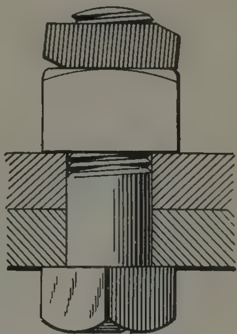
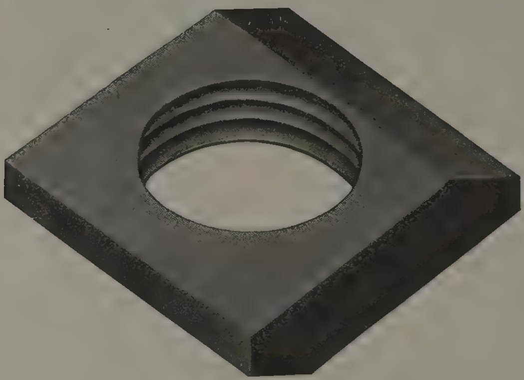


Fig. 2



HOLDING "DS" NUT

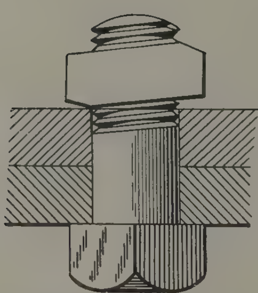


Fig. 3

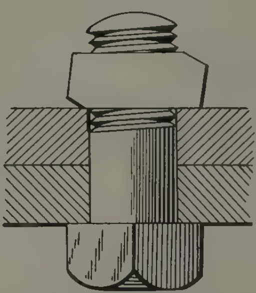


Fig. 4

Description

The "DS" Nut is manufactured in two types—a Lock Nut and Holding Nut. The same principle is followed in the design of both types. The Lock Nut is designed for use with a common nut while the Holding Nut, *being made thicker and heavier*, replaces both the common Nut and the Lock Nut at the same time securely locks itself on the bolt when tightened up to the work. *Both types are made in either the square or hexagon shapes.*

The "DS" Nuts are tapped with U. S. Standard threads.

"DS" Lock Nut

Figure 1 shows the "DS" lock nut on the bolt before it is seated. It is tapped with U. S. Standard threads and is therefore a *finger fit* on the bolt, requiring the use of a wrench only after it comes in contact with the common nut.

Figure 2 shows its position on the bolt after it has been wrenched down flat. *In this position it is securely locked on the bolt and to the common nut.*

Advantages

The "DS" Lock Nuts and Holding Nuts are *fool proof.* They may be applied with either side up or down. They can be used over and over again indefinitely without injury to either the bolt or nut threads and without impairing their locking efficiency. *Being a finger fit on the bolt the cost of application is no greater than that of a common nut.*

"DS" Holding Nut

Figure 3 clearly shows the position of the "DS" Holding Nut on the bolt before it is seated, while Figure 4 shows the holding nut wrenched down flat against any solid abutment.

The "DS" Holding Nuts are made in sizes from ⅜-in. to ¾-in., inclusive. They are used wherever safety demands a nut that will positively stay tight, such as on car roofs, siding, door tracks, running boards, etc. *They eliminate the necessity of using two nuts*—a common nut and a lock nut—*and also permit the use of shorter bolts, resulting in a large saving in the labor and material costs.*

Freight Car Forgings

Product and Facilities

Freight Car Forgings of all descriptions are manufactured by this company.

The company has the largest and best equipped plant in the country for this class of work, consisting of two complete units, advantageously located in the Pittsburgh and Chicago districts, enjoying exceptional rail transportation privileges. Prompt handling of raw material and finished product is at all times assured.

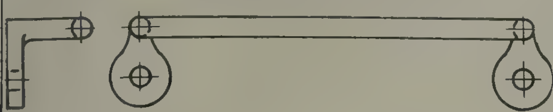


Fig. 1

An experience covering a period of nearly fifteen years developing drop forgings, the most improved machinery, combined with an efficient organization trained especially in the manufacture and production of forgings, has earned for the company the enviable reputation they enjoy as "Forging Specialists." The plants are prepared to furnish approximately 40,000 tons of forgings a year.

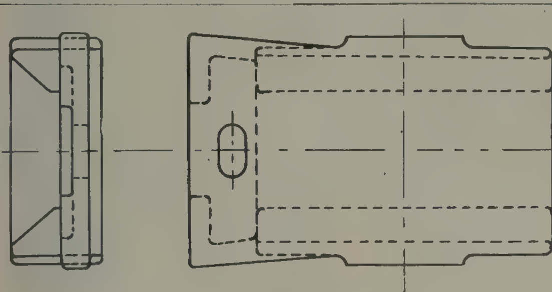


Fig. 4

Fig. 2

Essential Features

Only raw material of the highest grade is used. All forgings are manufactured by special machinery, which insures uniform quality and accuracy of design at all times. Especially adapted for those parts requiring exceptional strength with light weight.

Figure 1—Illustrates standard grab iron. This conforms with M. C. B. requirements, and combines utmost in strength and durability. Light in design, it can be applied where space limitations prohibit application of bulkier type. These can be furnished in any size in quantities as may be desired.

Figure 2—Shows knuckle pin made to suit any coupler. Manufactured and specially heat treated, this pin withstands the strains and shocks to which couplers are subjected. Eliminates pin breakage, makes possible big savings in material and reduces hazards of accident due to train separation; prompt shipments can be made in quantities as desired.

Figure 3—Shows light pattern drop forged brake jaw. This jaw has been especially developed to meet heavy braking service under all conditions. Light in design, it occupies but little space, yet combines all essentials in strength and wearing durability. Made to specification or in standard sizes as required.

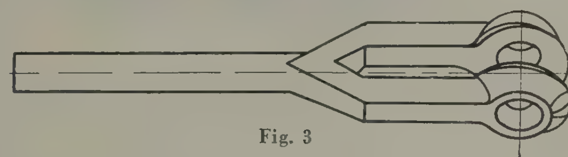


Fig. 3

Figure 4—The drop forged journal bearing wedge shown in figure 4 is made in all sizes, 3¾" x 7"—5" x 9"—5½" x 10" and 6" x 11". High standard of quality and accuracy in design so essential in bearing parts are faithfully maintained in every wedge.

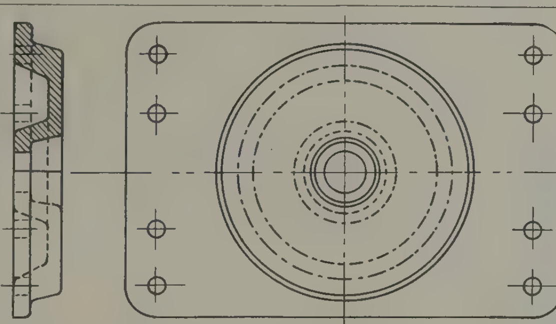


Fig. 5

Figure 5—Illustrates drop forge center plate made in many styles and sizes. Owing to the constantly increasing loads center plates are required to support, it is imperative that this important bearing be capable of withstanding the most severe frictional strains and wear. The ever increasing demand for drop forge center plates is evidence of their superiority in this particular field.

Figure 6—The drawbar yoke shown in illustration is the result of careful study of requirements in heavy freight car design, and combines strength, durability and long life so essential in coupler parts. A distinctive feature is its light weight which permits quick application, and accessibility in limited space area so frequently encountered in draft gear arrangement.

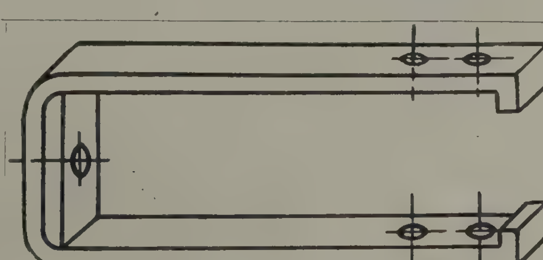
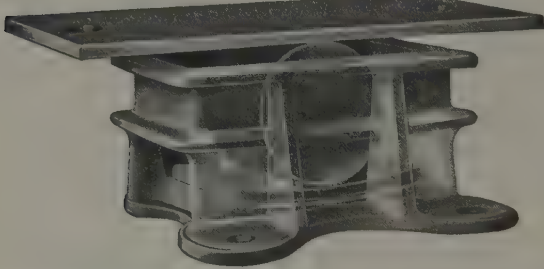
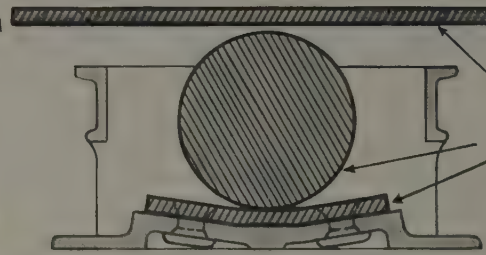


Fig. 6

Stucki Side Bearings





General Remarks

Almost from the beginning of railroading in this country it was realized that the truck under a car in passing a curve should swivel freely. This led to all sorts of anti-friction devices between the body and truck bolsters, and, as a rule, they answered the purpose to a marked degree, at least, as long as they were kept in good condition, reducing—

Rail Wear,
Wheel Flange Wear,
Train resistance, and
Liability of Derailments.

The Master Car Builders' Committee on side and center bearings in their report at the 1908 Convention sized up the situation very clearly, when it reported that frictionless side bearings are essential for the efficient operation of cars, but that they so far failed to find a bearing good enough to be recommended as a future standard.

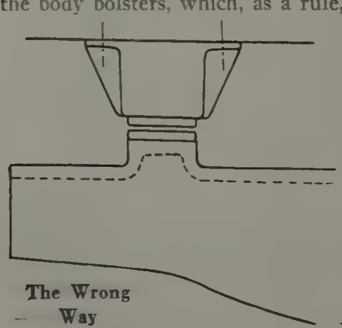
Essential Underlying Principles

Following this report, we came to the conclusion that a frictionless side bearing, in order to be permanently effective, must be of a simple construction. Our experience also soon taught us that it should be attached to the truck bolster so as to make it noiseless, immune of side bearing clearances and free of locking any movable parts.

Simplicity was obtained by using a single roller, centered by gravity instead of using a lot of small rollers, axles, springs, levers, keys, etc.

In applying it to the truck bolster, care was taken that no pocket would be formed for grit or sand to collect.

A distinct and essential feature inherent to the truck side bearing is its distribution of the load. Weak truck bolsters with it only show one-half as high stresses in their top members compared with those obtained when body side bearings are used, owing to the fact, that the former distributes the load over a considerable area on the roof of the truck bolster and concentrates it against the body bolsters, which, as a rule, are strong and stiff for other reasons. The sketch in the *lower right hand* corner shows such an application.



The Wrong Way

On the other hand, we often see integral humps cast in the truck bolster to accommodate the application of the body side bearings. Such a hump is very injurious, as the compression member is thereby discontinued and bolsters of that type show compression stresses more than twice as great as others. Sketch in *lower left hand* corner shows an application of this sort. See Railway Mechanical Engineer, June, 1918.

Specific Advantages

Smaller, but still essential features, in the construction of our own side bearing may be mentioned as follows:

All working parts are made of spring steel, tempered. We tried white iron, gray iron, malleable iron case hardened, titanium iron, and cast steel and finally decided in favor of spring steel.

The whole device consists of only four parts. Only one roller is used, but it is made large enough and strong enough to take the full load. This avoids shifting of loads, having twice the weight on one and none on the other.

The roller itself has no journal, but takes the load direct just as a rolling pin. It is centered by gravity and not by springs; its frictionless travel being 7 inches.

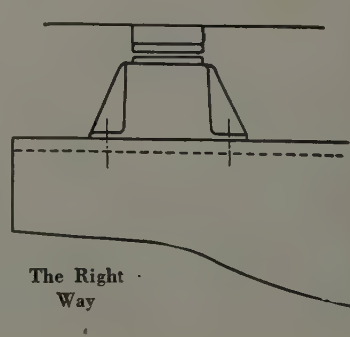
In coupling cars or during brake applications there is no shifting or bunching of loose parts, because there is only one loose; and it surely returns to its central position, no matter how severe the shocks are, as the whole face of the roller takes them. This avoids jamming and sticking, often occasioned by this feature being overlooked.

No fine fit or machine work is necessary and inequalities of ordinary workmanship do not affect the proper working of the bearing, which fact no doubt contributed to the phenomenal success obtained.

No lubrication is needed nor wanted and the reduction of train resistance in actual tests was found to be 10.4 per cent. See Railway Age, May 17, 1918.

There are no *bending or shearing stresses,* only straight compression stresses, and tests (Gulick-Henderson Laboratory) showed that even under a load of 150,000 lbs. the roller did not yield, nor did it chip under the blows of a heavy sledge.

The *inspection* is made easy, as all the parts can be seen without going under the car and without taking the device apart, and we feel sure that the great economy in the operation of cars will appeal to even the most conservative.



The Right Way

"National" Dust Guards

(Adjustable and reinforced)

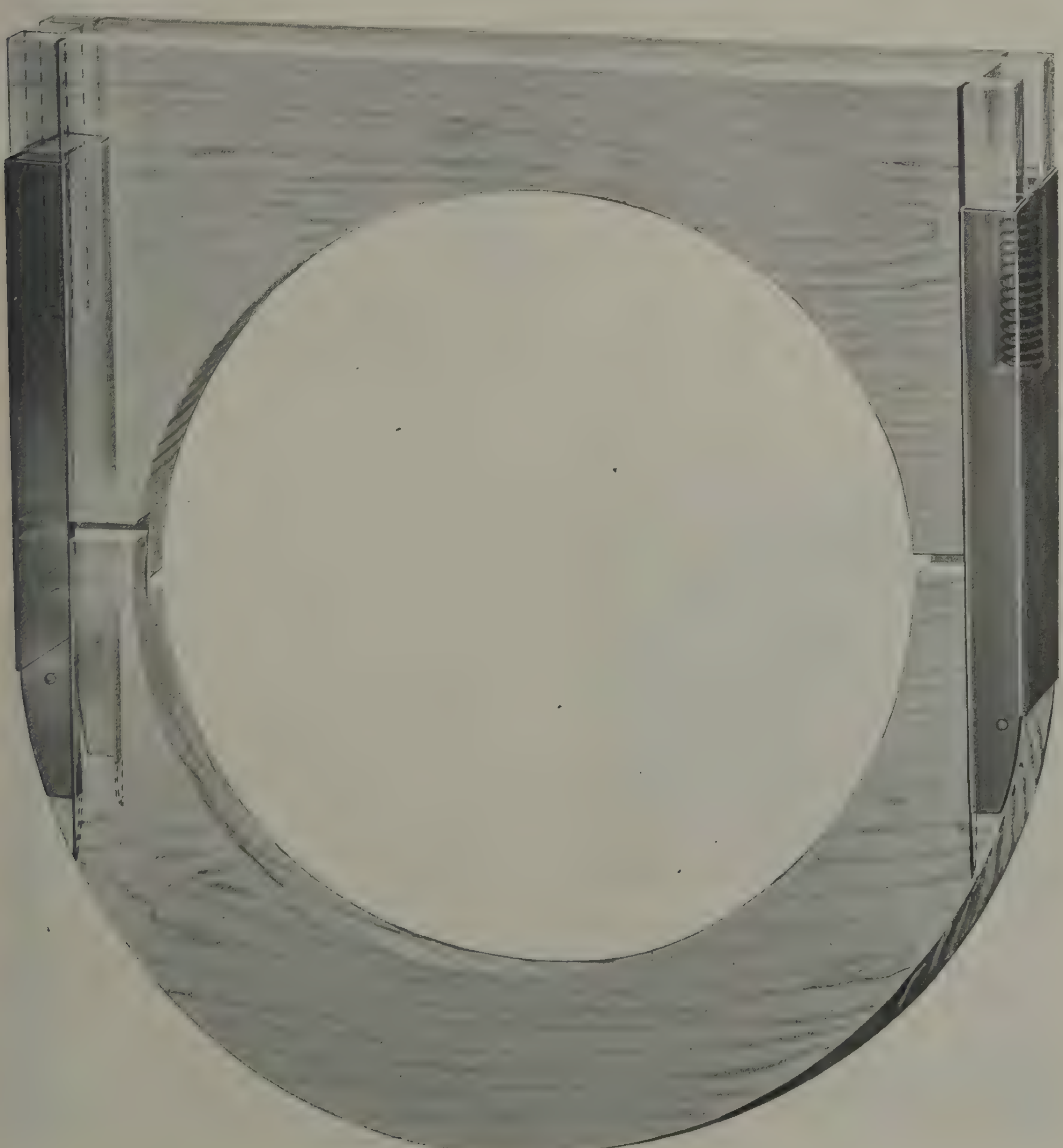
For Freight, Passenger and Locomotive Tender Equipment

Save Oil and Improve Lubrication

Thornburgh "National" Dust Guards save oil and improve lubrication. They are producing a saving in brasses alone sufficient to cover their cost. Made from selected bone-dry Southern gum, reinforced by steel guides that snugly and firmly hold the parts in position, insuring full compensation for wear and long service. Wood closure supplied with each guard. "National" Dust Guards are made in all sizes to satisfactorily meet all conditions and every journal requirement. Because of our special equipment and enlarged capacity, we supply these guards better and cheaper than ever before. We solicit the privilege of proving to you the economy of "National" Dust Guards. Your inquiry will be given immediate attention.

Where Used

An examination of the practical features of "National" Dust Guards will explain why they are chosen by the United States Railroad Adminstration for application to the recent purchase of 100,000 cars. "National" Dust Guards also are in service on over 30,000 cars on military railroads of France, and in general use throughout the United States, Canada and foreign countries.



Car Specialties

Flexolith and Tucolith Composition Flooring

Flexolith and Tucolith Composition are ideal floorings for passenger equipment. They are sanitary; absolutely fireproof, non-absorbent, and can be cleaned by flushing with a hose and mopping dry. General service demonstrates that these floors where properly applied last throughout the life of the car. They are standard on a majority of the principal Railroad Systems.

Tuco Preservative applied over the floor plates before application of composition insures a strong bond and overcomes any possibility of corrosion. See Fig. 1622.

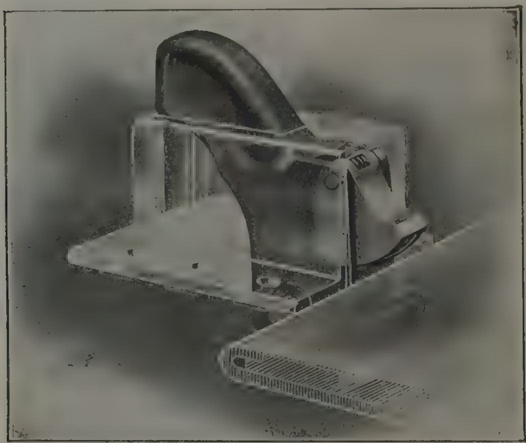
National and Universal Steel Trap Doors

National and Universal Trap Doors are one piece steel doors with cross rib depressions on the under side, and turned over edges, producing maximum strength and minimum weight. National type is furnished in two styles, viz: Elevated Station and Grade Level.

The Universal type is our latest design and embodies most desirable features. The Lifting Device is at once powerful, simple, and can be adjusted to place any desired tension on the spring, no matter how fine. See Figs. 595 to 597.

K-1 Trap Door Kicker Lock

The K-1 Lock embodies all desirable features for the efficient operation of trap doors and in design is simplicity itself, being composed of but three parts; thus insuring easy and positive action, and decreasing the possibility of failure in service. See Fig. 1841, page 783, and illustration below.



Resisto Quilt Insulation

Resisto Insulation is a hair-felt insulation treated on both sides with a special preparation making it fire-proof, waterproof and an exceptionally efficient non-conductor. It is made up in commonly used thicknesses; is particularly adapted as an insulation for passenger cars and is advantageously used in refrigerator cars. See Fig. 1612.

Tucork Insulation

Tucork Insulation is a mineral product designed to meet all conditions of service without disintegration or decay. Structure renders it fire-resisting, and having no capillary attraction to moisture it retains its high insulating value throughout its life. In addition it has remarkable sound-deadening properties. Light weight, ease of handling and application, low cost, and high insulating efficiency make it ideal for all types of equipment. See Fig. 1624.

National Standard Roofing

National Standard Roofing is a special fabric treated under a process making each fibre waterproof, fireproof and mildew-resistant. This treatment acts as a preservative to the fabric, neutralizing any harmful effects of paint ingredients. It is ready for immediate application, without the use of white lead, paraffin, oils, or similar materials used in preparing ordinary white duck for service, reducing time and cost of application. Is furnished in three weights: "FF," "AA" and "CC," corresponding in weight to Nos. 8, 6, and 4 cotton duck respectively, widths ranging from 24 in. to 128 in. See Fig. 935.

Imperial and Universal Car Window Screens

Imperial and Universal Car Window Screens are designed to add to the comfort of passenger travel, permitting air to enter with consequent ventilation in warm weather; yet screening the passengers from discomfort of dust and cinders without interference of vision. See Fig. 1891.

Perfection and Reliance Sash Balances

Perfection and Reliance Sash Balances are designed to withstand the exacting demands of railway service. Vertical winding and equalizing cables together with spring of required strength, insure ease of operation. See Figs. 1892-1893.

Eclipse Deck Sash Ratchet

Eclipse Deck Sash Ratchets are simple and positive in operation and of substantial and durable construction. The quadrant is designed to permit the deck sash to be opened to angles of 30 and 60 degrees, insuring proper ventilation. See Fig. 1971.

Metallic Steel Sheathing is adaptable for use on exterior of passenger cars of either steel or wooden construction. See Figs. 1611, 1613.

Brown Weatherstrips for car windows.

Sales Organization

The main office is located at 30 Church St., New York City. Branch offices at 11500 S. Sangamon St., West Pullman, Ill.; 630 Louisiana Ave., N. W., Washington, D. C.; 751 Monadnock Bldg., San Francisco, California, and 263 St. James St., Montreal, Quebec.

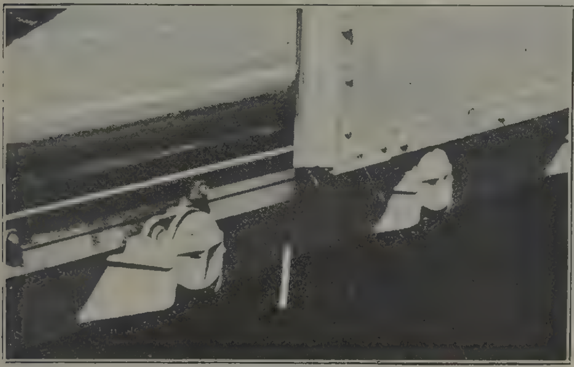
National Car Door

Purpose

The purpose of the construction of the National Car Door is to furnish for all classes of box and other house cars, a door which shall be weather-proof, spark-proof and burglar-proof and which shall at the same time meet all M. C. B. requirements and recommendations.

Principle

This door is supported upon strong roller brackets secured to the underframe. None of its weight is supported by the roof. The rollers of the brackets opposite the doorway are beveled and serve to keep the door tight against the car when closed. Other brackets with flat rollers keep the door away from the car when open, preventing binding and injury to the sheathing. An inaccessible bolt in the bracket at the rear edge of the door prevents burglarizing.



Roller Brackets on Side Sill

Construction

The door is steel-bound all around, with gussets at the corners. These, in connection with a steel brace, make a solid, rigid frame that keeps the door in alinement and insures a perfect fit even after long and hard usage. The roller brackets are open at the bottom to prevent the accumulation of ice and snow.

Because of its sturdy and simple construction, the upkeep is negligible.

Interlocking

The accompanying illustration shows the manner of interlocking at the top. The interlocked flanged Z-bars do away with the possibility of the door becoming unshipped and lost. At the top is also a weather-proof housing which makes a solid metal connection between the door and the roof. Interlocking at the front is by a Z-bar on the door which interlocks with a Z-bar on the framing and at the rear by an angle interlocking with a channel. There are therefore interlocking joints at top and both edges of the door. It is impossible to "spring" the door and gain entrance, and the entrance of rain, snow or sparks is effectually prevented.

Detail of Interlocking

The One-Man Door on 25,000 Government Cars

Cardwell Friction Draft Gear

Protection

Possibly if we studied the draft gear question from the viewpoint of *protection* we would arrive more quickly at a solution of the problem.

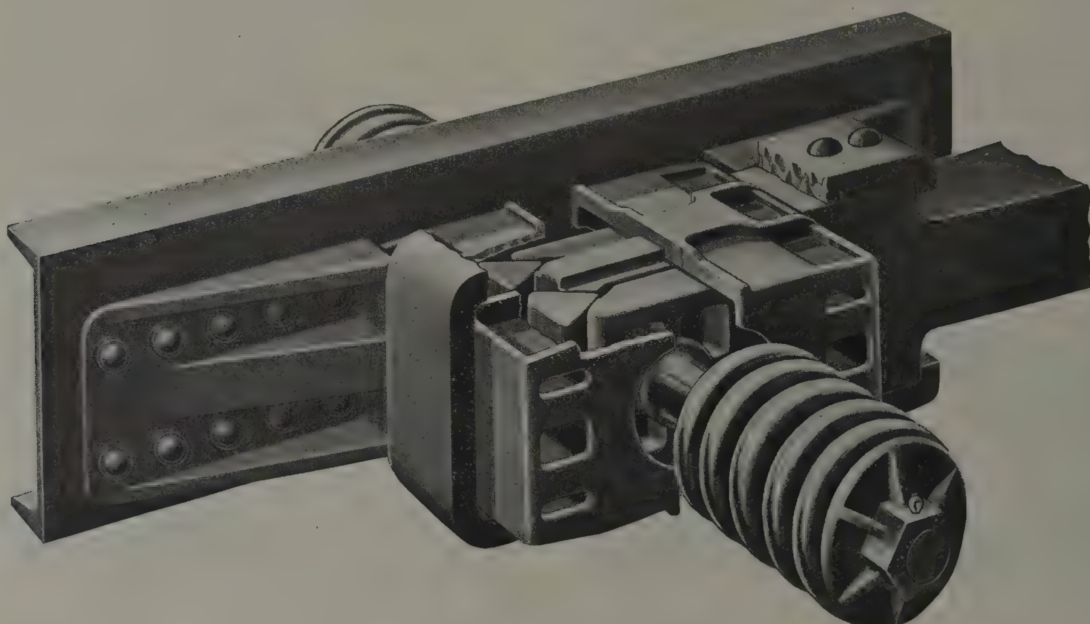
The perplexing problem of car maintenance is not that cars wear out, but that they break down. The "breakdown" is due to lack of adequate defense—in *protection* from the effects of *shocks.*

The natural cost of car maintenance—due to wear—is not over 22 per cent per car per year. The unnatural cost—the cost due to *shocks*—is 78 per cent per car per year.

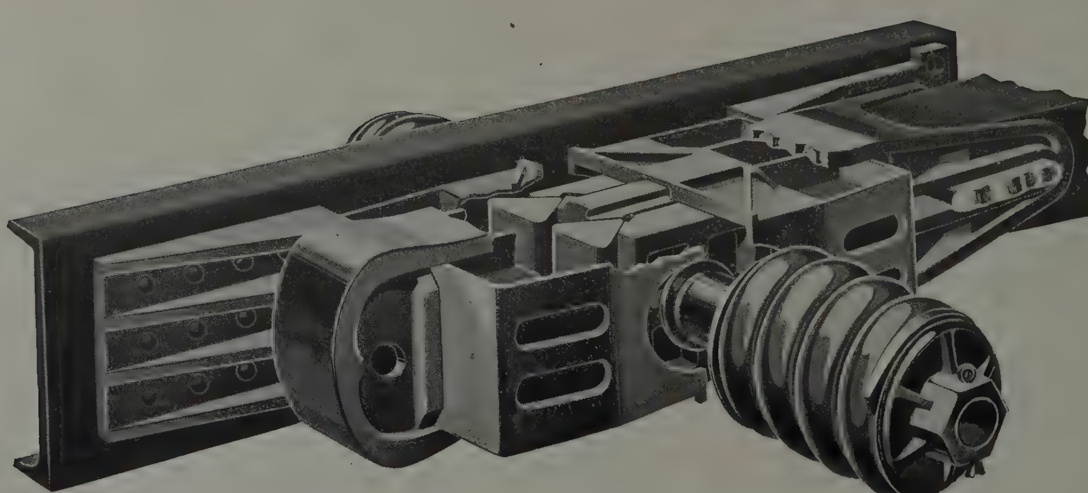
To reduce the amount of maintenance expense due to *shocks*—increase the amount of *protection* against the effects of *shocks.*

The Cardwell Friction Draft Gear affords greater *protection* than any other car appliance and will therefore reduce your maintenance cost due to *shocks.*

The amount of *protection* given by a draft gear is measured largely by the size of the gear and by the length of its travel—its capacity for doing work and the distance through which the resistance is effective.



Cardwell Friction Draft Gear, Type G, Class 11-A

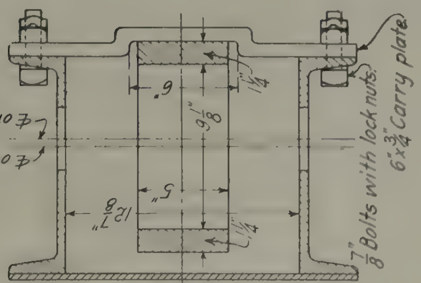


Cardwell Friction Draft Gear, Type G, Class 25-A, as Applied to United States Railroad Administration Cars

The Cardwell Friction Draft Gear destroys the effect of the shock and will increase the life of a car and decrease its maintenance.

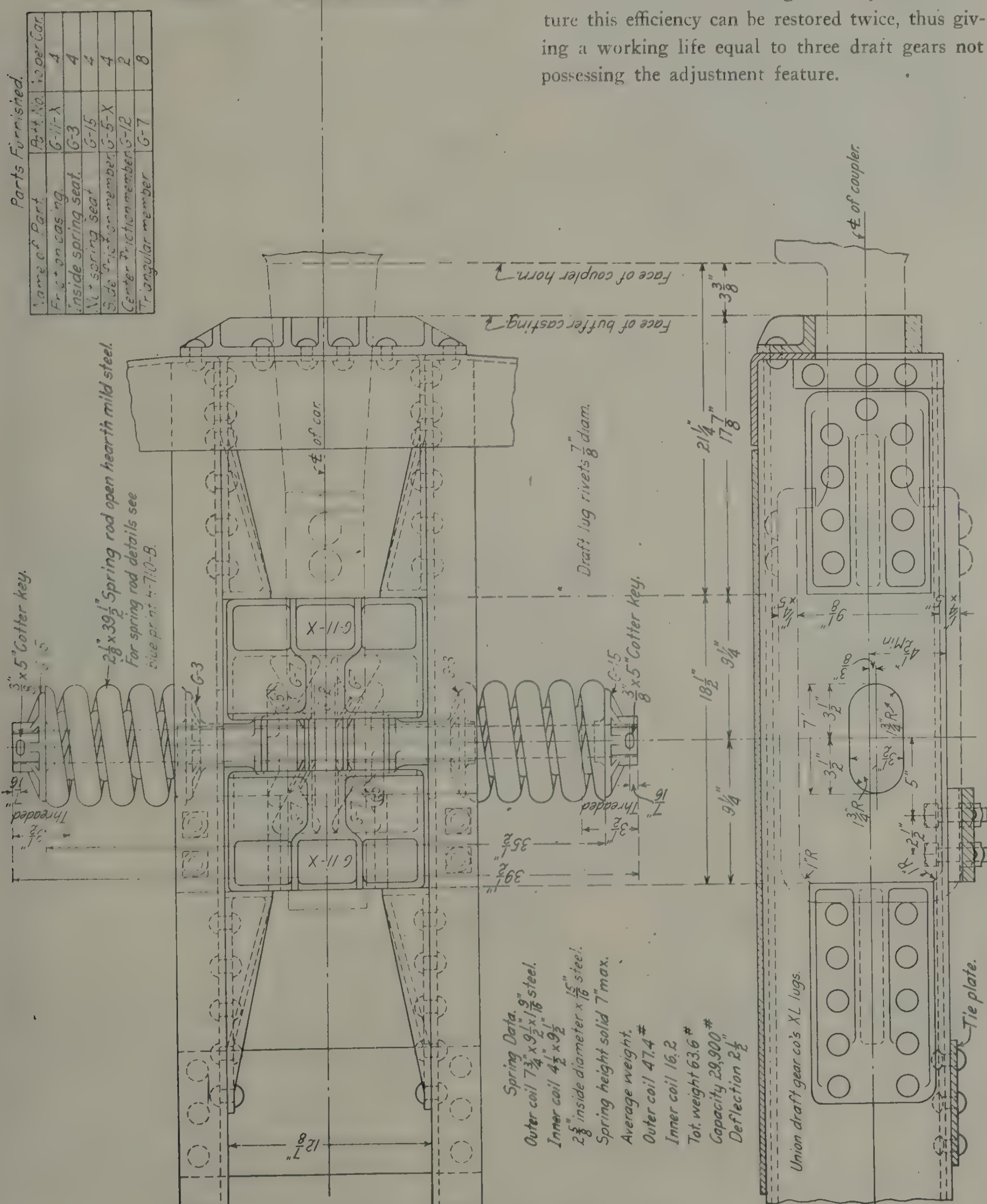
The distinguishing features of the Cardwell Friction Draft Gear are high work capacity, simplicity and long

Cardwell Friction Draft Gear



efficient life. This long efficient life is obtained by a property original with and peculiar to the Cardwell Friction Draft Gear, that of adjustment.

The contact areas of the frictional elements are such that its initial efficiency with the normal application is maintained as long as that of any other draft gear, while the arrangement of the frictional elements is such that through the adjustment feature this efficiency can be restored twice, thus giving a working life equal to three draft gears not possessing the adjustment feature.



Cardwell Friction Draft Gear, Type G, Class 11-A

Coil and Elliptic Springs for Railway Service

Products

Manufacturers of coil and elliptic springs of all kinds for use on all types of passenger and freight car equipment. Also manufacturers of special springs used in various types of machinery and shop equipment.

Facilities

The Company has a large and completely equipped plant advantageously located at New Kensington, Pa., enjoying exceptional transportation privileges which insures prompt handling of the finished product at all times. A wide experience of many years in the manufacture of springs for steam railway service, the employment of improved methods and modern machinery, combined with a most efficient organization especially trained for this class of work, has developed a product known for its high standard of quality. Durability and proper performance of all products is assured.

Essential Features

Only raw material is used that has successfully passed the rigid tests required by the Company. All springs are manufactured by special machinery which insures uniform quality and accuracy of design. All products are subjected to final tests greatly in excess of the requirements of the service for which they are intended. The tendency toward greater capacity in car design, with the resulting shock and strain due to long and heavy trains, increased speed and excessive tonnage, make it imperative that the selection of springs be given greater consideration than ever before. It is realized that much depends on the springs, not only in keeping equipment in service, but in prolonging the life of heavy equipment and keeping down maintenance costs.

It is the aim of the Union Spring and Manufacturing Company to fully meet the requirements of its patrons, and to this end every effort is made to fully co-operate with railway officials in furnishing a product that will measure up to the demands of the most exacting service conditions.

Where unusual conditions obtain and a departure from standard shapes or sizes is found necessary, our Engineering Department will be found valuable in assisting to determine the requirements.

For convenience in ordering the various types of car springs, blanks are furnished on request, herewith illustrated in reduced form, which will materially aid in furnishing all necessary information concerning size and strength required.

Form 321-2000-12-12-13

UNION SPRING & MANUFACTURING CO.

GENERAL OFFICE AND WORKS: NEW KENSINGTON, PA.

GENERAL SALES OFFICE: 610 FARMERS BANK BUILDING, PITTSBURGH, PA.

Customer's Order No.................. ....191.

Our Order No..................

SPECIFICATION FOR HELICAL SPRINGS.

FOR.. QUANTITY WANTED..............

PLACE A CROSS (X) OPPOSITE KIND OF SPRING WANTED	
Single Coil Spring........	
Double Coil Spring........	
Triple Coil Spring........	
Grouped in Plates........	

NOTE:— If grouped in plates, please state the following:

Free height over plates ....

Number of Single or Double Coils per group ....

Enclose sketch or print of plate desired.

	OUTSIDE DIAMETER	FREE HEIGHT	SIZE OF BAR	SOLID HEIGHT	NUMBER OF COILS	LOADED HEIGHT	LOAD	CAPACITY
Outer Coil......								
Middle Coil......								
Inner Coil......								

If solid height is not known give number of coils or pitch. These dimensions are equivalent.

SIGNED..............................

NOTE:— Please fill in all information called for above, as far as possible, to avoid all misunderstandings.

UNION SPRING & MANUFACTURING CO.

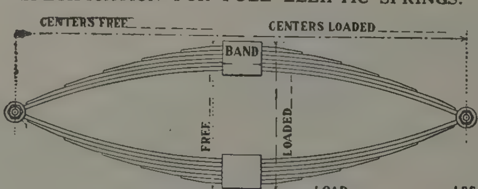
GENERAL OFFICE: OLIVER BUILDING, PITTSBURGH, PA.

WORKS: NEW KENSINGTON, PA.

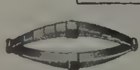
Customer's Order No.......... ....191....

Our Order No...................

SPECIFICATION FOR FULL ELLIPTIC SPRINGS.

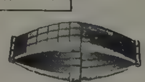


NUMBER OF LEAVES _ _ _ _ _ | BAND | SIZE OF STEEL _ _ _X_ _ _ _



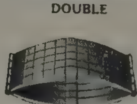
SINGLE

DOUBLE



TRIPLE

QUADRUPLE



QUINTUPLE

AUXILIARY

Place a cross (X) over style of Spring wanted.

With or without Auxiliary Leaves .... Number of Leaves, including Auxiliary.......................

SIGNATURE..............................

NOTE—Please fill in all information called for above, as far as possible, to avoid all misunderstandings.

Kensington All Steel Journal Box
Pressed Steel Spring Plates and Journal Box Lids

Kensington Journal Box

The box consists of three pieces. The top is made of cast steel, the body is pressed of ¼″ plate and the dust guard pocket is pressed of 3/16″ plate, making it a strictly all steel box. All rivets are ¾″ diameter and driven by hydraulic pressure.

Advantages

The box is absolutely oil tight, as the back of the body is pressed solid to the full depth required by M. C. B. standards. No rivets located below the oil line.

The box is made to M. C. B. standard dimensions and will, therefore, take M. C. B. standard lid, wedge, bearing and dust guard.

Rigidity is a distinctive feature. It cannot get out of square even if the Tie Bar pull becomes excessive. This is accomplished by the inside flanges of the Cast Steel top and the continuous corrugation running around the three sides of the body.

Precaution has been taken to relieve the rivets of any excessive strain by providing slots in the lower edge of the inside brackets, into which the pressed body is solidly driven. Along the top the sides are held in a similar way by means of lugs projecting from the top casting. These lugs are located on each side of the corrugation, which is tied firmly to the cast steel top at its starting point and imparts its full stiffness to the box.

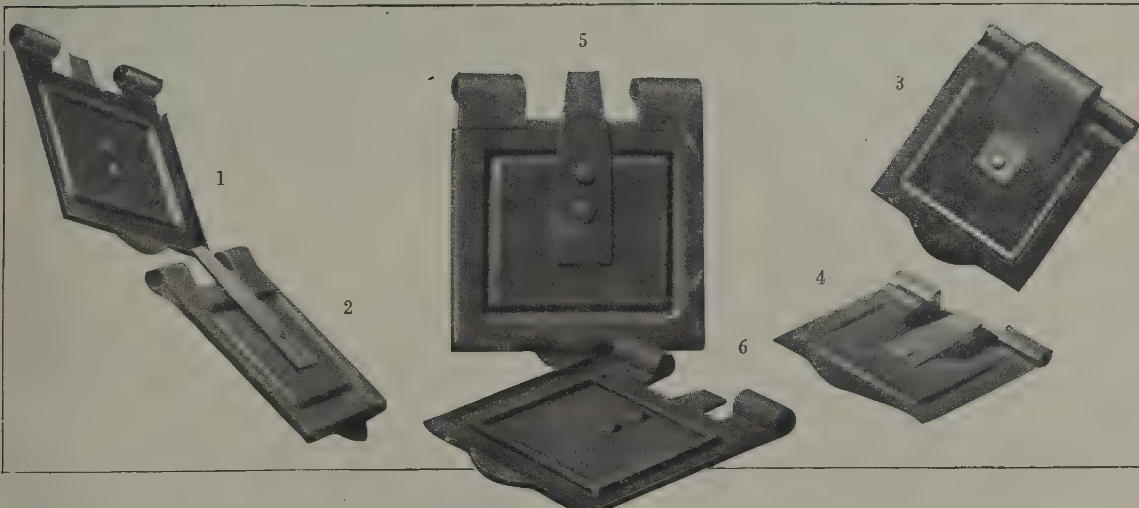
Possible shearing strain on the rivets is avoided by the top of the box fitting neatly against the top flanges of the casting.

The top casting contains all the bearing surfaces, and as it is easily gauged and ground before assembling the frequent trouble of wedge and bearing not going into place has been successfully overcome.

This top casting takes all vertical, lateral and longitudinal stress which possibly can come upon the axles and, being made of steel, gives it greater strength to resist these strains than either malleable or grey iron box.

An added advantage of the top casting is that it can be used after an accident that has destroyed all other parts of the equipment.

An important feature from the standpoint of economy is the overcoming of frequent trouble of breaking the back of box by side blows from the axle, for the back of the Kensington Journal box would only be dented by a blow that would break a grey iron or malleable box. Should the body become so distorted that it could not be straightened out, a new body can be refitted to the casting by cutting out ten rivets, thus giving a salvage in the casting of 60 to 90 cents per box.



The weight of a 5½″ x 10″ Kensington Journal box is 80 pounds with lid, 12 to 15 pounds lighter than a malleable box of same size and about 25 pounds lighter than grey iron box.

Figures 1 and 2 illustrate inside and outside views of "Union" No. 3 pressed steel dust proof Journal Box lid, adapted to 5″ x 9″ and 5½″ x 10″ Journal Boxes. Figures 3 and 4 show outside and inside views of Union No. 3 M. C. B. standard pressed steel box lids, with single riveted spring. Figures 5 and 6 represent outside and inside views of Union No. 3 M. C. B. pressed steel dust proof lid. Approved by leading railroads for its rigidity and stiffness resulting in better service and long life.

U S L Equipment With Ampere Hour Meter Control

Ampere Hour Meter Control

USL Equipments operate on the modified constant Potential principle with which is incorporated Ampere Hour Meter control.

Advantages

With Ampere Hour Meter Control, the exact state of battery charge or discharge may be determined instantly by a glance at the Ampere Hour Meter which measures accurately and registers continuously the number of ampere hours charged into or discharged from the battery. By the use of the Ampere Hour Meter, operation of the system is doubly automatic.

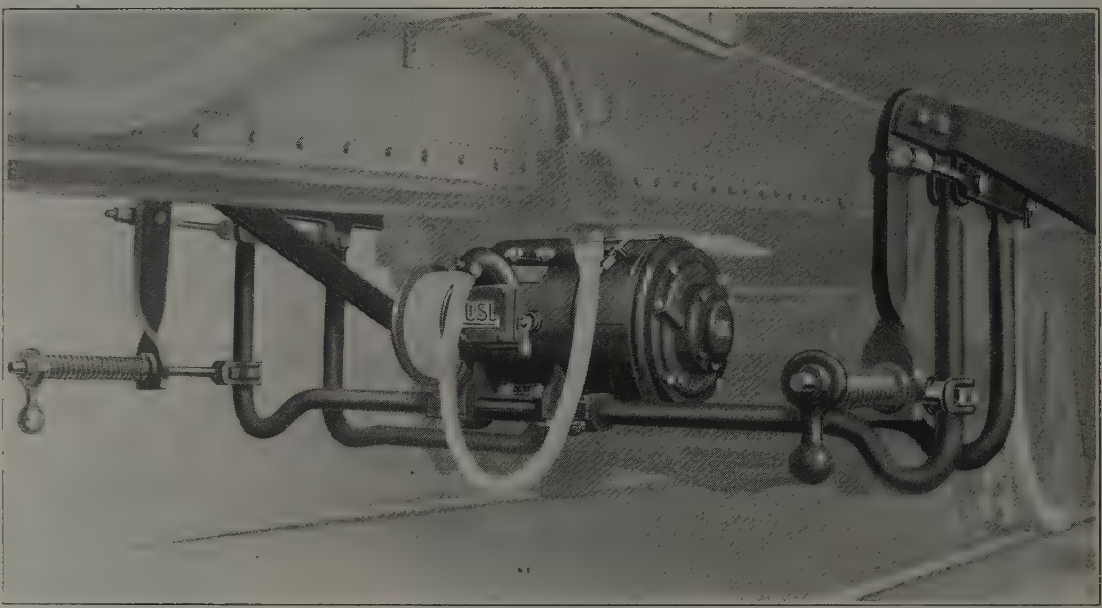
now "floats" on the line as it said neither charging nor discharging, whatever lamp load there may be at this time being carried by the generator.

Frequent Battery Cleaning Unnecessary

Accumulation of sediment in the bottom of cells due to overcharging is greatly reduced, thereby making it unnecessary to clean batteries more than once in four years.

Battery Flushing Necessary Only Twice Yearly

Ampere Hour Meter Control by eliminating useless overcharging makes battery flushing more than twice a year unnecessary.



Battery Life Increased

Disintegration of plates, and gassing due to overcharging positively prevented.

Operating records of more than 7000 equipments covering a period of five years have shown a doubling and in many cases a trebling of the life of the battery.

Battery Charging Automatic

When a battery is fully discharged, the charging operation starts without excessive initial current, and continues until battery is fully charged, the charging rate at the finish being about half that at the start. Thus the battery is charged correctly in the minimum time.

When a slight discharge of the fully charged battery takes place the charging function is automatically re-established.

The completion of the charge is indicated by the meter hand being returned to zero, which is taken to mean "zero discharge" or "full charge." At this instant the meter causes a pair of contacts to close a circuit, which acting upon the generator regulator causes the charging voltage to drop to floating value and the charging of the battery to cease. The battery

Reduces Wear and Tear on Generator

Since continuous charging is unnecessary with Ampere Hour Meter Control, the generator runs unloaded for many hours during the day runs, thus lessening maintenance cost, and reducing the drag on the locomotive and saving coal.

Universal Frame Generators for Body or Truck Mounting

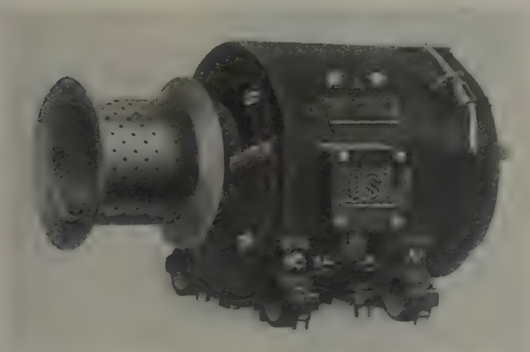
USL Generators are all designed and built so that they may be used either for truck or body mounting. The generator frames are universally machined so that fittings for either style of mounting may be readily assembled theron.

The bearing housings or heads, terminal box, and hand hole cover are assembled right side up for the particular style in which generator is to be mounted. For truck mounting, two adapters are bolted onto the generator frame adapted to engage the supporting links of the truck suspension. For body mounting, a saddle casting having two supporting lugs at the top takes the place of the adapters used in truck mounting. This saddle casting is adapted to be pin connected to the hanger attached to the car body. This system enables the USL to carry generators in stock ready to assemble either as truck or body mounted generators.

U S L Equipment With Ampere Hour Meter Control

Generator Specifications

USL Generators have been designed with the care and conservatism that long experience insures, and are noted for their simplicity of construction and accessibility for inspection and repairs. The well known reversible brush principle is used to preserve polarity, independent of direction of rotation. The generator is of the ironclad, four pole, shunt wound type. Sparkless commutation is secured



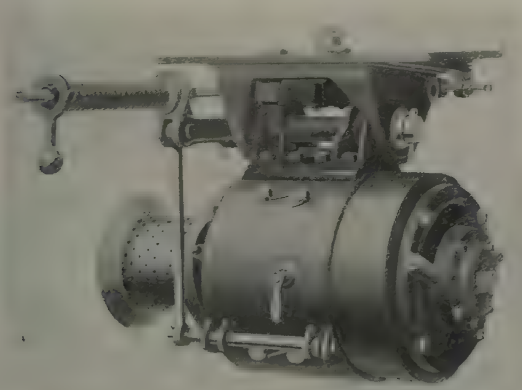
by the use of above principle together with careful design. The armature is of the drum type. The coils are form wound with fire proof insulated wire and are perfectly balanced, both mechanically and electrically.

The hand holes in the generator frame are closed by a hand hole cover and so constructed as to prevent the entrance of dust and dirt.

Lubrication is absolutely automatic and thorough.

Constant Belt Tension

The Tension of the belt is maintained substantially constant by a very simple mechanism in connection with a tension spring and the weight of the generator which permits a wide angle of swing of the generator from a vertical position to one in which the center of the generator shaft has been drawn by the belt six inches toward the truck.



Belt Loss Percentage Exceedingly Small

Records carefully kept over a period of years show the belt life to be very great due to the high flaring flanges on both axle and armature pulleys, and the correct design and position of the belt tension device.

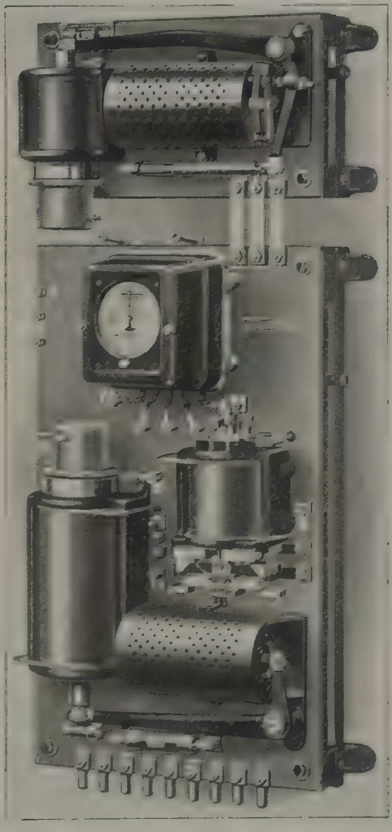
Control Panel

The type "C" panel consists of a slate 26″ high, 16″ wide and 1″ thick. On this panel are mounted all of the regulating devices, consisting of:

1. A generator regulator composed of a carbon pile rheostat in series with the shunt field winding of the generator and controlled by a solenoid and lever mechanism whereby the resistance in the field circuit may be varied according to the requirement of the system.

2. An Ampere Hour Meter which measures the Ampere hours charged into or discharged from the battery, and acts to reduce generator voltage to floating value so that charging ceases when battery is fully charged.

3. An Automatic Switch which makes and breaks the connection of the generator to the system whenever the voltage of the former is respectively above or below that of the latter.



Type B Lamp Regulator

The USL Lamp Regulator is similar in principle to the generator regulator and is a device for accurate regulation of voltage on the lamps. It is balanced both mechanically and electrically and operates perfectly under all conditions after the required adjustment is once made.

USL regulating devices are so thoroughly accurate and reliable that inspection is rarely necessary.

USL Equipments all embody the same principles but are made in such variety of capacities and forms as to meet the diversified requirements of railway lighting.

Universal Attachments—Yokes

General

The advent of steel underframe cars transferred the weak links in a car train from the draft sills to the yokes and couplers. Rivets used for securing yokes to drawbars have been a source of annoyance. To produce best results a rivet must hold tightly. The connection between yokes and couplers should be flexible. The result is, where a riveted connection has been used it has proved unsatisfactory, the rivets not only becoming loose and thus reducing efficiency, but there is frequent breakage with consequent delay in train service. A strong and flexible connection that can be readily made is therefore more efficient and reliable.

Universal Keyed Yoke for Friction Type of Draft Gear

Purpose

Universal Yokes are designed with the view of:

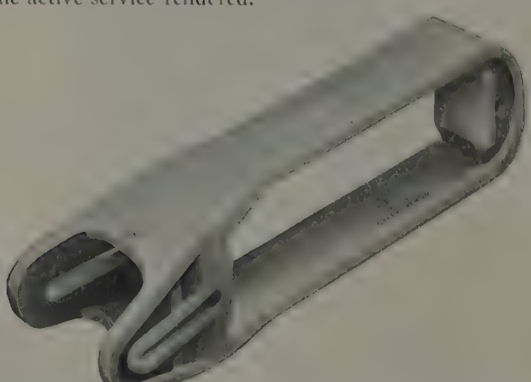
First—Elimination of coupler rivets, blacksmith labor and the handling of couplers to and from shops.

Second Permitting quick and economical exchange of couplers without disturbing yokes or draft gear.

Third—Providing greater strength than is possessed by ordinary wrot yokes.

Fourth—Greater flexibility of couplers.

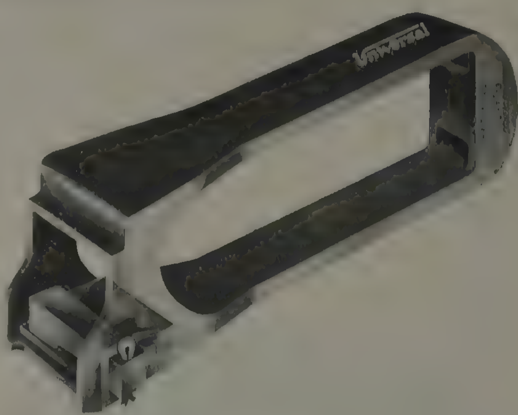
Riveting yokes to couplers means that each coupler ready for service must have a yoke, and as there are 10 or more sizes and lengths of yokes, the investment in extra couplers and yokes is entirely out of proportion to the active service rendered.



Universal Keyed Yoke, Government Standard Cars and Locomotives

Advantages

By careful design and the use of first class, thoroughly heat-treated material, the Universal Yokes are practically unbreakable and therefore where used nearly all "break in twos" are almost invariably due to failure of couplers and



Universal Rivles Yoke for Friction Type of Draft Gear

these can be easily, and in a few moments, replaced without disturbing the draft rigging or other parts of the car. It is conceded good practice to reduce to the minimum the classes and sizes used, thus resulting in economy of stock to be carried for repairs, and any device that will permit of this reduction should be considered with favor.

The Universal Attachment for couplers means to the user:

First—Practically no surplus yokes.

Second—Minimum supply of drawbars.

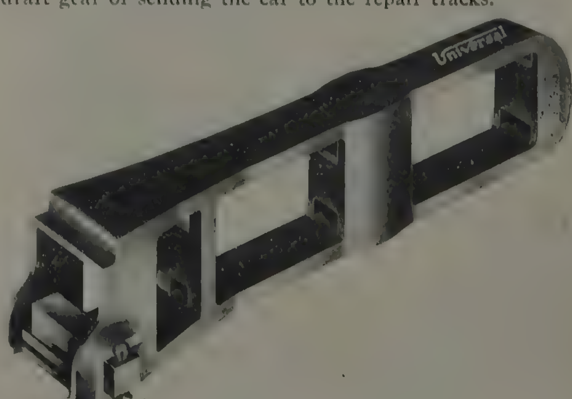
Third—Minimum expense and delay in applying couplers.

Fourth—Maximum service for cars.

With the exception of the tandem type of draft rigging requiring follower plate separators, the Universal Yoke permits of backward movement of couplers, as in buff, without corresponding movement of yokes. This is a very important feature, as it lessens the wear of parts and permits the application of draft gear in otherwise prohibitive spaces.

Types

The Keyed type of yoke is the most popular, as the key passing through the sills provides an additional safety feature. The Rivles type may be used on old cars without changing construction. This type engages the gibs of the couplers and permits the use of couplers that are not key slotted, but in all cases are stronger than wrot yokes, free from rivets and permits of quick and economical exchange of couplers without disturbing the draft gear or sending the car to the repair tracks.



Universal Rivles Yoke for Tandem Spring Draft Gear

Universal Attachments—Draft Arms

General

The unchallenged statement is frequently made that the cost of maintenance of draft rigging is greater than any other part of the car. As a general proposition it can be safely said that the cost is greater than on all other parts of the car combined; indeed, on a wooden car it would be safe to say that where cast steel draft arms are not used the maintenance of the attachments or connector *between* draft gear and car is the real offender. This defect is by no means confined to wooden draft timbers, as structural steel for this purpose on wooden cars is not infrequently of little more value than wooden timbers.

Universal Draft Arm

The Universal Draft Arm is a one-piece steel casting and forms an indestructible connector between the draft gear and the car sills and bolsters that effectually prevents the breakage of sills and displaces the draft lugs and numerous plates, straps, bolts and rivets. Actual service has demonstrated that an old wooden car equipped with cast steel draft arms, is not only stronger than when new, but will more than double its life.

Special Features

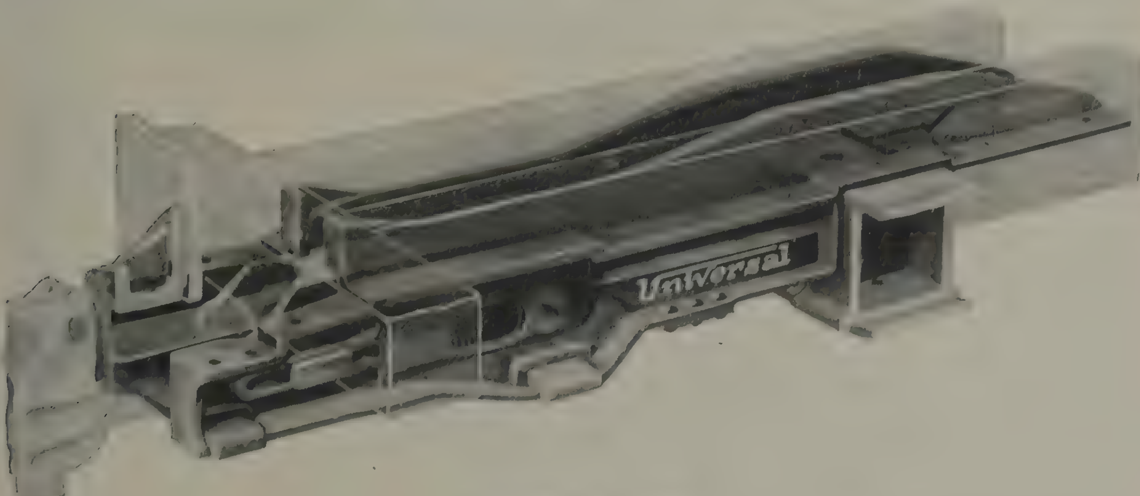
The Universal Arm possesses the following special features: First—"Z" section back of the rear abutting shoulder. This supplies additional strength to resist abutting stresses at a vital point, possible by no other means.

Second—Coupler and draft gear carrier plates are placed on *top* of the lower flange; this relieves the securing bolts from all tension strains and effectually prevents the sagging or loss of these parts.

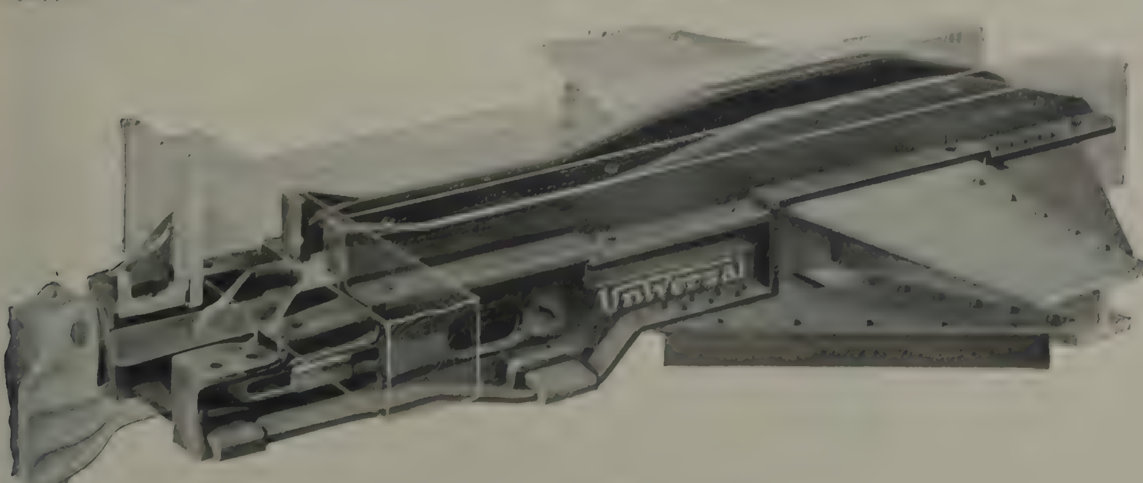
Third—A successful means is provided for making a tight fit at the bolster; this by means of a riveted plate immediately back of the bolster, and is a very important feature.

Fourth—Universal Gussets when applied connect the two draft arms and bolster in one compact unit; movement of arms with reference to bolster or the turning of bolster due to shock in starting or stopping car is effectually prevented.

Universal Draft Arms are adaptable to any type of car, wooden, composite or steel, new or old, and can be made to accommodate any type of draft gear.



Universal Draft Arms

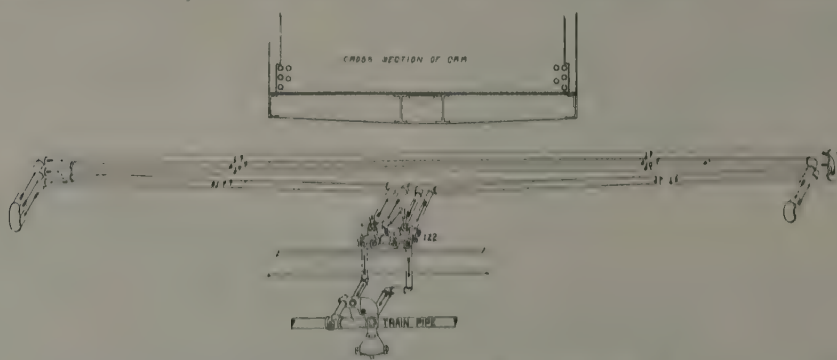


Universal Draft Arms—With Gusset Plates

Vapor System of Car Heating

General Description

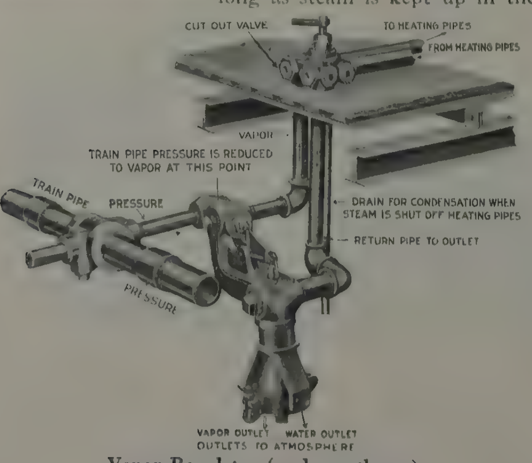
The steam supply for the heating pipes inside of the car is carried in a train pipe under each car, connections being made between the cars and to the locomotive by rubber hose fitted with suitable couplings. A sufficient pressure of steam is maintained in this pipe so that there will be live steam throughout its entire length to the rear of the train. Steam is supplied to the heating pipes inside the car from this train pipe, but, before entering the pipes in the interior of the car, it passes through a simple apparatus, close to the train pipe, which converts the pressure steam into vapor, or steam at atmospheric pressure. This apparatus is called a Vapor Regulator, and is shown in cut.



Steam at any pressure above atmospheric never enters the pipes inside of the car. The outlet of the system is always open to the atmosphere, therefore it is impossible to ever create any pressure in the heating pipes. This is accomplished by means of the thermostatically operated Vapor Regulator. This insures the same temperature on all the heating pipes in use, i. e. 212 degrees Fahrenheit, regardless of what the pressure in the train pipe may be. This does away with the annoyance of over heating the forward cars in the train in order to maintain the required temperature in the rear cars.

Non-Freezing

The system is non-freezing. Whether steam is turned on or off in the car, the regulator underneath the car is in operation and, consequently, kept hot so long as steam is kept up in the train pipe. As there are no blow-off valves or drips to be operated, there is no responsibility on the part of the trainmen to guard against freezing. Because the regulators are hot whether steam is turned on or off in the car, there is no necessity for keeping heat turned on in the car when it is not needed.



Vapor Regulator (underneath car)

Safety

Danger to passengers on account of steam escaping from broken pipes is eliminated by reason of the fact that the pipes within the car contain steam under atmospheric pressure only and are always open to the atmosphere at the outlet end. The accumulation of pressure under any circumstance is impossible.

Economy

As the steam in the heating system is under no pressure, or, more correctly, at atmospheric pressure, it necessarily causes the least possible drain of steam from the locomotive. Steam cannot be raised to a temperature exceeding 212 degrees except by being held under pressure; and there can never be any pressure in the heating pipes because steam from the train pipe passes through the vapor regulator and thence freely through the heating pipes to the thermostatic end of this regulator which is in an open casing and forms the actual outlet of the system. It is, therefore, not necessary to carry a high pressure of steam on the train pipe. This means a substantial saving not only in steam, and therefore fuel consumed, but it also reduces the cost of hose maintenance and obviates the necessity of using heavy piping and fittings inside the car.

Repairs and renewals of pipe and fittings due to high pressure and freezing are eliminated.

Regulation of Temperature

The heating pipes inside the car are divided into several coils or units of radiation, each of which is independently controlled by its own Vapor Cut-out Valve.

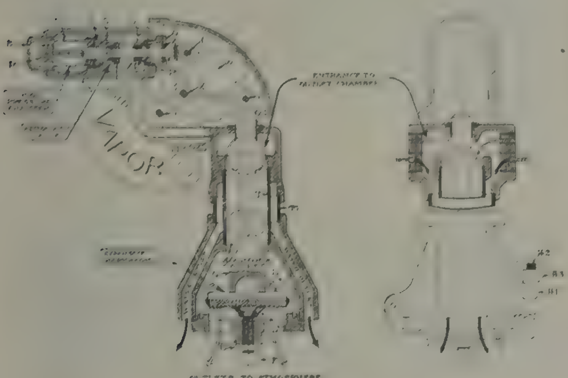
This division of heating surface into separately controlled units (of five pipes on each side of car as shown in cut) will permit, in ordinary steel passenger cars of using 20, 30, 40, 50, 60, 70, 80 or 100% of the total heating surface in each car, as may be required. In cars of special construction,—such as sleeping, compartment cars, etc.—heat may be maintained in any one or more drawing room, smoking room, toilet, compartment, etc., independent of any other part of the car.

Vapor System of Car Heating

The Vapor Regulator

The Vapor Regulator receives steam from the train pipe at whatever pressure and temperature it may be furnished from the locomotive. It converts it into steam or vapor at 212 degrees before it passes into the heating pipes in the car.

The operation of the regulator depends upon the thermostatic action of an expansive diaphragm consisting of a sealed flat box of spring brass partly filled with fluid and located in a casing at the bottom of the regulator at the outlet of the heating pipes. When heated to 200 to 212 degrees, the expansion of the fluid causes the swelling of the flat sides of the diaphragm. The expansion and contraction under changes of temperature, through a stem and bell-crank lever, control a valve between high and low pressure chambers of the regulator which are respectively in connection with the train pipe from the locomotive and the pipes of the heating system, and in which train pipe pressure is reduced to vapor at atmospheric pressure.



Outlets to Atmosphere

As shown in the illustration, the parts are as follows: E is the expansive diaphragm located in the outlet chamber which is open to the air. The diaphragm is connected by the stem G, bell-crank lever W, and valve stem P, with the automatic valve connecting the high and low pressure chambers and being the immediate point of automatic control of the whole system. The return pipe from the heating system enters the outlet chamber just above the diaphragm.

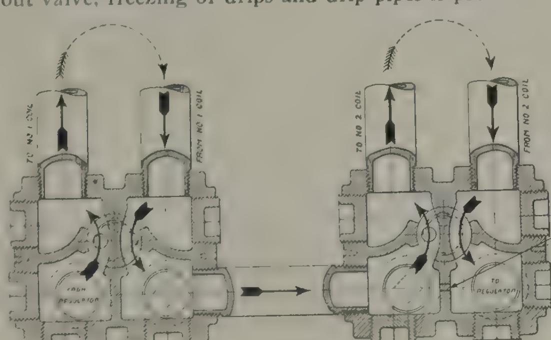
In operation, assuming that the train pipes and the diaphragm are cold, steam from the train pipe passes freely through the open valve S, through the cutout valve (Fig. 2169, Illustrated Section) and though the whole system to the diaphragm E, and the outlet. Live steam blowing on the diaphragm for a moment expands it, closes the valve S, and shuts off the flow of steam around the diaphragm until the temperature drops to about 200 degrees, when it again acts upon the valve to open it slightly and again admit steam to the heating pipes.

Location of Thermostat

The outside location of thermostat serves two purposes: First, being at the outlet of the apparatus, it insures the outlet will be kept hot and prevents the freezing of this most important point; and, second, it insures prompt action of the automatic valve and admission of vapor to the radiating pipes when a closed cutout valve is opened. Its location does not, however, result in heating the radiating pipes to a higher temperature in cold than in warm weather. They are necessarily heated to 212 degrees in any weather.

Vapor Cutout Valve

The function of the Vapor Cutout Valve is merely to direct the flow of vapor—steam at atmospheric pressure. It is always placed on the atmospheric pressure side of the regulator, between the regulator and the heating coil. It can never come in contact with steam under pressure, nor shut off the passage of steam to the thermostat. When the valve is open, the steam is directed through the radiating pipes and back to the outlet. When it is closed, steam is "short-circuited" across the valve back to the outlet, cut off from the radiating pipes, and kept on the thermostat. Since in either case vapor is always passing from the automatic valve to the outlet, either through the radiating system or directly across the cutout valve, freezing of drips and drip pipes is prevented.

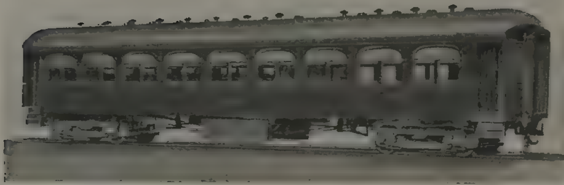


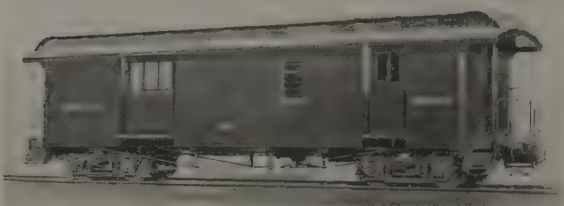
The bottom of the cutout valve body is provided with a drip hole to take care of condensation from the radiating pipes to the valve when the valve is closed. This hole also breaks the vacuum that would otherwise exist in the heating pipes when steam was turned off. When the valve is open the hole is blanked by the bottom of the valve stem.

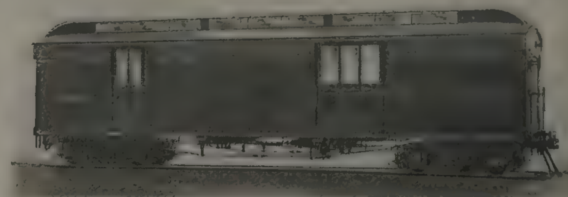
Simplicity of Operation in Service

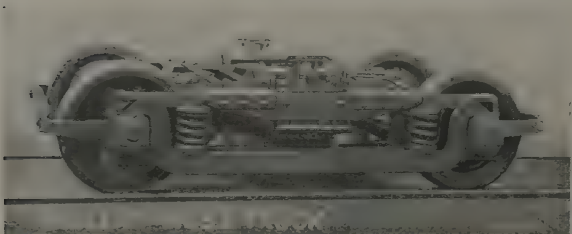
By referring to the cut of the cutout valve, it will be seen that the handle of the valve is a lever. This lever can be moved a quarter turn only and, when moved to the shut or open position in accordance with these words cast on the body of the valve, it either directs the flow of vapor into the heating pipes, or short-circuits it across the valve and returns it direct to the outlet or thermostatic end of the Vapor Regulator. There are no other valves or drips to be operated, and nothing can be done by the trainmen in the car which will endanger the system in any way.

Cars and Trucks for Foreign Railways









Passenger Car Construction

Designs of Wason-built passenger cars embrace every type from the short, plainly finished, third-class cars of narrow-gage lines in newly opened regions, to the sumptuous, vestibuled, compartment cars of continental systems.

Most of the car bodies, of whatever length, are built with steel underframes composed of channel side sills, I-beam center and intermediate sills, truss-form plate bolsters and iron truss rods. The center and intermediate sills extend through to channel buffer beams. All transverse members are riveted to the longitudinal members.

The usual side construction consists of two diagonal braces between each pair of posts, the braces being secured at the top by hook bolts which are brought through the side sills and have nuts and washers to permit tightening, if necessary. This relieves the belt rail of strain and furnishes a convenient means of tightening joints that may be effected if extremes of weather are encountered. Tie rods are provided at each post and extend vertically through the entire side, including the top plate and side sill.

Seats

Longitudinal seats of the wooden slat type are frequently specified for third-class cars, and in addition to the regular side seats, a central bench is usually included. Reversible-back seats, with spring cushions and backs covered with twill-woven rattan, are furnished with the majority of higher class cars. Leather upholstered seats, with or without head-roll, are generally ordered for the best service.

Baggage and Freight Cars

Baggage, express, mail, freight and live-stock cars of a wide variety of types have been designed and built to meet every conceivable requirement of modern service. The steel underframes of the baggage, express and mail-cars is usually the same as for passenger cars, described above.

Shipping and Re-Assembling

Cars of all kinds are completely assembled before being taken apart and boxed for ocean shipment. Long experience in building cars for foreign railways has produced a complete system which insures the receipt of the cars at destination in perfect condition and enables them to be readily re-assembled.

Trucks

Passenger and freight trucks for all types and weights of cars include the well-known Brill trucks which are equipped with solid forged side frames.

Organization

The J. G. Brill Company, Main Office: Philadelphia, U. S. A.
London Office: 110 Cannon Street, E. C.

Cable Address .... "Brill," Philadelphia
Cable Address .... "Axles," London
Wason Manufacturing Company... Springfield, Mass.
American Car Company............. St. Louis, Mo.
G. C. Kuhlman Car Company...... Cleveland, Ohio
Compagnie J. G. Brill................ Paris, France

Friction Spring Draft Gear

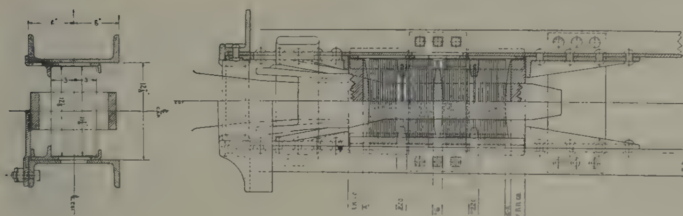


Fig. 1

Waugh Draft Gear. The Waugh draft gear is constructed of straight spring steel plates, curved over oval bearings. It requires no special release or tension spring. Friction developed under compression is adhesive, which increases the capacity and in release retards the recoil. The bracket and chafing plate shown is not attached to sills and practically encases the draft gear. There is no abrasion, therefore no slack develops and capacity is maintained.

Capacity is 375,000 lbs., but may be varied by varying the number of plates in each group. The gear is installed in standard pocket dimensions.

Draft Gear and Auxiliary Buffer. Fig. 2 shows draft gear contained in standard yoke in combination with auxiliary buffer. The auxiliary is located at the rear of and in line with the draft gear and shocks are transmitted to the auxiliary through the draft gear through floating rear draft gear stops. The auxiliary is in service under buffing shocks only, the auxiliary being held under tension in installation, the main draft gear under pulling strains draws away from the auxiliary. The auxiliary is constructed of much higher capacity than the draft gear and the combination may be developed to a capacity of 1,000,000 lbs. or more.

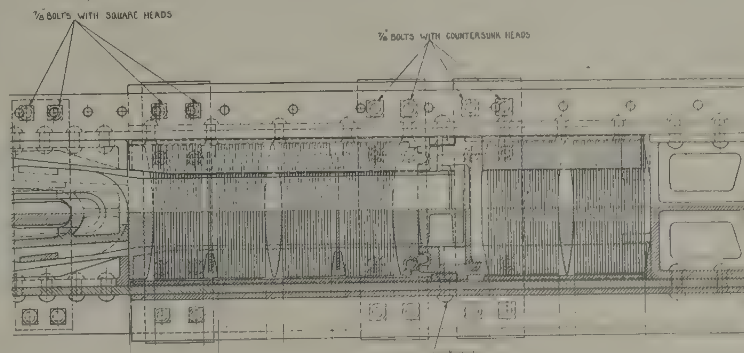


Fig. 2

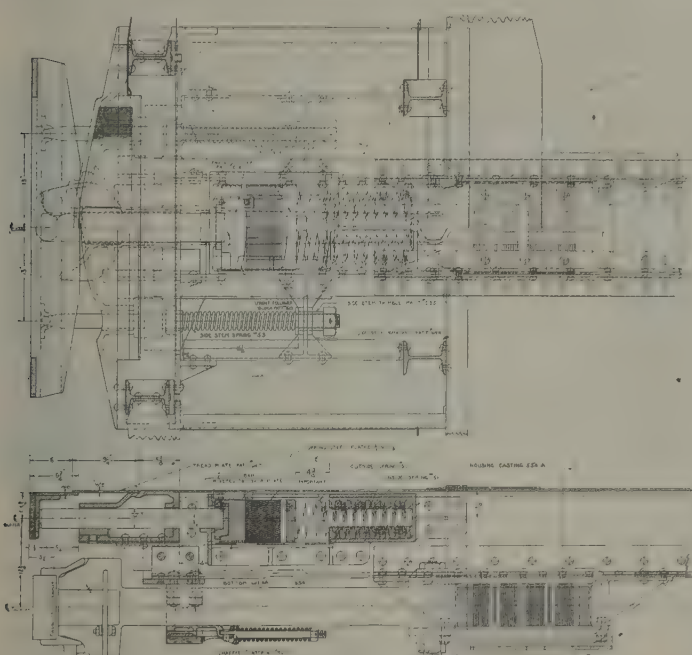


Fig. 3

Waugh-Forsyth High Capacity Buffer. Fig. 3 shows the combination of the Waugh-Forsyth high capacity buffer, Waugh draft gear, and Chaffee centering device for passenger cars. Each device can be used in combination with other manufacturers' devices.

Waugh Platform Buffer. Fig. 4 shows the Waugh type "H" buffer of the same capacity (300,000 lbs.) as the Waugh-Forsyth and applicable to M. C. B. standard measurements.

Chaffee Centering Device. Fig. 5 shows the Chaffee centering device, which admits of any desired lateral motion of coupler and is positive in its return of coupler to its center position. Selection from our various types will meet any desired requirements.

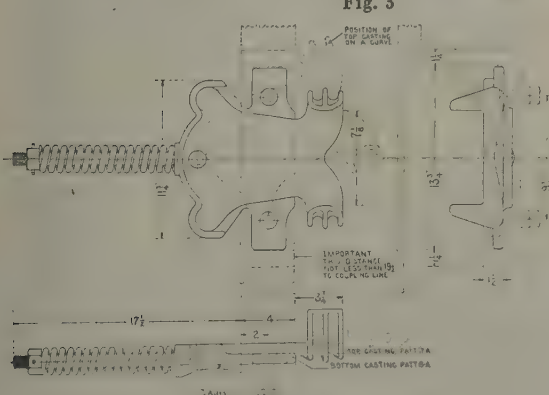


Fig. 5

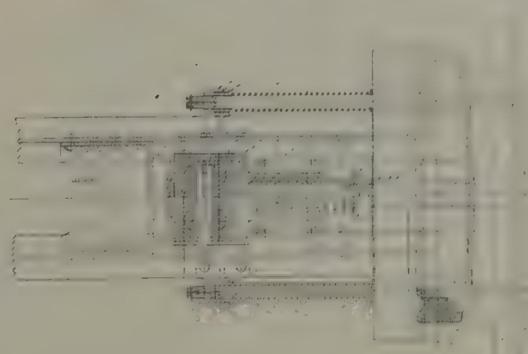


Fig. 4

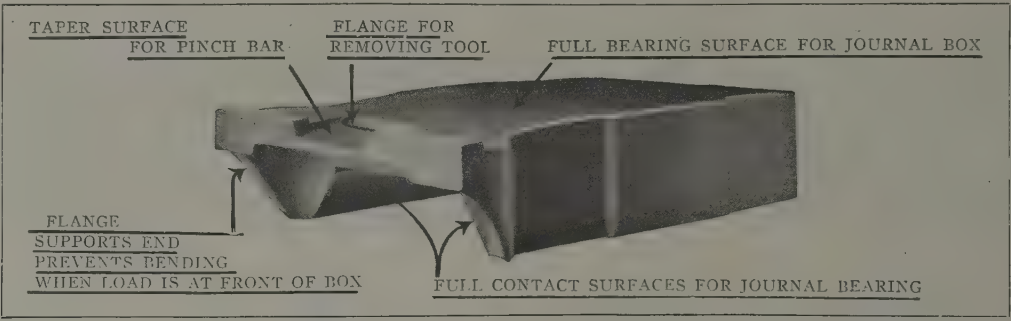
Car Specialties

Products

The products of the Western Railway Equipment Company, comprising M. C. B. Standard Type Journal Bearing Wedge, "Security" Dust Guard, "Acme" Pipe Clamp, "Western" Steel Carline, "Western" Break Jaws, "Western" Timber Pockets, Linstrom Locomotive Syphon, etc., are the result of long years of experience and earnest conscientious endeavor to meet the demand of the railways for dependable devices of known merit.

Journal Bearing Wedge

The M. C. B. Standard Type Journal Bearing Wedge (Patented), shown by illustration below, is made of the highest grade of malleable iron which is perfectly distributed so as to assure both lightness and strength combined to the utmost degree. The illustration below shows the principal points of its design, as well as the features which make it the most easily removable wedge on the market.



M. C. B. Standard Type Journal Bearing Wedge
(Patented)

"Security" Dust Guard

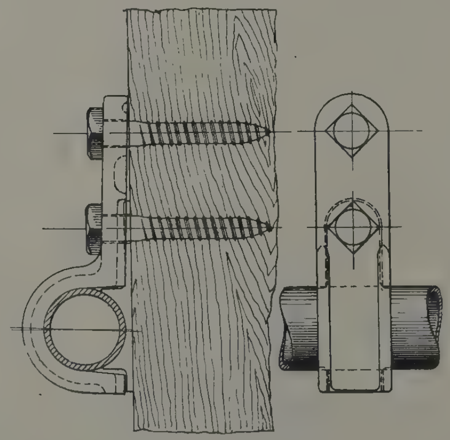
The "Security" (Patented) is the most efficient and economical dust guard on the market, and affords proper protection to journal boxes. It fits the axle perfectly and remains tight regardless of wear. A strong feature of the Security is that it is very flexible, and therefore the axle thrusts will not destroy its efficiency in protecting journal boxes.

Guard Closed

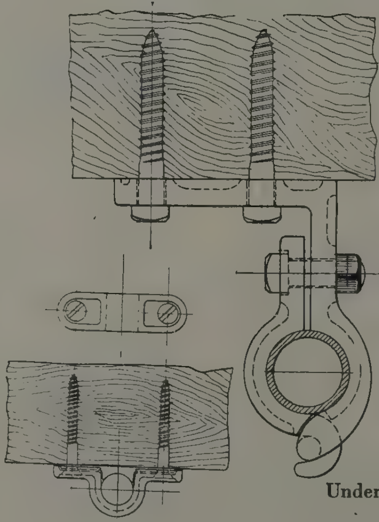
Guard Extended

The "Acme" Pipe Clamp

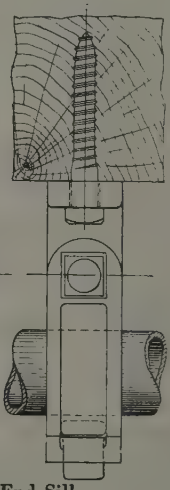
The "Acme" pipe clamp is an improved fastening for pipes on cars.



At Cross-over Bend



For Retainer Pipe



Under End Sill

Western Steel Carline

(Patented)

Description

The Western Steel Carline (Fig. 2) is the lightest and strongest carline made, and is made for any style of roof, size and location of purlines. Built of $1\frac{1}{2} \times 1\frac{1}{2}$ inch angles with malleable iron end castings. This carline gives a straight tie between side plates, prevents spreading, saves dead weight, and increases inside height of car. The smaller cut (Fig. 1) clearly shows the end arrangement of the Western Steel Carline which permits of applying carline for repairs without removal of the car roof.

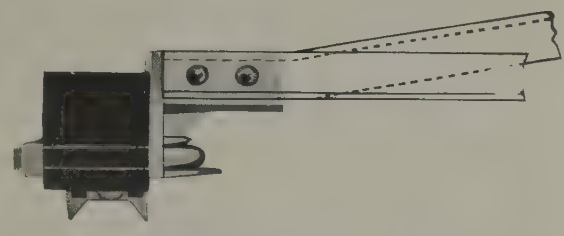


Fig. 1. This End Arrangement Permits of Applying Carline for Repairs Without Removing Roof

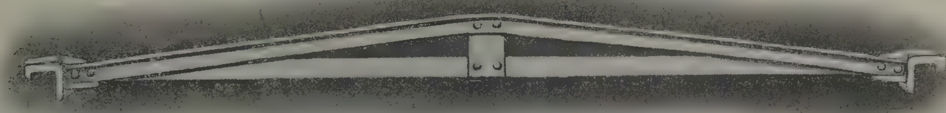


Fig. 2. Western Steel Carline

Western Brake Jaws

Western Brake Jaws, (Patented), are made for all sizes of both top rods and bottom connecting rods. These brake jaws are made with both one and two holes, the illustrations given below Figs. 3 and 4) shows two styles.

Fig. 3. Bottom Rod Jaw

Fig. 4. One Hole Jaw for Top Rods—Requires no Welding

"Western" Timber Pockets

Western Timber Pockets (Patented) (Figs. 5 and 6) are made of malleable iron and are designed to be used on sills, posts, end plates, brake blocks, and carlines, in fact, every part of a car that has heretofore been mortised and tenoned, and whether used in new work, in rebuilding, or in repairs Western Timber Pockets save material, time, money and labor, as they eliminate tenons, machine work, mortises and decayed tenons.

The key at the bottom of the casting permits a timber to be taken down and a new one put up in less than one-fourth the time required in ordinary cases.

Another advantage of the Western Timber Pocket is that after the end of a timber is squared off, there is a shoulder that will not permit the end of the timber being beaten and battered up. These timber pockets are made in all sizes, they protect the end sills and never wear out.

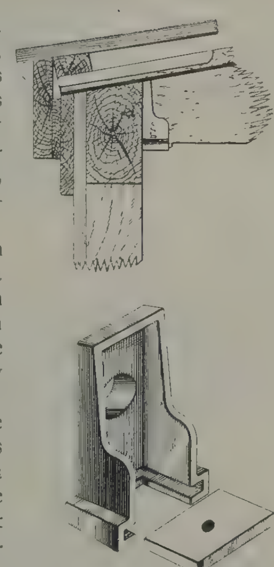


Fig. 5. Carline Pocket

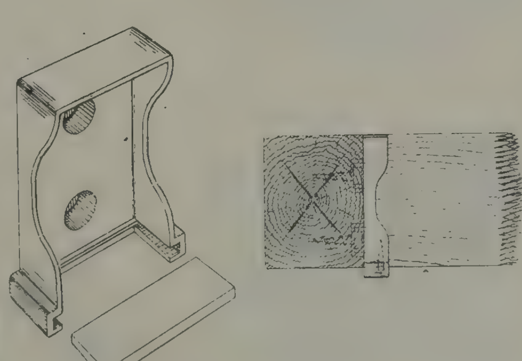


Fig. 6. Sill Pocket

The "Western" Type of Side Dump Cars

Standard Type Cars, Made in All Sizes

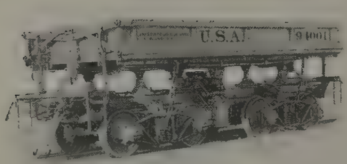
The word Western, when applied to dump cars and earth-moving machinery has come to mean *standard* during the more than forty years since the Western Wheeled Scraper Company was founded in 1877. They are made in every practical size to meet various requirements. The smaller sizes are narrow gage, and easily dumped by hand. The larger sizes are standard gage, equipped with air brakes and dumped by an air-dumping device and they are capable of high speed, with safety, on main line track.

Mechanical Design

The bed of the car is pivoted longitudinally in the center over the draft beams and will dump on either side. When dumping, the hinges, riveted to center sill under the bed, rock on pedestal castings which are riveted to the draft beams. The connection consists of a flat bar which drops loosely in the socket of the pedestal, in a perpendicular position, the upper end of the bar being held between the lugs of bed hinge by a pin.

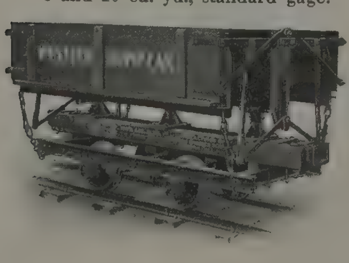
The weight of the car does not rest upon this pin, making impossible the bending of the pin and consequent dumping trouble.

Western Automatic Compression Lock Air Dump Car, 20 cu. yd. capacity, standard gage. Made also in 16 cu. yd. and 30 cu. yd. sizes.



Western 12 cu. yd. Air Dump Car, standard gage. Also made in 16 cu. yd., 20 cu. yd., and 30 cu. yd. sizes.

Western 4 cu. yd. Dump Car, 36" gage. Also made in 3 and 5 cu. yd., 36" gage —6 and 10 cu. yd., standard gage.



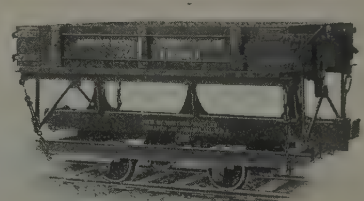
Western 1½ cu. yd. Dump Car, 24" gage. Also made in 1 cu. yd. size.

Arms operating doors act automatically, thrusting the door outward and upward from the load as bed is tilted, so that no part of load is thrown against the door. This permits load to be discharged instantly, the dumping angle being so acute and discharge opening so large, that anything which can be loaded into the car will clear the side board in dumping.

Distinctive Features

Freedom from derailment is one of the distinctive Western features. Others are the hinge device between bed and underframe; pivoted arms and toggle operating doors; air-dumping device and the compression lock which controls the bed in automatic types. These features give economic operation, steep dumping angle, large discharge opening and automatically operated side doors. Western cars have 32 per cent more dumping power, without additional compressed air, than other makes. No hand shovelling is necessary as the load dumps clear.

Western 8 cu. yd. Dump Car, 36" gage. Made for Hand or Air Dumping.



Western 2 cu. yd. Dump Car, 30" gage.

Western ½ cu. yd. Dump Car, 18" gage.

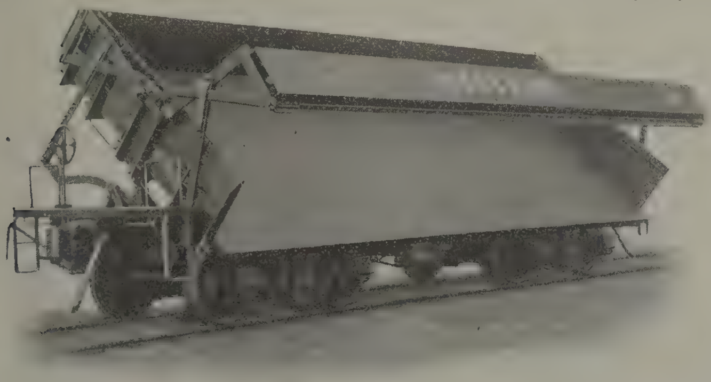
The "Western" Type of Side Dump Cars

Scope of Operation

The use of Western Dump Cars is constantly broadening in scope. Originated especially to handle earth and rock in steam shovel excavation, their recognized economy and efficiency in transporting all classes of material has brought about their installation in a great variety of industrial and mining plants scattered throughout the world, as well as by fifty-five important railroads who are using them in a variety of ways. They are peculiarly adapted to trestle filling, double track construction and betterment work of all kinds. The Maintenance of Way departments have found that they can make great savings in money and labor, as well as clear the traffic more easily by using Western dump cars in ditching. The practice is to operate a steam ditching machine between two air dump cars. The 1918 Roadmasters' convention specifically recommended this practice.

Western air dump cars are used extensively in stripping for open-pit mining on the iron ranges and in the coal and copper fields throughout the world; also in handling ore between the mine and concentrating plant, and in the storage of coal.

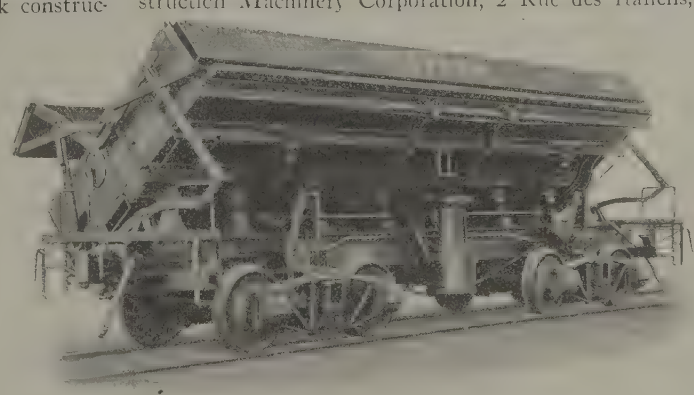
Western dump cars have assisted in building most of the railroads which have been completed during the past quarter century and more than 900 cars were in service in Panama Canal construction.



Western Automatic Compression Lock 20 cu. yd. Air Dump Car—Forward Dumping Position. Also made in 30 cu. yd. size, with two air cylinders.

Products and Sales Organization

The Western Wheeled Scraper Company, in addition to dump cars, manufactures a full line of earth-moving machinery. The general offices and factory are at Aurora, Ill., U. S. A. Branch offices are scattered throughout the world as follows: Atlanta, Ga., 602 Rhodes Bldg.; Chicago, Ill., 14 So. Canal St.; Dallas, Texas, 410 So. Lamar St.; Denver, Colo., 1841 Wazee St.; Kansas City, Mo., 1737 Walnut St.; Memphis, Tenn., 105 So. Front St.; New York, 50 Church St.; Omaha, Neb., 914 Farnum St.; Pittsburgh, Pa., 324 Fourth Ave.; Salt Lake City, Utah, 920 Kearns Bldg.; San Francisco, Cal., 741 Monadnock Bldg.; Seattle, Wash., 1511 Smith Bldg.; St. Louis, Mo., 1442 No. Broadway; St. Paul, Minn., 1309 Pioneer Bldg.; Washington, D. C., 708 Colorado Bldg.; South American Branch, Venezuela 691, Buenos Aires, Argentina; Canadian Equipment Co., Guarantee Trust Bldg., Montreal Que. Can.; Geo. F. West & Co., 13 Victoria St., Westminster, London, S. W., Eng.; E. D. Morrison & Co., Ltd., 257-A George St., Sydney, N. S. W.; Allied Construction Machinery Corporation, Fontanello 21 pral., Barcelona, Spain; Allied Construction Machinery Corporation, 2 Rue des Italiens, Paris, France; Allied Construction Machinery Corporation, 72 Calle de Cuba, Havana, Cuba. Cable address, "Western Aurora, Illinois." Codes used. Al, and ABC, 4th and 5th Editions, Western Union.

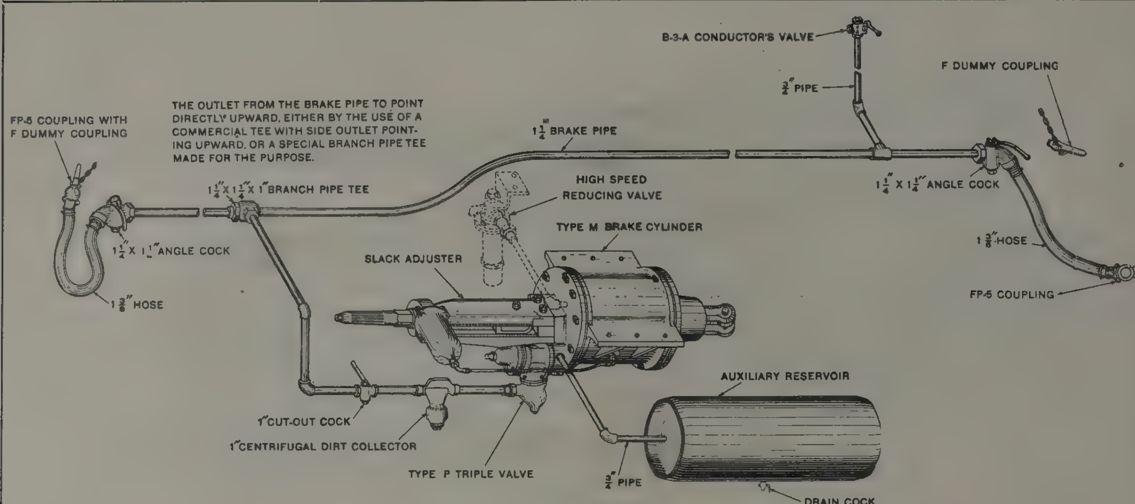


Western Automatic Compression Lock 20 cu. yd. Air Dump Car—Rear Dumping Position. Also made in 30 cu. yd. size, with two air cylinders.

Passenger Car Brake Equipment

PM Passenger Car Brake Equipment

The PM Equipment (Quick-Action Automatic Brake) still generally used throughout the world, has been superseded by the LN Equipment, in turn superseded by the UC Equipment, especially adapted to meet the higher speeds, heavier cars, greater frequency and the necessity for quicker stops at these speeds.



Diagrammatic Piping PM Passenger Car Brake Equipment

LN Passenger Car Brake Equipment

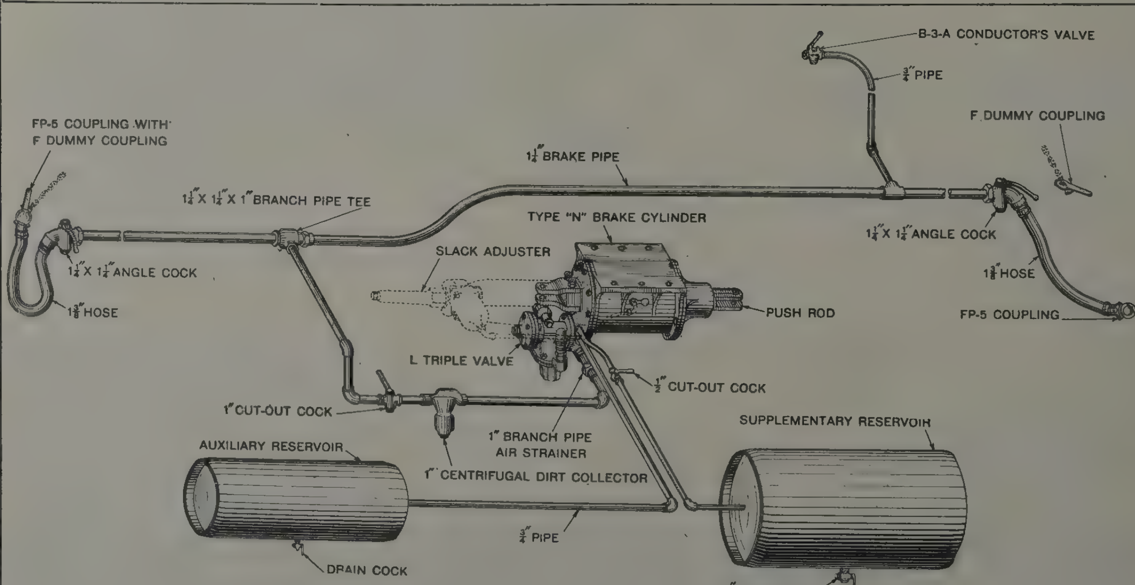
The development of the LN Passenger Car Brake Equipment marks a distinct departure from the lines followed in previous designs.

This equipment was developed to meet improvements in railway passenger service. Chief among the features added to those already existing in preceding designs of brake equipments are: Quick service, quick recharge, graduated release, high emergency cylinder pressure.

The features mentioned are incorporated in the triple valve (designated type L) and compensate for increased speeds, weights and lengths of trains and larger cylinders and reservoirs and result in more prompt, uniform and certain application of the brake. This equipment supersedes the PM equipment.

UC Passenger Car Brake Equipment

The Universal Brake Equipment is the result of and was made necessary by the rapid development of the many elements comprehended in railway passenger service, including weights of cars, length of trains, speeds, traffic, equipment and requirements, and offers the solution of the

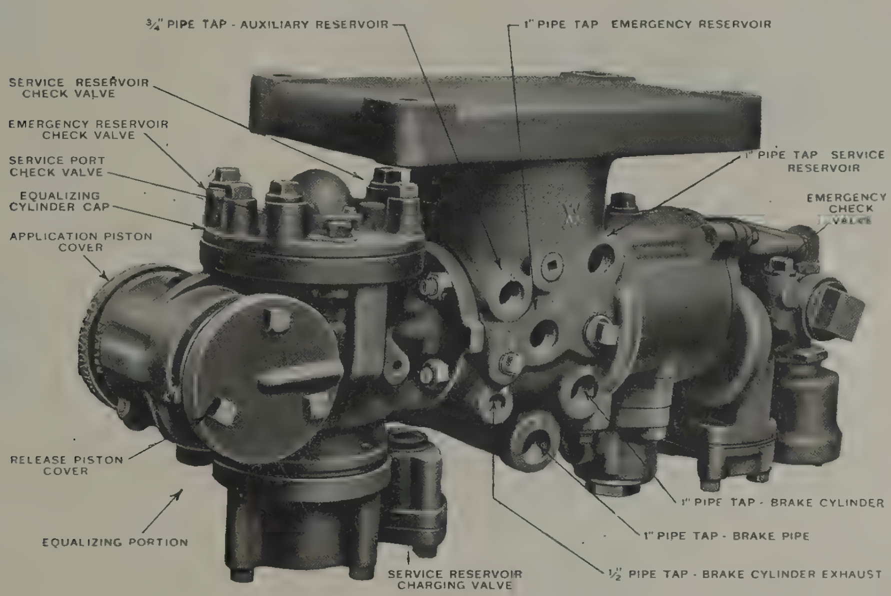


Diagrammatic Piping LN Passenger Car Brake Equipment

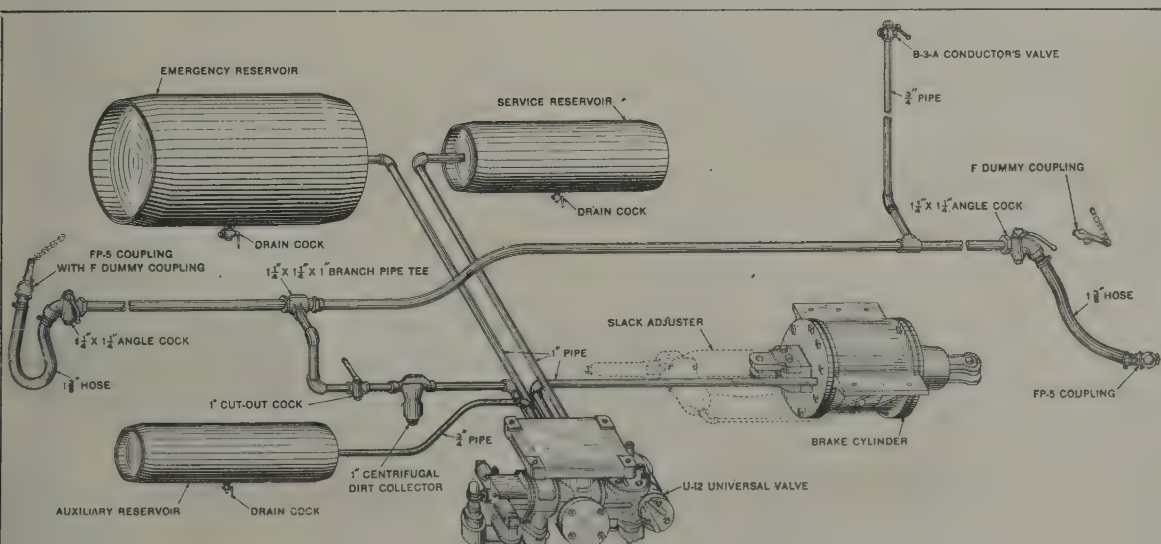
Passenger Car Brake Equipment *(Concluded)*

braking problems which have confronted railway operating officials during recent years.

It operates in harmony with all previous types of automatic brake equipments and only one size of Universal Valve is used for all weights of cars or sizes of brake cylinders. The unit system of construction permits any combination of parts necessary to produce the desired results, as the equalizing, quick action, high pressure and electric portions are separated so that with the use of proper combinations any feature can be incorporated or dispensed with according to the requirements of the service.



The designation "Universal" is derived from the fact that it is arranged to cover any requirements in any branch of service.

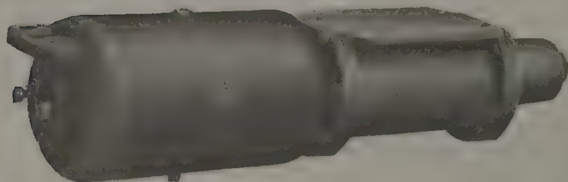


Diagrammatic Piping UC Passenger Car Brake Equipment

Freight Car Brake Equipment

Combined Freight Brake Cylinder and Reservoir

The accompanying illustration shows the combined type of brake cylinder and reservoir. It is provided with a seat for attaching the triple valve directly to the reservoir. This



type is the usual form furnished for freight brake equipment as it makes a very compact unit and is particularly desirable where the installation space is limited.

Type "K" Triple Valve

The type "K" triple valve is of the well known quick-action, quick-service, uniform release, uniform-recharge type and is furnished on all orders for freight brake equipments unless otherwise specified.

Reservoir Release Valve

The reservoir release valve shown in the illustration is the type regularly furnished as standard with

full sets of freight brake equipment for releasing auxiliary reservoir pressure when required.

Spring Type Pressure Retaining Valve

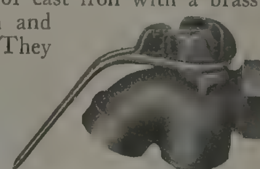
The spring type pressure retaining valve is an improved design, providing uniform blow-down for cylinder pressure, that is, in proportion to the size of the cylinder. In addition, the spring type retaining valve is provided with an opening tapped for gage connection whereby brake cylinder leakage may be readily tested without the necessity of disconnecting the retainer pipe at the triple valve.

Centrifugal Dirt Collector

The centrifugal dirt collector is so constructed that, due to the combined action of centrifugal force and gravity, all dirt and foreign matter is automatically eliminated from the air blowing through the collector as, when the brakes are applied or released, without reducing the area of the openings in any way. The design of the collector is such that the dirt and foreign matter eliminated fall into the bottom chamber and, by means of a plug, may be removed at intervals without breaking any pipe connections.

Angle Cocks

The angle cocks supplied with freight brake equipments and shown in the illustration are made of cast iron with a brass bush and key. They are of the type which has been in use in air brake service for many years. The locking feature eliminates all danger of the handle being accidentally moved from either the open or closed position.



Cut-out Cocks

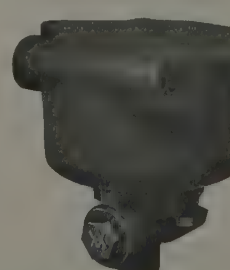
The cut-out cocks illustrated by the accompanying cut are made of cast iron with a brass bush and key. They are of the same rugged construction that has been used in connection with air brake installations for many years.

Hose and Couplings

Only the best grade of rubber hose is used for the flexible connections between cars. The couplings proper are of the type used in air brake work for many years and are the result of a

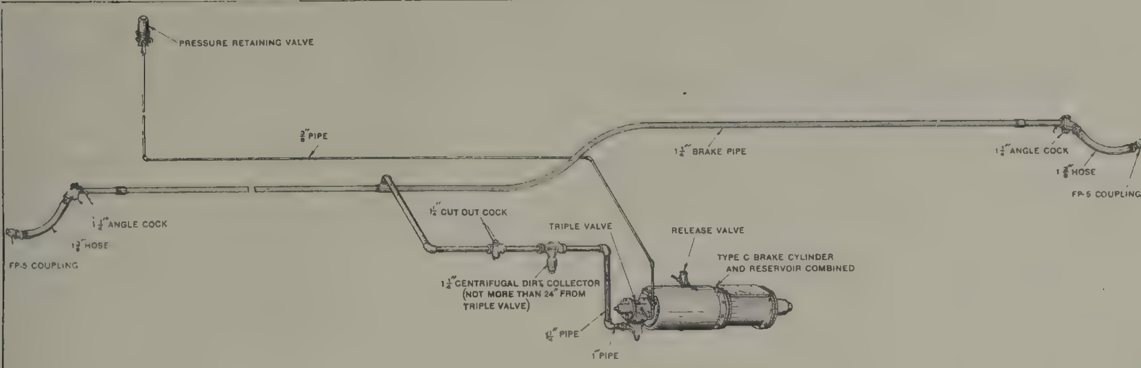
detailed study and careful observation of the conditions to be met in this phase of air brake requirements.

No. 4 Pneumatic Brake Pipe Vent Valve



The No. 4 pneumatic brake pipe vent valve is for the purpose of insuring the propagation of quick action, especially when the first car or cars in the train are cut out. It is also intended for use in cases where it is possible for the cars to be so coupled together that the usual form of quick action devices will be too far apart.

Freight Car Brake Equipment *(Concluded)*



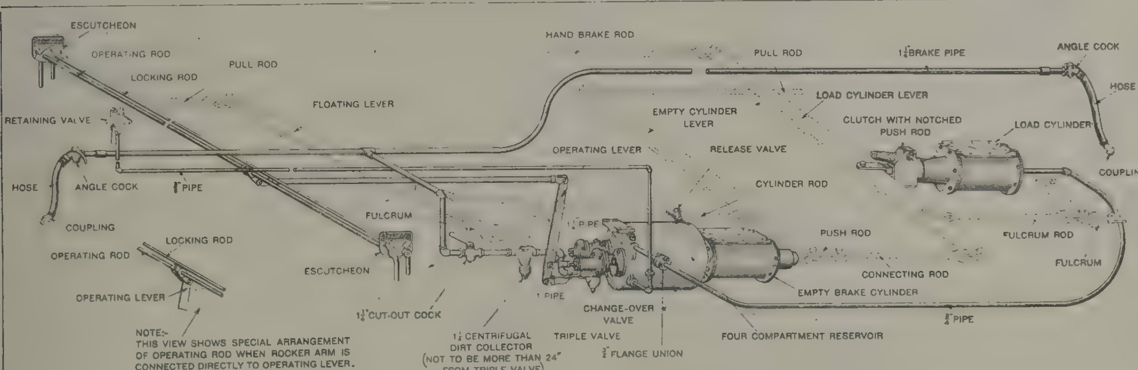
Diagrammatic Piping Combined Type Freight Car Brake Equipment

Empty and Load Freight Brake Equipment

The Empty and Load Brake Equipment was developed for the purpose of equalizing the braking power on cars, whether empty or loaded and, while needed for level as well as grade service, it is particularly desirable for severe grade conditions where the volume of traffic may be limited because of inability to control heavily loaded trains down grades at a satisfactory speed.

It is entirely interchangeable with the standard freight brake equipment and includes the well known type "K" Quick-Service, Uniform-Release, Uniform-Recharge Freight Triple Valve, and in addition to the normal functions performed by this valve, provides adequate braking power on the partially or fully loaded car and makes possible uniform braking power throughout the train, thus tending to minimize shocks, break-in-twos, etc., which are likely to result when empty and loaded cars are mixed in the same train.

The installation of the Empty and Load Brake Equipment increases the tractive capacity and earning power of the road as a whole, by enabling the handling of a greater number of loaded cars down grade, permitting the efficiency of the most powerful type of motive power to be utilized to the fullest extent, as the longest train and heaviest tonnage that can be hauled up one side of the mountain may be readily controlled down the other side.



Diagrammatic Piping Empty and Load Freight Brake Equipment

For more detail information, including sectional views of the devices comprising the air brake equipments described, see pages 690 to 718.

Westinghouse Friction Draft Gear

The Westinghouse Friction Draft Gear has been in constant service for many years. During this time it has been subjected to various severe and exhaustive tests, in which its capacity to absorb and dissipate severe shocks has been amply demonstrated. Its installation has resulted in reducing the annual cost of maintaining rolling stock due to damage to couplers, draft rigging and draft sills, as well as claims for damage to lading due to rough handling in transit.

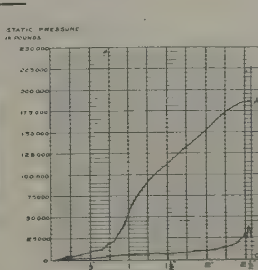


Fig. 3

Fig. 3 is a representative diagram showing a test of a gear selected arbitrarily from stock.

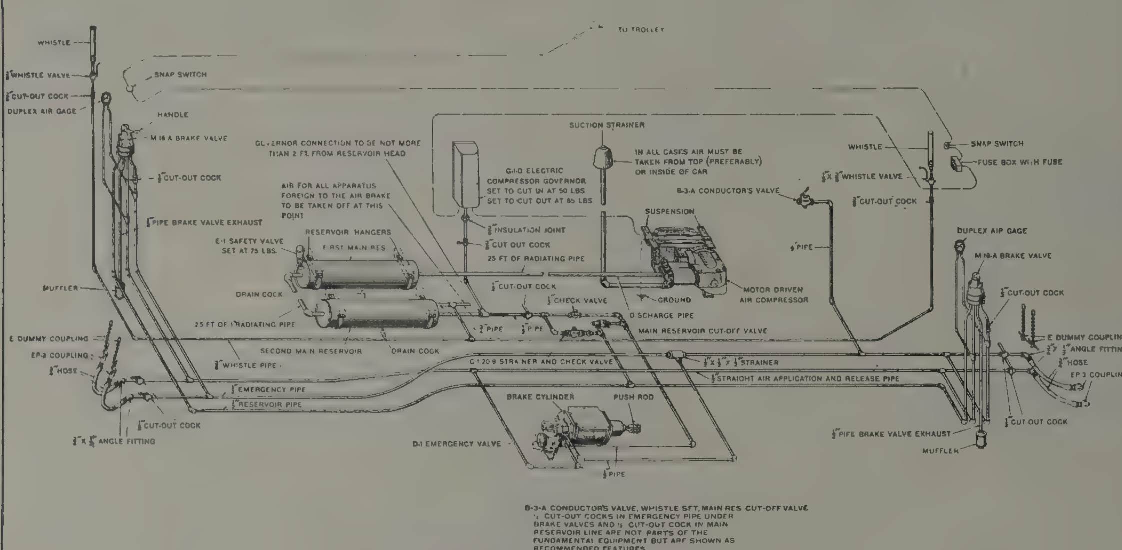
Traction Brake Equipment

Introduction

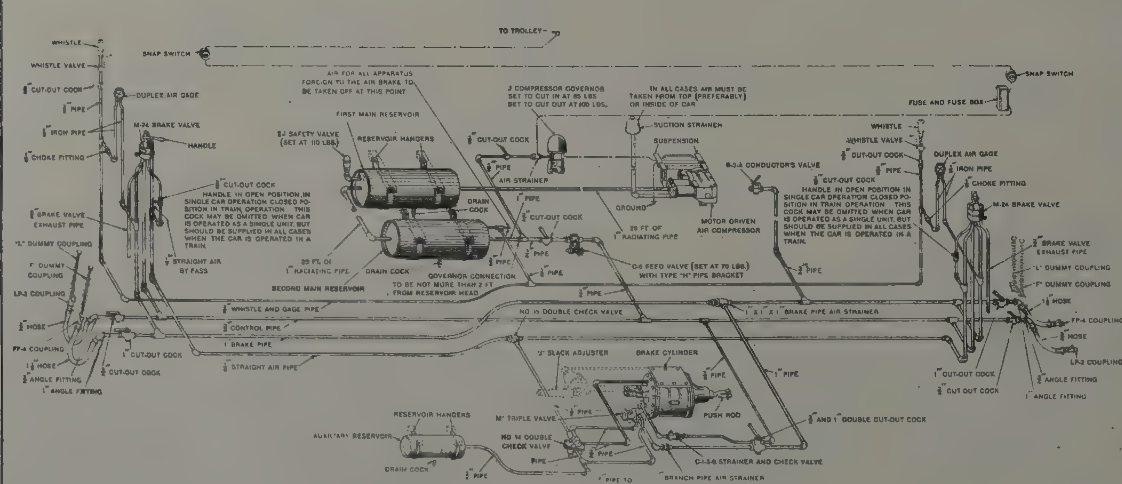
The Brake is the most important factor in the problem of transportation and from the standpoint of profit warrants careful consideration being given both the kind of brake and its proper installation. Adequate braking facilities permit the utilization of existing motors, rolling stock and track to their maximum capacities. An inadequate brake or the failure of any one of the elements comprising the complete system will correspondingly lower or destroy the effectiveness of the system as a whole.

Light City Service (Single Car or Motor and Trailer)

The SME Semi-Automatic Brake has been developed for this service. It retains the simplicity and flexibility of the Straight Air Brake and at the same time secures the protection and safety features of an automatic brake in case of



Diagrammatic Piping SME Brake Equipment

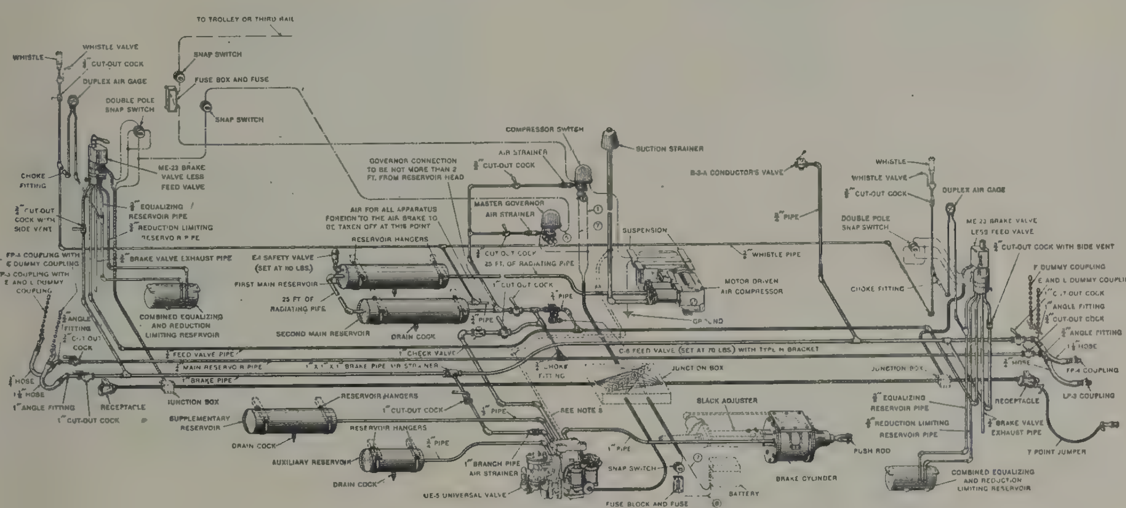


Diagrammatic Piping AMM Brake Equipment

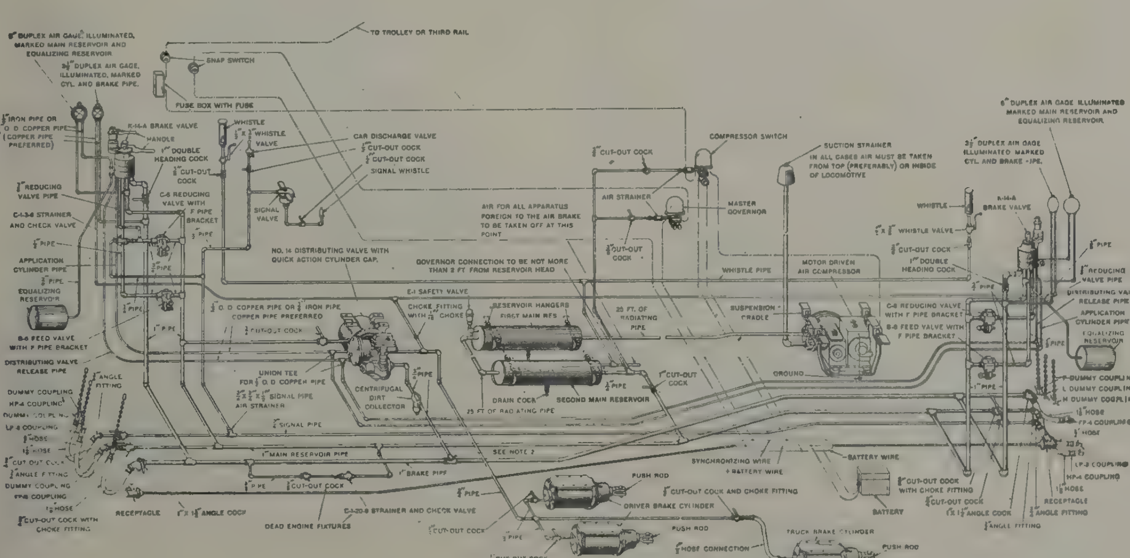
Traction Brake Equipment *(Continued)*

accident to the piping. The ordinary service application and release of the brake is the same as with straight air except that the air on its way from the Motorman's Brake Valve to the Brake Cylinder passes through a device called an *Emergency Valve.*

The Emergency Valve is inoperative during a service application of the brake. But when an emergency application is made or a pipe bursts or hose becomes uncoupled, the emergency valve moves so as to close the connection from the brake valve to the brake cylinder and short circuit the main reservoir air directly into the brake cylinder.



Diagrammatic Piping AMUE (Electro-Pneumatic) Brake Equipment



Diagrammatic Piping No. 14 EL Brake Equipment

Traction Brake Equipment *(Continued)*

Heavy City and Interurban Service (Single Car or Short Train)

The AMM Equipment was developed to meet the requirements of this service providing a flexible, convenient straight air service operation on a single car or on the head car of a train entirely independent of the automatic features which are held in reserve during straight air operation ready to function with full effectiveness in case of need.

An important safety feature of this equipment is the ability to recharge the brake system as promptly as the brakes are released. This means that the brakes are ready for immediate re-application to full effectiveness in case of sudden need. The same means which permit this prompt recharging also permit the brakes to be released in a series of stops or graduations, an operation of great assistance in making quick stops smoothly and accurately but not possible with the ordinary plain automatic brake.

Subway, Elevated and Suburban Service (Train—rarely Single Car)

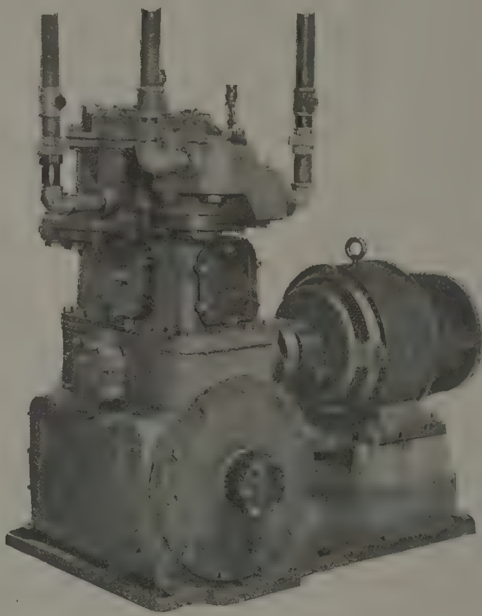
The AMUE (Electro-Pneumatic) Brake Equipment is designed for this service in which trains are long and run on short headway with frequent stops. For these reasons, the electric control has been found desirable. The Electro-Pneumatic Brake System adds to the pneumatically operated brake of highest type certain advantageous features otherwise impossible of attainment, namely—simultaneous and uniform response of all brakes in the train, double protection against delays to traffic since the pneumatic brake is always in reserve ready for use if required, maximum efficiency and safety due to simultaneous operation of all brakes in the train both in service and in emergency applications and a perfect flexibility of manipulation, economy in air consumption and maintenance of brake cylinder pressure at will.

Electric Locomotive Service (Single and Multiple Units)

The No. 14 EL Equipment in which is embodied the operative features and advantages of the No. 6 ET Equipment, is, in fact, an adaptation of the No. 6 ET Equipment to the conditions of electric service and may be applied to any Electric Locomotive whether used in high speed passenger, ordinary passenger, or freight, or any kind of switching service.

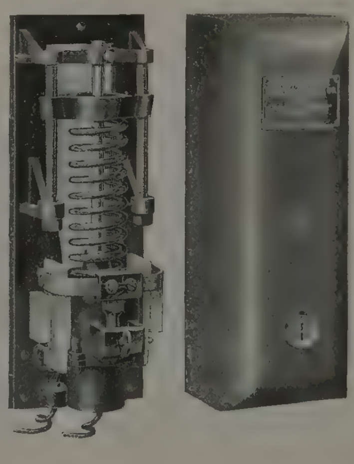
CA-150 Motor Driven Air Compressor

The type CA-150 Motor Driven Air Compressor is an adaptation of the cross compound steam driven compressor arranged for motor drive through a worm and gear. It is intended for heavy duty electric locomotive service. As the designation implies, this compressor has a piston displacement of 150 cu. ft. per minute.



Type G Electric Compressor Governor

The type G Electric Compressor Governor is of the combined pneumatic and magnetic design and is especially suitable for light traction service with small compressors, in service where straight air or semi-automatic air brakes are used. This governor has a



magnetic blow-out for extinguishing the arc when the circuit is broken. The range of this governor is non-adjustable.

Traction Brake Equipment *(Concluded)*

Type J Electric Compressor Governor

The type J Electric Compressor Governor is for use under severe service conditions with either straight air or automatic equipments. It has an adjustable range, making it suitable for a wide variation of pressures. It is of the pneu-

matic, double piston, slide valve type and is provided with a pneumatic blow-out for extinguishing the arc when the switch circuit is broken.

Type S Electric Compressor Governor

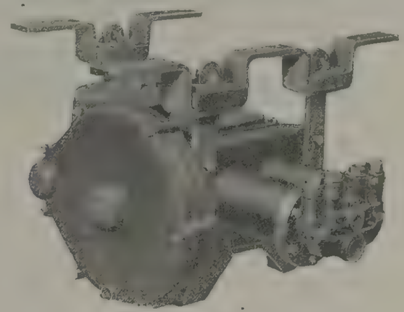
The type S Electric Compressor Governor is adapted to the same conditions of service as the type J. It is of the safety valve type.

Types DH and DF Motor Driven Compressors

The types DH and DF Motor Driven Compressors shown in the accompanying cuts represent in a high degree the result of our many years' experience in the design and construction of motor driven compressors for Electric Railway Service. They possess all of the important features experience has suggested and are especially suited to light-weight cars.

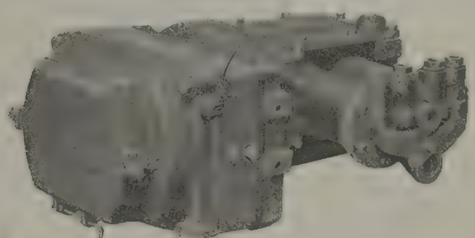
These compressors are of the horizontal, duplex air cylinder, gear-driven type, operated by a series wound direct-current motor, the whole being a compact dust-proof unit.

A unique feature of both compressors is in the casting of the cylinders and crank case, motor housing and bearing bracket in one piece, thus eliminating the necessity for a bed plate, or adjustment to obtain



Type DF Motor Driven Compressor

proper centers for gear and pinion, and providing a construction which is rigid and of few parts. An important feature also is the extreme accessibility of all parts for inspection and repairs. In the case of the armature this is especially facilitated, being accomplished without lowering the compressor from the car.



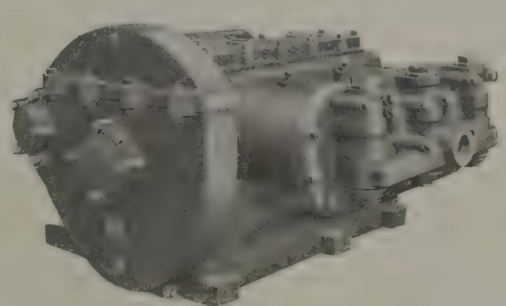
Type DH Motor Driven Compressor

The lubrication of the compressors is entirely automatic, requiring no attention other than to replenish the oil supply when required.

While both compressors are designed to meet the demand for a compressor for modern light weight cars, the DH compressor is especially adapted to the low built type of car.

Type C-60 Motor Driven Air Compressor

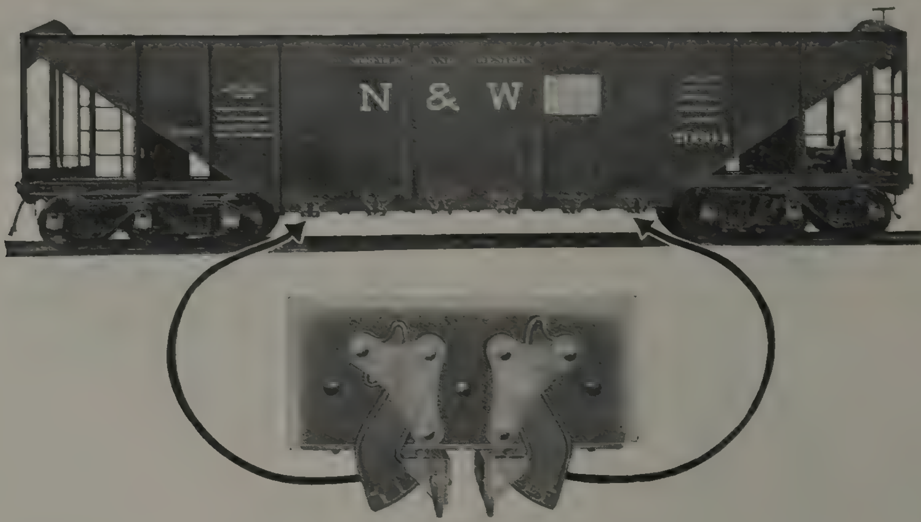
The type C-60 Motor Driven Air Compressor is a three cylinder, compound, gear driven compressor suitable for heavy electric locomotive service. It may be driven by either a Direct Current or Alternating Current Motor. As the



designation implies, this compressor has a piston displacement of 60 cu. ft. per minute.

For more detail information, including sectional views of the devices comprising the air brake equipments described, see pages 693 to 719.

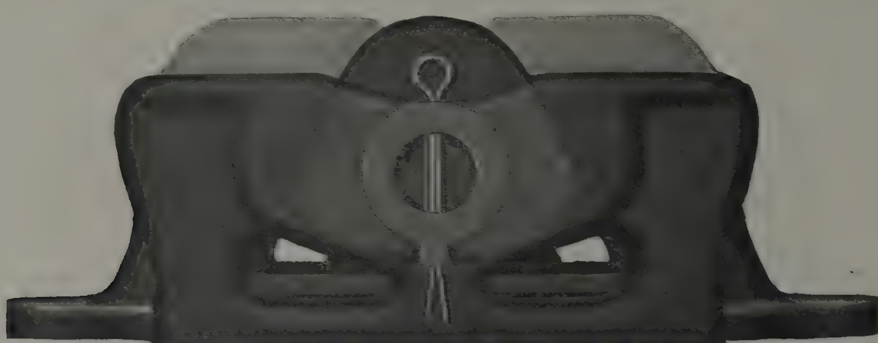
Hopper Door Device—Roller Side Bearings



Hopper Door Device

Products

This Company manufactures the Wine Car Ventilating Shutter for the ventilation of fruit cars—Wine Roller Side Bearings adaptable to all types of cars—Steel Ladders for use on all classes of car equipment as well as cars of special construction, and a modernized Hopper Door Device for use on Hopper cars, Gondola cars and all other classes of drop bottom cars.



The Wine Bearing Showing the Roller in its Central and Two Extreme Positions

Hopper Door Device

This door device will save from 200 to 2,000 pounds per car, depending upon design and number of doors. This device is easily and quickly repaired, all parts being on the outside and readily accessible. Absolutely positive in its operation. Will decrease weight of car without altering strength of vital parts. Will decrease first cost and maintenance. Will increase revenue tonnage.

Roller Side Bearing

The Wine Roller Side Bearing has many distinctive features which commend it to practical railroad men. Among these are: It is self-centering and requires less than 1/16 inch clearance to allow the roller to return to center. As the weight on the roller is transferred to the steel plate in the bottom, the working conditions are improved by constant usage, the roller and plate become polished and the two surfaces are made smooth. On account of the crushing force between the steel roller and the steel plate, any foreign substance, such as dirt or small stones, getting into the bearing will be reduced to a powder and sucked out through the holes in the housing. The top of the roller always travels in a straight line—the roller is the same height in every position. Of few parts—simple, rugged and dependable, the Wine Bearing is particularly adaptable to all classes of car equipment.

Ventilating Shutter

One of the features sought in design of the Wine Ventilating Shutter was to make it burglar proof. This has been thoroughly accomplished by constructing a strong metal frame into which is fitted a system of louvers for closing the openings.

These louvers or shutters are so arranged that they perform two distinct functions, that of closing the openings and directing more air into the car which increases ventilation. All parts are standard and interchangeable. The material used in these ventilators is the very best grade of malleable iron. All parts are

Car Ventilating Shutter—Steel Ladders

straightened in dies before assembling, and then riveted together in a machine especially designed for the work.

The ventilator can be used in sides of cars instead of ventilated side doors. When open, the ventilator permits unrestricted flow of air to interior and in greater volume than ordinary ventilators. They are

Applicable to Cars with Steel Ends

also practically indestructible. If car should be burned, the ventilators can again be used in car when rebuilt. The Company manufactures Ventilators in two types—one for ventilating purposes only and the other provided with an opening for loading lumber and other long material.

Both types are standard and interchangeable. The lumber opening is sufficiently large to accommodate any material which it is necessary to load through the end of a car. The size of the clear opening is 8x22 inches.

Wine Steel Ladder

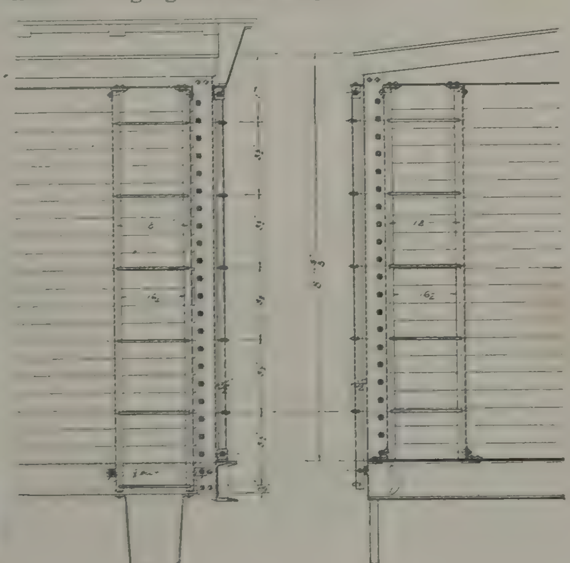
The Wine Railway Appliance Company have made a specialty of producing steel ladders for all classes of Railway Equipment including Box cars, Stock

Wine Steel Ladder

cars, Hopper, Coal and Coke Rack cars, Gondola cars and cars of special design. All types of ladders conform absolutely to United States Safety Appliance standards in every detail. Simplicity and safety has been the aim of the Company and with this end in view, all parts have a high factor of safety in strength and rigidity.

The selection of material is made with care, only steel being used that has withstood severe tests. Only bolts and rivets are used of proved worth and dependability.

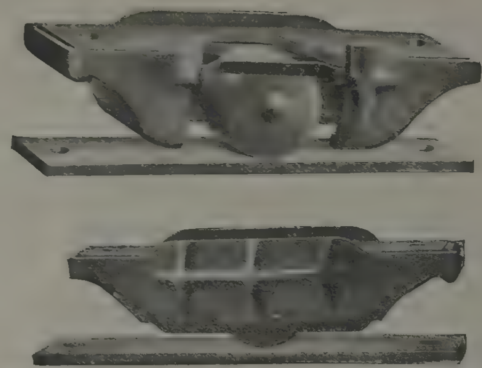
The employment of skilled workmen, the close adherence to prescribed forms with frequent and rigid inspection of all parts during process of manufacture ensures a high grade finished product.



Side Bearings and Center Plates

Anti-Friction Side Bearing

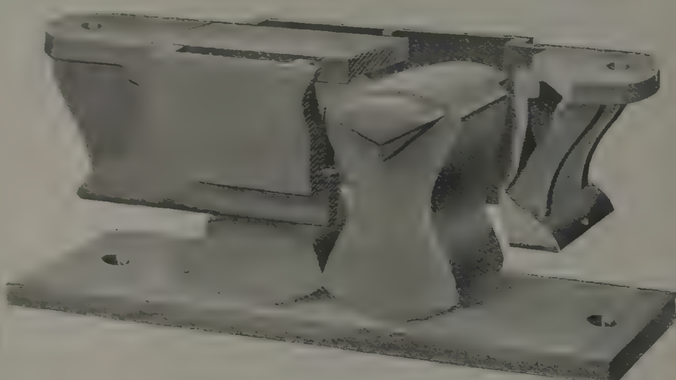
The aim of the E. S. Woods & Co.'s Anti-Friction Side Bearing is to reduce flange wear, derailments, train resistance and other consequent undesirable conditions. The importance with which railroads regard the use of anti-friction bearings is evidenced by the fact that there is hardly a road of consequence which is *not* using some form of E. S. Woods & Co.'s Anti-Friction Bearings.



Passenger Car Side Bearing Showing Roller and Springs

"Tip Roller" Side Bearing

This is the only bearing that will stand the service under the heaviest class of equipment without crushing. The design resulted from a careful study of the elements involved in meeting general as well as difficult service conditions. Rollers are made from cast steel or hard iron, and work between oil tempered spring steel plates. By combining a number of intervening rollers, the required carrying capacity together with sufficient travel for ordinary working conditions are secured.



"Tip Roller" Side Bearing for Application to Body Bolster

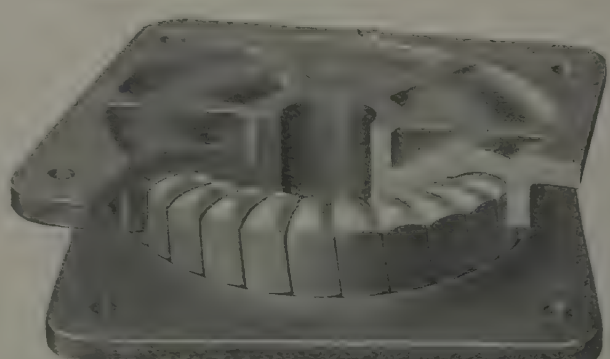
"XL" Roller Side Bearing

This bearing is designed for application to the truck bolster; gives continuous travel and has a lateral adjustment which allows the roller to adjust itself to any variation in the alignment of the body side bearing, thereby insuring contact of the full face of the roller with the body side bearing at all times.

"XL" Roller Side Bearing for Application to Truck Bolster

Ball Center Plates

The important basic principle involved in the design of these center bearings is the sustaining power, largely increased by the use of flat-sided balls. A plate having 40 flat-sided rollers has a carrying capacity of nearly three times that of the same sized plate, with rollers of full circular cross section. The flat-sided ball plate eliminates the tendency of end thrust on conical rollers. Full information sent on request.

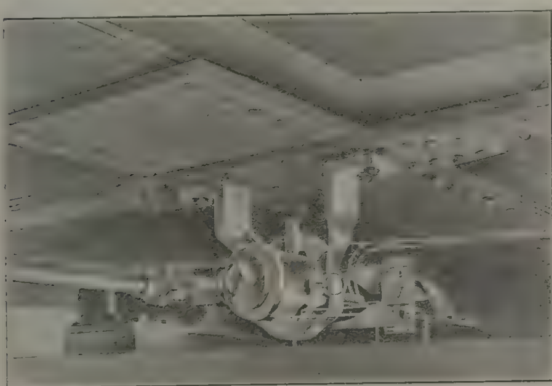


Ball Center Plate Which Eliminates Thrust on Conical Rollers

Truck Safety Attachment

Purpose

For the purpose of making an automatic and instantaneous application of the air brakes on cars and locomotives, whenever the trucks are derailed, broken or deranged in any way. The "Wright Little Watchman" has been placed in successful operation on a number of railroads.



Applied to Car

Development

To bring this device to its present perfection, experiments have been made covering a period of more than ten years. Thirty-two different models were made and thoroughly tested. The present form of the "Wright Little Watchman" represents a close approach to perfection.

Description

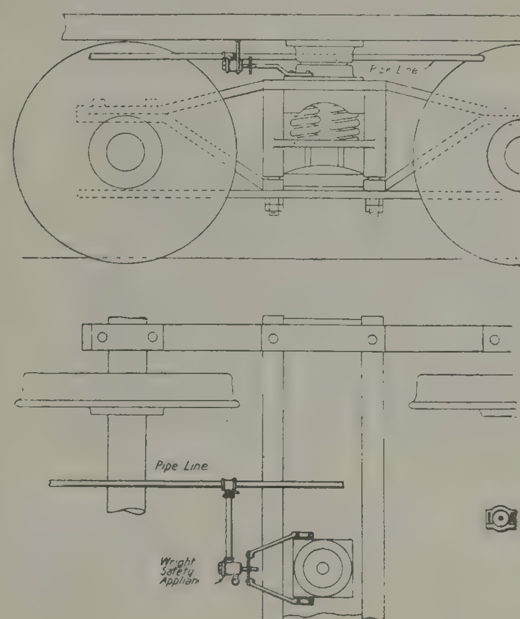
The "Wright Little Watchman" consists of a valve, which is rigidly attached to the underframe of the car, and connected to the brake pipe. When any of the following abnormal conditions or defects occur, the brakes are automatically and instantly applied.

Broken or spreading rails. Derailed wheels. Broken axle, bolster or arch bar. Wringing off journal. Complete breakdown of springs. Car body disengaging from center bearing. Running over any considerable obstruction. Splitting a switch.

Operation

The complete unit is mounted underneath the car in a horizontal position, and in line with the center lines of the car and truck. Air pressure is supplied from the train air line by a short pipe connection which may be provided with a cut-out if desired. An adjustable collar is attached by brackets, securely bolted, to the truck bolster. In this collar is an opening through which the valve actuating rod plays loosely. The size of the opening has been determined with absolute certainty by actual, exhaustive service tests, and due allowance is made for oscillations which are experienced in normal operation. All irregularities, such as rough track and low joints, have been considered in making the allowances.

When any abnormal condition or defect affecting the safety of the train is experienced, such as those which have been previously mentioned, the adjustable collar is brought into contact with the operating rod which opens the valve and allows the air to escape to the atmosphere, thereby applying the brakes.



Applied to Freight Car

Unnecessary Action Eliminated

At times excessive rocking or other abnormal movements are set up under high rate of speed over sharp curves and rough track, which make it necessary to reduce the speed of a train. The "Wright Little Watchman" does this automatically. While not causing an emergency application of the brakes, it causes a light service application without latching the valve open, and ceases the application when conditions become normal. Equally effective over good or bad roadbed. Acts only when needed.

Advantages

Simplicity of design and construction, low operating, and first costs, make this device the cheapest and most reliable safety appliance which can be applied to cars and locomotives. It can be applied with equal results to freight and passenger equipment.

The more thoroughly you investigate the merits of the "Little Watchman" the more certain you will be to install it.

Write us for full information.

Wright Safety Air Brake Co., Banner Bldg., Greensboro, N. C.

Standard Railway and Industrial Equipment

Design

The Youngstown Steel Car Company's experience, gathered by years spent in studying the problems of the economic handling of materials is thoroughly competent to meet every condition. During this time we have been called upon to design and build cars, covering such a diversified range of usages that there is practically no branch of industrial car service which we have not entered.

Fig. "A"—Rocker Dump Car

Rocker Dump Cars; Capacity 18 to 54 cu. ft.

Fig. "A" shows a car most desirable for automatic unloading and for transportation of various loose materials, such as crushed stone, concrete, sand, excavated soil, coal, ashes, slack, scrap, farm products, etc. These materials can be readily dumped to either side from these cars. The cars are of all-steel construction and can also be used for light steam shovel work and light locomotive traction. Owing to the great dumping angle, the hopper is completely emptied when dumped. The cars are provided with roller bearings and chilled iron wheels and can be furnished in 18 cu. ft. capacity to 54 cu. ft. capacity.

Fig. "B"—Steel Scoop Shape Rotary Dump Car

Rotary Dump Cars; Capacity 9, 18 & 27 cu. ft.

Fig. "B" shows a car adapted to a wide variety of purposes. The car dumps in any direction and empties its contents completely without raking or scraping. The body is released for both rotating and dumping by the one operation of lifting a lever at the rear of the hopper. The body has the form of a scoop, an excellent construction for placing the load where it is desired, when the body is tipped. The cars are provided with square axles and chilled iron wheels, with rollers in the hub. The rollers facilitate easy running of the car.

Fig. "C"—Steel Sugar Cane Car

Sugar Cane Cars; Capacity 2 to 4 Tons

Fig. "C" shows a car of all-steel construction for from 2 to 4 tons capacity. This car is designed so that the cane can be loaded cross-wise between the ends. The end racks can be made to suit requirements. It is provided with spring roller bearings and spring bumper.

Fig. "D"—Steel Sugar Cane Car with Steel Racks

Sugar Cane Cars; Capacity 10 to 50 Tons

Fig. "D" shows a car of all-steel construction with a capacity of from 10 to 50 tons. The car is divided into sections so that part of the load may be handled separately by cranes. This car can be provided with MCB automatic couplers and hand or air brake, or with both.

Standard Railway and Industrial Equipment

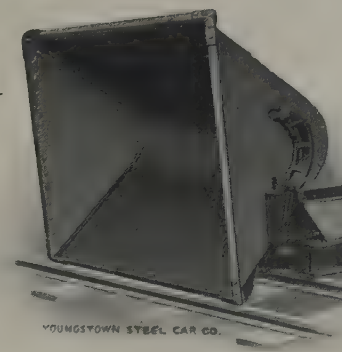


Fig. "E"—Rocker Dump Car

Rocker Dump Car; Capacity 3 to 5 cu. yd.

Fig. "E" shows a car designed for locomotive traction, is strongly braced and reinforced throughout and is usually furnished with spring draft rigging and cast steel draw head. These cars are used in large quantities by quarries, contractors and industrial plants and are specially useful in cases where the load is dumped into hoppers. Can be furnished in capacities of 3, 4 and 5 cu. yds.

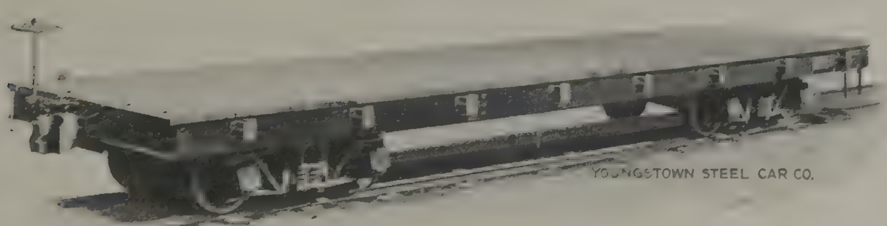


Fig "F"—Steel Flat Car with Wood Decking

Steel Flat Cars; Capacity 30 to 75 Tons

Fig. "F" shows an all-steel Flat Car for 30 to 75 tons capacity. Built in accordance with the Master Car Builders and Interstate Commerce Commission standard practice. Trucks of arch bar or cast steel side frames. We also manufacture flat cars of any capacity or gauge of track desired.

Location and Facilities

Situation of the plant is ideal, being in the very heart of the iron and steel belt, and in a commanding position at intersection of five large railway systems, all of whose tracks enter our yards. The facilities are modern in every respect for all steel car equipment. No matter how large or small the order, our Engineering Department is at all times ready to work out your individual problems which enter into Standard Railway and Industrial Equipment.

Export

Not only is designing and constructing given careful consideration, but packing for export is given important detail. A large part of The Youngstown Steel Car Company's products are for foreign trade and the necessity of packing to meet the rigorous requirements of export has experienced us to pack cars in the most convenient way.

Sales Offices

Sales Offices of The Youngstown Steel Car Company are located in New York, Richmond, Pittsburg, Chicago, Detroit and San Francisco.

DIRECTORY OF PRODUCTS

For the convenience of the users of this Dictionary and Cyclopedia, a complete classification of cars and specialties used in car building and maintenance appears on this and the following pages.

This directory includes the names of the manufacturers represented in the Catalog Section, their page numbers and also the figure numbers referring to their products in the Illustrated Section.

AIR BRAKE APPLIANCE.

(See Safety Device, Truck.)

AIR SIGNAL APPARATUS.

Westinghouse Air Brake Co.
Pages 1306 to 1309; also Figs. 1347, 1365, 1421, 1427.

ANGLE COCK HOLDER.

(See Holder, Angle Cock.)

ARRESTERS, LIGHTNING.

General Electric Co.
Pages 1176 to 1180; also Figs. 2631, 2632.

AXLES.

Brill Co., The J. G.
Page 1300.
Gregg Company, Ltd.
Pages 1186 to 1193.
Johnson & Co., J. R.
Page 1203; also Fig. 2675.
Magor Car Corp.
Pages 1214-1215.
Pollak Steel Co.
Pages 1240 to 1243.
Standard Steel Works Co.
Pages 1282-1283.
Wason Mfg. Co.
Page 1300.

BABBITT METAL.

Brill Co., The J. G.
Page 1300.
Gregg Company, Ltd.
Pages 1186 to 1193.
Wason Mfg. Co.
Page 1300.

BAGGAGE RACKS.

Adams & Westlake Co.
Page 1118; also Figs. 1852, 1854.
Brill Co., The J. G.
Page 1300.
Dayton Mfg. Co.
Page 1162; also Figs. 1847 to 1851; 1856, 1857.
Howard & Co., James L.
Page 1200; also Figs. 1853, 1855.
Wason Mfg. Co.
Page 1300.

BARS, ANGLES AND SHAPES.

Pollak Steel Co.
Pages 1240 to 1243.

BATTERIES, STORAGE.

Edison Storage Battery Co.
Pages 1168-1169; also Figs. 2517 to 2531.
Electric Storage Battery Co.
Page 1167; also Figs. 2538 to 2548.
Gould Coupler Co.
Pages 1182-1183; (See Gould Storage Battery Co., figure number 2516.)
Gould Storage Battery Co.
Page 1183; also Fig. 2516.
U. S. Light & Heat Corp.
Pages 1294-1295.

BATTERY CHARGING EQUIPMENTS.

Crouse-Hinds Co.
Pages 1155 to 1159.
General Electric Co.,
Pages 1176 to 1180.

BEARINGS, JOURNAL.

Brill Co., The J. G.
Page 1300.
Gregg Company, Ltd.
Pages 1186 to 1193
Haskell & Barker Car Co., Inc.
Pages 1195 to 1197.

BEARINGS, JOURNAL—(Continued).

Magor Car Corp.
Pages 1214-1215.
Wason Mfg. Co.
Page 1300.

BEARINGS, SIDE AND CENTER.

American Steel Foundries.
Pages 1126 to 1129; also Figs. 1132 to 1137.
Brill Co., The J. G.
Page 1300.
Canadian Car & Foundry Co., Ltd.
Pages 1142 to 1145.
Chicago Railway Equipment Co.
Pages 1148-1149; also Figs. 1090; 1098 to 1111; 1115; 1118 to 1120.
Gregg Company, Ltd.
Pages 1186 to 1193.
Joliet Railway Supply Co.
Pages 1204-1205; also Figs. 1086, 1087; 1091 to 1097; 1122.
Magor Car Corp.
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Miner, W. H.
Pages 1224-1225; also Figs. 1116, 1117.
National Malleable Castings Co.
Page 1229.
National Railway Appliance Co.
Page 1230.
Standard Car Truck Co.
Pages 1275 to 1277; also Figs. 1088, 1131.
Stucki Co., A.
Page 1286; also Figs. 1085, 1089.
Union Draft Gear Co.
Pages 1290-1291; also Figs. 1112 to 1114.
Universal Draft Gear Attachment Co.
Figs. 1112 to 1114.
Wason Mfg. Co.
Page 1300.
Wine Railway Appliance Co.
Pages 1314-1315; also Figs. 1121, 1123.
Woods & Co., Edwin S.
Page 1316; also Figs. 1124 to 1130.

BEDS, SUSPENDED AND WALL (CAR).

Dunbar Mfg. Co.
Pages 1164-1165.

BELL AND SIGNAL CORD.

Brill Co., The J. G.
Page 1300.
Dayton Mfg. Co.
Page 1162.
Wason Mfg. Co.
Page 1300.

BELL CORD COUPLINGS.

Dayton Mfg. Co.
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BENDERS, RAIL.

Gregg Company, Ltd.
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Reading Specialties Co.
Page 1252.

BENDING MACHINERY.

Niles-Bement-Pond Co.
Page 1231.

BERTH FITTINGS.

(See Hardware, Car.)

BLOWERS, ELECTRIC.

General Electric Co.
Pages 1176 to 1180.

BOLSTERS, CAR BODY AND TRUCK.

American Car & Foundry Co.
Pages 1122 to 1124; also Figs. 520, 1142.
American Car & Foundry Export Co.
Page 1124.
American Steel Foundries.
Pages 1126 to 1129; also Figs. 512 to 514; 521 to 525; 1148 to 1153.

BOLSTERS, CAR BODY AND TRUCK—(Continued).

Bettendorf Company.
Page 1131; also Figs. 516, 1141.
Brill Co., The J. G.
Page 1300.
Buckeye Steel Castings Co.
Pages 1137 to 1139; also Figs. 1145 to 1147.
Canadian Car & Foundry Co., Ltd.
Pages 1142 to 1145.
Chicago Railway Equipment Co.
Pages 1148-1149; also Figs. 510, 515, 519, 1155, 1156.
Commonwealth Steel Co.
Pages 1152 to 1154; also Figs. 511, 517, 518, 527, 528, 531, 1158.
Gould Coupler Co.
Pages 1182-1183; also Figs. 526, 1157.
Gregg Company, Ltd.
Pages 1186 to 1193.
Haskell & Barker Car Co., Inc.
Pages 1195 to 1197.
Joliet Railway Supply Co.
Pages 1204-1205; also Figs. 1159 to 1163.
Magor Car Corp.
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National Railway Appliance Co.
Page 1230; also Fig. 1154.
Pressed Steel Car Co.
Page 1245; also Fig. 1140.
Scullin Steel Co.
Pages 1260 to 1263; also Figs. 1143, 1144.
Wason Mfg. Co.
Page 1300.
Western Steel Car & Foundry Co.
Page 1245.

BOLTS.

(See Nuts and Bolts.)

BOX CAR END REINFORCEMENTS.

(See End Reinforcements, Freight Car.)

BRACES, RAIL.

Gregg Company, Ltd.
Pages 1186 to 1193.

BRAKES, AIR.

General Electric Co.
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Gregg Company, Ltd.
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Westinghouse Air Brake Co.
Pages 1306 to 1309; also Figs. 1365 to 1400.
Westinghouse Traction Brake Co.
Pages 1310 to 1313; (see Westinghouse Air Brake Co. figure numbers.)

BRAKES, CLASP.

American Brake Co.
Pages 1120-1121.
American Steel Foundries.
Pages 1126 to 1129; also Fig. 1360.
Buckeye Steel Castings Co.
Pages 1137 to 1139; also Fig. 1364.
Chicago Railway Equipment Co.
Pages 1148-1149; also Figs. 1351, 1357.

BRAKES, ELECTRO-PNEUMATIC.

Westinghouse Air Brake Co.
Pages 1306 to 1309.
Westinghouse Traction Brake Co.
Pages 1310 to 1313.

BRAKE BEAMS.

American Steel Foundries.
Pages 1126 to 1129; also Figs. 1235 to 1243.
Brill Co., The J. G.
Page 1300.
Buffalo Brake Beam Co.
Page 1140; also Figs. 1227 to 1234.
Canadian Car & Foundry Co., Ltd.
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Chicago Railway Equipment Co.
Pages 1148-1149; also Figs. 1263 to 1287.

BRAKE BEAMS—(Continued).

Damascus Brake Beam Co.
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Gregg Company, Ltd.
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Haskell & Barker Car Co., Inc.
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Joliet Railway Supply Co.
Pages 1204-1205; also Figs. 1288 to 1299.
Magor Car Corp.
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Pressed Steel Car Co.
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Wason Mfg. Co.
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Western Steel Car & Foundry Co.
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BRAKE BEAM SUPPORTS AND SAFETY DEVICE.

American Steel Foundries.
Pages 1126 to 1129; also Figs. 1361, 1362.
Chicago Railway Equipment Co.
Pages 1148-1149; also Figs. 1352, 1354. 1356.
Joliet Railway Supply Co.
Pages 1204-1205; also Fig. 1363.

BRAKE EQUIPMENT, AIR AND HAND.

American Brake Co.
Pages 1120-1121; also Figs. 1529, 1530.
American Steel Foundries.
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Bettendorf Company.
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Howard & Co., James L.
Page 1200; also Fig. 626.
Magor Car Corp.
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Miner, W. H.
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National Railway Appliance Co.
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Standard Car Truck Co.
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Westinghouse Air Brake Co.
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Westinghouse Traction Brake Co.
Pages 1310 to 1313; (See also Westinghouse Air Brake Co., figure numbers.)

BRAKE GEAR AND DETAILS.

American Brake Co.
Pages 1120-1121.
American Steel Foundries.
Pages 1126 to 1129; also Figs. 1360 to 1362.
Buckeye Steel Castings Co.
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Buffalo Brake Beam Co.
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Joliet Railway Supply Co.
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National Railway Appliance Co.
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Schaefer Equipment Co.
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BRAKE GEAR AND DETAILS—(Continued).

Steel Car Forge Co.
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BRAKE HANDLES, WHEELS AND STAFFS.

Adams & Westlake Co.
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Standard Car Truck Co.
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Wason Mfg. Co.
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BRAKE HEADS.

American Steel Foundries.
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Buffalo Brake Beam Co.
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Chicago Railway Equipment Co.
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Gregg Company, Ltd.
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Joliet Railway Supply Co.
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BRAKE JAWS.

Brill Co., The J. G.
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Chicago Railway Equipment Co.
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National Railway Appliance Co.
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Western Railway Equipment Co.
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BRAKE MECHANISM, HAND.

Bettendorf Company.
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National Malleable Castings Co.
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Railway Devices Co.
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Standard Car Truck Co.
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BRAKE SHOES.

American Brake Shoe & Foundry Co.
Page 1119; also Figs. 1309, 1310.
Brill Co., The J. G.
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BRAKE SHOE KEYS.

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BRAKE SHOE KEYS—(Continued).

National Malleable Castings Co.
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BRAKE SLACK ADJUSTERS.

(See Slack Adjusters.)

BRASSES, JOURNAL BOX.

Gregg Company, Ltd.
Pages 1186 to 1193.
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BRONZE, JOURNAL BOX.

Gregg Company, Ltd.
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BRUSHES, COMMUTATOR.

General Electric Co.
Pages 1176 to 1180.

BRUSH HOLDERS.

General Electric Co.
Pages 1176 to 1180.

BUCKETS, POWER.

McMyler Interstate Co.
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BUCKETS, WATER.

Gray & Sons, Inc., Peter
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BUFFERS AND PLATFORMS.

Commonwealth Steel Co.
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CABINETS, METAL.

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CABLES, ELECTRIC.

General Electric Co.
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Kerite Insulated Wire & Cable Co.
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CANE CARRIER (CONVEYOR, CONDUCTOR) FEEDERS.

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CANS, WATER.

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CARS, BALLAST.

(See Cars, Freight.)

CARS, CABOOSE OR CABIN.

(See Cars, Freight.)

CARS, CANE.

(See Cars, Plantation.)

CARS, COAL.

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CARS, CONTRACTORS.

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CARS, CONVERTIBLE.

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CARS, DERRICK.

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CARS, DUMP.

American Car & Foundry Co.
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American Car & Foundry Export Co.
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Brill Co., The J. G.
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Clark Car Co.
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Enterprise Railway Equipment Co.
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